Nature of Mathematics that Impacts Difficulties in learning it: A Comparison of Student Perspectives on Learning School Subjects from Kerala

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Abstract

Though factors contributing to difficulty in learning school subjects including Mathematics were extensively studied, nature and characteristics of mathematics, possibly, one among the foremost causes for difficulty in learning it has not received required attention. To bring attention to the difficulties arising out of the nature of mathematics teaching-learning, this study identifies and compares the level of difficulty of major school subjects perceived by students. The study categorizes the characteristics of subjects that contribute to student perception of difficulty. Then it compares Mathematics with other school subjects on these perceived reasons. Questionnaire survey on a sample comprising of 300, 8^{th} standard students randomly selected from schools of Kerala is employed. Findings indicate that as to mathematics, most of these identified factors are highly causative to difficulty compared to other subjects. The study implies reducing the difficulties in learning Mathematics through remedial measures that consider special nature of that subject.

Keywords: Difficulties in learning, Nature of Mathematics, Problem-solving, Reasons for difficulty

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Introduction

Learning is at once an interesting and hard task. It is especially hard when learners are forced to learn much of the time every day and that too different subjects in a sequence which they have no role in deciding. Hence school students generally feel difficulty in learning various subjects. However, all subjects are not uniformly hard to learn. Subjects like mathematics, foreign languages and the like are said to be harder than mother tongue and social science. The extent of difficulty students feel though may vary among other things by their strengths and weaknesses in learning, attitudes, teaching-learning methods and epistemological believes of students (Papanastasiou, 2000). The other factors that makes subjects to be perceived difficult to learn include learner factors, process factors, curriculum factors, home related factors (Christenson, Rounds& Gorney,1992), school related factors (Schneider,2002) and the like (Mji& Makgato,2006).

Need and significance of the study

One of the major categories of reason for students feeling difficulty to learn various subjects are related to the nature and characteristics of the content and method of respective subject (Gafoor& Sarabi, 2015). For example mathematics is generally described as abstract while many of the natural sciences are described as more concrete. Subjects like Mathematics and physics are taught with more focus on enabling students to solve problems whereas languages and the social sciences are dealt with more focus on daily life activities of learning. However the combination of factors that makes the subject difficult makes some subjects harder and others easier to learn. This study is on the premise that Mathematics has more number of characteristics related to the content and methods of learning that makes it harder for students to learn than the other school subjects. Hence this study is to examine the student perception of difficulty of various school subjects and the reasons related to subject characteristics attributed by students for their felt difficulty in each of the major school subjects.

Objectives

1. To identify and compare the level of difficulty of major school subjects as perceived by students.
2. To compare Perceived Reasons for difficulty in learning Mathematics with other subjects
3. Categorize the factors related to nature of subjects that contribute to the feeling of difficulty as perceived by the students.

Method

Descriptive Survey procedure with statistical analyses including Mean, Paired t-test and Pearson's r is employed.

Tool

Questionnaire on students' Difficulties in Learning containing 14 items was administered. One item was to rate the school subjects namely Malayalam, Physics, Chemistry, Biology, Social Science and Malayalam in the order of feeling of difficulty. Remaining items comprise reasons related to nature of different school subjects that makes the subject difficult to learn. The reasons included are Uselessness in daily life, Rote learning, Prevalence of symbols and notations, Need to learn unfamiliar terms, Understanding questions, Need for external support, Toughness of concepts, Number of concepts, Repeated Practice, Prominence of Problem solving, Need for strenuous attention, Need for unfaltering Regularity in attending classes and Need for Precision in understanding. Participants have to rate their feeling of difficulty of school subjects for each of these reasons.

Participants

Participants were 300, 8th standard students randomly selected from government and aided schools of Kerala with equal weightage to gender of the student from urban and rural area.

Analysis

Mathematics is comparatively highly difficult subject as perceived by the students. Numbers of factors were identified as the reason for difficulty in learning each subject. As to mathematics, most of these identified factors are highly causative to difficulty compared to other subjects. Results are discussed under three major headings namely Difficulty level of school subjects as perceived by students, Comparison of Perceived Reasons for difficulty in learning Mathematics with other subjects and Categorization of reasons for difficulty in various school subjects.

A. Difficulty Level of School Subjects as Perceived by Students

The mean scores of perceived difficulty of school subjects among 8th Standard students appears to be in the order Mathematics, Physics and Chemistry, Biology, Social science and Malayalam. The perceived difficulty of other subjects are put alongside and compared with that of Mathematics in Table I.

Table I

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	1.91	0.58	.12*	5.75**
		Chemistry	1.91	0.65	-.07	4.85**
2.16	.68	Biology	1.66	0.64	-.20**	8.92**
		Social Science	1.52	0.65	0	12.87**
		Malayalam	1.36	0.61	.01	16.68**

Note. N= 300

* p < .05. **p<.01.

Mathematics is perceived as more difficult in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01). Student perception of Difficulty in Mathematics has significant positive but negligible correlation with perception of difficulty in Physics and significant negative low correlation with perception of difficulty in Biology. However perception of difficulty in Mathematics is not correlated with perception of difficulty in Chemistry, Social science and Malayalam.

B. **Comparison of Perceived Reasons for difficulty in learning Mathematics with other subjects**

The mean scores of perception of difficulty in school subjects based on 13 identified reasons were studied. Mean scores of perceived difficulty in Mathematics on these reasons were correlated and compared against those of other subjects using Pearson's r and paired t-test.

1. Uselessness in daily life

The mean scores of difficulty of school subjects owing to Perceived Uselessness in Daily Life among 8th Standard students appears to be in the order Physics, Mathematics, Chemistry, Social science, Biology and Malayalam. The perceived difficulty due to uselessness in life in other subjects are put alongside and compared with that of Mathematics in Table II.

Table II

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Uselessness in Daily Life against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	1.84	0.58	.49**	0.39
		Chemistry	1.75	0 .67	.52**	1.68
1.82	0.69	Social Science	1.58	0 .59	.38**	5.18**
		Biology	1.55	0.65	.37**	5.74**
		Malayalam	1.37	0.52	.17**	9.11**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as the material learned are not applicable in daily life than a) Social Science (p <.01), b) Biology (p<.01), and c) Malayalam (p<.01). But perception of difficulty in Mathematics on account of this is not significantly different from those of a) Physics (p>.05) and b) Chemistry (p>.05).

Student perception of uselessness of school mathematics in daily life has positive substantial correlation with such perception in chemistry (p <.01) and positive low correlation with such perception in Physics, Social science and Biology (p <.01). However such perception of Mathematics has only negligible relationship with likewise perception of Malayalam.

As the material learned being inapplicable in daily life, students feel Mathematics as more difficult than Malayalam, Biology and Social science but at par with Physics and Chemistry.

2. **Rote learning**

The mean scores of difficulty of school subjects due to rote learning among 8th Standard students appears to be in the order Mathematics, Chemistry, Physics, Biology, Social science and Malayalam. The perceived difficulty due to rote learning in other subjects are put alongside and compared with that of Mathematics in Table III.

Table III

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to need for rote learning against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Chemistry	2.06	0.64	.18**	0.19
		Physics	2.04	0.59	.21**	0.52
2.07	0.65	Biology	1.89	0.68	-.01	2.96*****
		Social Science	1.79	0.62	.19**	5.04******
		Malayalam	1.46	0.57	.07	10.95******

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it requires rote learning of concepts in comparison to a) Biology (p<.01), b) Social Science (p<.01) and c) Malayalam (p <.01). But perception of difficulty in Mathematics on account of this is not significantly different from those of a) Physics (p>.05) and b) Chemistry (p>.05).

Student perception of constraint from rote learning in Mathematics has significant positive and low correlation with such perception in Physics (p<.01). Student perception of constraint from rote learning in Mathematics has significant and positive but negligible correlations with such perception in chemistry and Social science (p<.01). However such perception of Mathematics is unrelated with likewise perception of Biology and Malayalam (p>.05)

As it demands rote learning, students feel Mathematics as more difficult than Malayalam, Biology and Social science but on this reason it is at par with Physics and Chemistry.

3. Prevalence of symbols and notations

The mean scores of difficulty of school subjects owing to Prevalence of symbols and notations among 8th Standard students appears to be in the order Mathematics, Chemistry, Physics, Biology, Social science and Malayalam. The perceived difficulty due to prevalence of symbols and notations in other subjects are put alongside and compared with that of Mathematics in Table IV.

Table IV

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Prevalence of symbols and notations against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Chemistry	2.02	0.64	.35**	1.41
		Physics	1.93	0.6	.41**	3.65**
2.09	0.65	Biology	1.44	0.67	.17**	13.01**
		Social Science	1.39	0.7	.19**	14.09**
		Malayalam	1.21	0.58	.09	17.95**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it has Prevalence of symbols and notations in comparison to a), Physics (p<.01), b) Biology (p<.01), c) Social Science (p<.01) and d) Malayalam (p <.01). But perception of difficulty in Mathematics on account of this is not significantly different from that of Chemistry (p>.05).

Student perception of constraint from Prevalence of symbols and notations has significant positive but negligible correlations (p<.01) with such perception in chemistry, Physics and Social science (p<.01). However such perception of Mathematics is unrelated with likewise perception of Biology and Malayalam (p>.05)

As there is prevalence of symbols and notations in Mathematics, students feel it as more difficult than Malayalam, Physics, Biology and Social science but at par with Chemistry.

4. **Need to learn unfamiliar terms**

The mean scores of difficulty of school subjects owing need to learn unfamiliar terms among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty by need to learn unfamiliar words in other subjects are put alongside and compared with that of Mathematics in Table V.

Table V

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to need to learn unfamiliar terms against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.07	0.62	.41**	1.25
		Chemistry	2.02	0.66	.36**	2.32*
2.13	0.77	Biology	1.83	0.7	.23**	5.58**
		Social Science	1.65	0.73	.27**	9.50**
		Malayalam	1.52	0.63	.26**	11.77**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it requires to learn enormous unfamiliar terms in comparison to a) Malayalam (p <.01), b) Chemistry (p<.01), c) Biology (p<.01), and d) Social Science (p<.01). But perception of difficulty in Mathematics on account of this is not significantly different from that of Physics (p>.05).

Student perception of difficulty due to unfamiliar terms in Mathematics has significant positive substantial correlations with such perception in Physics (p<.01). Student perception of constraint from learning unfamiliar terms in Mathematics has significant and positive low correlations with such perceptions in chemistry, Biology, Social science and Malayalam (p<.01).

As it necessitates learning of number of unfamiliar terms, students feel Mathematics as more difficult than Chemistry, Biology, Social science and Malayalam but at par with Physics.

5. Understanding questions

The mean scores of difficulty of school subjects due to constraint in understanding questions among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty in understanding questions in other subjects are put alongside and compared with that of Mathematics in Table VI.

Table VI

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Difficulty in understanding questions against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	1.92	0.59	.31**	7.57**
		Chemistry	1.87	0.71	.29**	8.17**
2.27	0.64	Biology	1.67	0.64	.22**	12.03**
		Social Science	1.63	0.63	.24**	12.70**
		Malayalam	1.36	0.49	.15**	18.47**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult due to difficulty in understanding questions in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of constraints of understanding questions in Mathematics has significant positive and low correlation with such perception of Physics, Chemistry, Biology and Social science (p<.01). However such perception of Mathematics has significant positive but negligible correlation with likewise perception of Malayalam (p<.01).

As there is difficulty in understanding questions, students feel Mathematics as more difficult than all other subjects.

6. **Need for external support**

The mean scores of difficulty of school subjects due to the need for external support in learning among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Malayalam and Social science. The perceived difficulty due to the need for external support in learning in other subjects are put alongside and compared with that of Mathematics in Table VII.

Table VII

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Need for external support against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.1	0.67	.25**	4.41**
		Chemistry	2.06	0.64	.22**	5.02**
2.29	0.73	Biology	1.83	0.61	.13*	9.07**
		Malayalam	1.46	0.49	.09	17.59**
		Social Science	1.46	0.49	.09	17.59**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult in terms of rate of external support needed to study concepts than a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of constraint from need for external support in Mathematics has significant positive and low correlation with such perception in Physics and Chemistry (p<.01). Student perception of constraint from need for external support in Mathematics has significant and positive but negligible correlations with such perception in Biology (p<.05). However such perception of Mathematics is unrelated with likewise perception of Malayalam and Social science (p>.05)

As it needs external support to learn, students feel Mathematics as more difficult than Malayalam, Physics, Chemistry, Biology and Social science.

7. Toughness of concepts

The mean scores of difficulty of school subjects owing to toughness of concepts among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty due to toughness of concepts in other subjects are put alongside and compared with that of Mathematics in Table VIII.

Table VIII

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Toughness of concepts against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.11	0.45	.19**	4.41**
		Chemistry	2.08	0.47	.12*	4.73**
2.32	0.39	Biology	1.87	0.5	.05	8.36**
		Social Science	1.66	0.48	.07	12.41**
		Malayalam	1.62	0.35	.02	13.01**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it contain more tough concepts to learn in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of constraint from Toughness of concepts in Mathematics has significant positive but negligible correlation with such perception in Physics (p<.01) and Chemistry (p<.05). Student perception of constraint from Toughness of concepts in Mathematics is unrelated with likewise perception of Biology, Social science and Malayalam (p>.05).

Students feel Mathematics as more difficult due to the toughness of concepts to be learned than all other school subjects.

8. **Number of concepts**

The mean scores of difficulty of school subjects due to number of concepts among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty due to number of concepts in other subjects are put alongside and compared with that of Mathematics in Table IX.

Table IX

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Number of concepts against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.11	0.66	.28**	4.75**
		Chemistry	2.11	0.68	.16**	4.25**
2.33	0.77	Biology	1.98	0.73	.13*	6.41**
		Social Science	1.84	0.68	.09	9.09**
		Malayalam	1.67	0.68	.03	11.83**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it loads with more number of concepts in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of difficulty due to number of concepts in Mathematics has significant positive low correlation (p<.01) with such perception in Physics. Student perception of constraint from number of concepts in Mathematics has significant but negligible correlations with such perceptions in chemistry (p<.01) and Biology (p<.05). However such perception of Mathematics is unrelated with likewise perception of Social science and Malayalam (p>.05)

Students feel Mathematics as more difficult due to high number of concepts than all other subjects like Malayalam, Physics, Chemistry, Biology and Social science.

9. Repeated Practice

The mean scores of difficulty of school subjects owing to repeated practice among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty due to need for repeated practice in other subjects are put alongside and compared with that of Mathematics in Table X.

Table X

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Need for Repeated Practice against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.16	0.68	.22**	3.82**
		Chemistry	2.11	0.69	.11	4.41**
2.34	0.73	Biology	1.88	0.74	.07	8.85**
		Social Science	1.81	0.72	.15**	10.59**
		Malayalam	1.55	0.63	.16**	16.42**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult as it needs repeated practice to learn in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of difficulty due to repeated practice in Mathematics has significant positive low correlation (p<.01) with such perception in Physics. Student perception of constraint from repeated practice in Mathematics has significant positive but negligible correlations with such perceptions of Social science and Malayalam (p<.01). However such perception of Mathematics is unrelated with likewise perception of Chemistry and Biology (p>.05)

As it requires practice to learn concepts, students feel Mathematics as more difficult than Malayalam, Physics, Chemistry, Biology and Social science.

10. Prominence of Problem solving

The mean scores of difficulty of school subjects owing to Prominence of problem solving among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science, and Malayalam. The perceived difficulty due to Prominence of problem solving in other subjects are put alongside and compared with that of Mathematics in Table XI.

Table XI

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Prominence of Problem Solving against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.19	0.17	.28**	4.30**
		Chemistry	1.84	0.71	.09	10.07**
2.37	0.76	Biology	1.53	0.7	.05	16.42**
		Social Science	1.49	0.67	.19**	18.94**
		Malayalam	1.24	0.55	.07	25.09**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult because of Prominence to Problem solving in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of difficulty due to Prominence to Problem solving in Mathematics has significant positive low correlation (p<.01) with such perception in Physics. Student perception of constraint from Prominence to Problem solving in Mathematics has significant positive but negligible correlations with such perceptions of Social science (p<.01). However such perception of Mathematics is unrelated with likewise perception of Chemistry, Biology and Malayalam (p>.05)

Due to the prominence to problem solving, students feel Mathematics as more difficult than Malayalam, Physics, Chemistry, Biology and Social science.

11. **Need for strenuous attention**

The mean scores of difficulty of school subjects owing to need for strenuous attention among 8th Standard students appears to be in the order Mathematics, Chemistry, Physics, Biology, Social science and Malayalam. The perceived difficulty due to need for strenuous attention in other subjects are put alongside and compared with that of Mathematics in Table XII.

Table XII

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Need for strenuous attention against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Chemistry	2.18	0.65	.33**	4.02**
		Physics	2.14	0.61	.41**	5.14**
2.37	0.69	Biology	2.01	0.65	.25**	6.86**
		Social Science	1.79	0.65	.32**	11.97**
		Malayalam	1.44	0.62	.28**	19.61**

Note. N= 300

* p < .05. **p<.01.

Mathematics is rated more difficult due to need for strenuous attention to learn concepts in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of difficulty due to Need for strenuous attention in Mathematics has significant positive substantial correlation (p<.01) with such perception in Physics. Student perception of constraint from Need for strenuous attention in Mathematics has significant positive low correlations with such perceptions of Chemistry, Biology, Social science and Malayalam (p<.01).

As it needs strenuous attention to understand concepts, students feel Mathematics as more difficult than Malayalam, Physics, Chemistry, Biology and Social science.

12. **Need for unfaltering Regularity in attending classes**

The mean scores of difficulty of school subjects owing to need for regularity in attending classes among 8th Standard students appears to be in the order Mathematics, Physics, Chemistry, Biology, Social science and Malayalam. The perceived difficulty due to need for regularity in attending classes in other subjects are put alongside and compared with that of Mathematics in Table XIII.

Table XIII

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Need for Regularity in Attending Classes against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.18	0.62	.22**	5.88**
		Chemistry	2.14	0.66	.21**	6.53**
2.44	0.70	Biology	1.88	0.7	.07	10.78**
		Social Science	1.74	0.6	.16**	13.89**
		Malayalam	1.41	0.67	.06	19.91**

Note. N= 300

* p < .05. **p<.01.

As perceived by students, Need for Regularity in attending classes makes Mathematics more difficult in comparison to a) Malayalam (p <.01), b) Physics (p<.01), c) Chemistry (p<.01), d) Biology (p<.01), and e) Social Science (p<.01).

Student perception of difficulty due to Need for Regularity in attending classes in Mathematics has significant positive low correlation with such perception of Physics and Chemistry (p<.01). Student perception of constraint from Need for Regularity in attending classes in Mathematics has significant positive but negligible correlations with such perceptions of Social science (p<.01). However such perception of Mathematics is unrelated with likewise perception of Biology and Malayalam (p>.05)

As discontinuity in teaching learning process makes it difficult to learn the material students feel Mathematics as more difficult than all other subjects namely Malayalam, Physics, Chemistry, Biology and Social science.

13. **Need for Precision in understanding**

The mean scores of difficulty of school subjects owing to Need for Precision in understanding concepts among 8th Standard students appears to be in the order Mathematics Physics, Chemistry, Biology , Social science and Malayalam. The perceived difficulty due to Need for Precision in understanding concepts in other subjects are put alongside and compared with that of Mathematics in Table XIV.

Table XIV

Results and Descriptive Statistics for Paired t -test of Perception of Difficulty of Mathematics Owing to Need for Precision in understanding against Other School Subjects

Mathematics		Comparison subject				
M	SD	Subject	M	SD	r	t
		Physics	2.18	0.62	.22**	5.88**
		Chemistry	2.14	0.66	.21**	6.53**
2.72	0.72	Biology	1.88	0.7	.07	10.78**
		Social Science	1.74	0.6	.16**	13.89**
		Malayalam	1.41	0.67	.06	19.91**

Note. N= 300

* p < .05. **p<.01.

As perceived by students, Need for Precision in understanding makes Mathematics more difficult than a) Malayalam ($p < .01$), b) Physics ($p < .01$), c) Chemistry ($p < .01$), d) Biology ($p < .01$), and e) Social Science ($p < .01$).

Student perception of difficulty due to Need for Precision in understanding of Mathematics has significant positive low correlation ($p < .01$) with such perception of Physics and Chemistry. Student perception of difficulty due to Need for Precision in understanding in Mathematics has significant positive but negligible correlations with such perceptions of Social science ($p < .01$). However such perception of Mathematics is unrelated with likewise perception of Biology and Malayalam ($p > .05$).

As it requires Precision in understanding concepts, students feel Mathematics as more difficult than Physics, Chemistry, Biology, Social science and Malayalam.

C. Three Tier Categorization of reasons for difficulty in school subjects

	Mean index of difficulty					
Reasons for difficulty	MAL	PHY	CHE	BIO	SS	MATHS
Need for unfaltering Regularity in attending classes	⇩ 1.41	⇧ 2.18	⇧ 2.14	⇨ 1.88	⇨ 1.74	⇧ 2.44
Prominence of Problem solving	⇩ 1.24	⇧ 2.19	⇨ 1.84	⇩ 1.53	⇩ 1.49	⇧ 2.37
Need for strenuous attention	⇩ 1.44	⇧ 2.14	⇧ 2.18	⇨ 2.01	⇨ 1.79	⇧ 2.37
Repeated Practice	⇩ 1.55	⇧ 2.16	⇧ 2.11	⇨ 1.88	⇨ 1.81	⇧ 2.34
Number of concepts	⇨ 1.67	⇧ 2.11	⇧ 2.11	⇨ 1.98	⇨ 1.84	⇧ 2.33
Toughness of concepts	⇩ 1.62	⇧ 2.11	⇧ 2.08	⇨ 1.87	⇨ 1.66	⇧ 2.32
Need for external support	⇩ 1.46	⇧ 2.10	⇧ 2.06	⇨ 1.83	⇨ 1.66	⇧ 2.29
Understanding questions	⇩ 1.36	⇨ 1.92	⇨ 1.87	⇨ 1.67	⇨ 1.63	⇧ 2.27
Need to learn unfamiliar terms	⇩ 1.52	⇧ 2.07	⇨ 2.02	⇨ 1.83	⇨ 1.65	⇧ 2.13
Prevalence of symbols and notations	⇩ 1.21	⇨ 1.93	⇨ 2.02	⇩ 1.44	⇩ 1.39	⇧ 2.09
Need for rote learning	⇩ 1.46	⇧ 2.04	⇧ 2.06	⇨ 1.89	⇨ 1.79	⇧ 2.07
Uselessness in daily life	⇩ 1.37	⇨ 1.84	⇨ 1.75	⇩ 1.55	⇩ 1.58	⇨ 1.82
Subject Difficulty	⇩ **1.36**	⇨ **1.91**	⇨ **1.91**	⇨ **1.66**	⇩ **1.52**	⇧ **2.19**

Note. ⇧, ⇨ and ⇩ respectively indicates High, Moderate and Low level of difficulty.

Figure 1. Three Tier Categorization of reasons for perceived difficulty in school subjects

For Malayalam, Biology and Social science none of the identified characteristics are felt to the extent to make the subject highly difficult. Other than number of concepts all other characteristics of Malayalam falls into low level difficulty in comparing to other subjects. Likewise in Biology and Social science three of the identified characteristics such as prominence problem solving, prevalence of symbols and notations, useless in daily life is making low level difficulty whereas the remaining characteristics makes the subject moderately difficult. For Mathematics, Physics and Chemistry none of the identified characteristics makes the subject feel easy to learn for students. All other characteristics of Physics other than difficulty in understanding questions and prevalence of symbols and notations make students feel the subject as highly difficult. Five characteristics namely prominence of problem solving, difficulty in understanding questions, need to learn unfamiliar terms, prevalence of symbols and notations uselessness in daily life are make chemistry moderately difficult to learn while the remaining seven factors make it hard to learn.

Conclusion and Implications

Mathematics is perceived difficult than all other subjects by standard 8 students in Kerala. The reasons attributed by students for this are connected in one way or other to the nature of mathematics. The most prominent among the reasons for difficulty of mathematics is discontinuity in teaching learning process. However this is one of the reason attributed by students for feeling difficulty in subjects like Physics, chemistry and social science and to some extend biology as well.

Second most recognisable reasons for felt difficulty in Mathematics are Prominence of Problem solving and Need for strenuous attention. Problem solving causes difficulty in Physics as well. Feeling difficulty due to problem solving in Mathematics is correlated only with such feeling in Physics but not in other subjects. While need for strenuous attention is the most prominent reason for feeling difficulty in chemistry and biology and to some extend in social science. In physics also need for strenuous attention cause problem to students. Feeling difficulty in mathematics due to need for strenuous attention is positively correlated to such feeling in all other school subjects including Malayalam which is the least difficult subject reported by students.

Requirement of repeated practice is the fourth major reason for felt difficulty in Mathematics again this reason also is reported in all other subjects including Malayalam with prominence. However such felt difficulty from need for repeated practice in mathematics is correlated weakly with such feeling in physics only, not in other subjects. Number of concepts to be learned in mathematics is another major reason for felt difficulty in mathematics. Though, this reason is reported in lesser extent in all other subjects including in Malayalam and social science. However feeling difficulty due to bulk of concepts on maths is related only to such feelings in Physics.

Toughness of concepts involved is the sixth prominent reason for felt difficulty in mathematics which is a moderately prominent reason in science subject and the second most prominent reason in Malayalam. But it is a relatively easy aspect of social sciences. Feeling of toughness of concepts in Mathematics is indifferent to such feeling in all other school subjects.

Feeling of difficulty due to Need for external support in mathematics is relatively low for Mathematics and is a moderate reason for difficulty in all subjects. Feeling of difficulty due to need for external support in mathematics is correlated with Physics and Chemistry. Perceived difficulty due to constraint in Understanding questions is high in Mathematics and moderate in Physics. Difficulty in Mathematics due to this factor is correlated with all difficulty in all other subjects except in Malayalam.

Perceived difficulty due to necessity to learn unfamiliar terms is relatively low for mathematics and moderate reason in all other subjects except in Malayalam where it is one of the prominent reason for difficulty in Malayalam. But such difficulty is highly correlated with physics and moderately correlated with all other subjects Perceived difficulty in mathematics due to Prevalence of symbols and notations is relatively low among reasons for difficulty in Mathematics but a prominent reason for difficulty in Chemistry. Perceived difficulty in mathematics is correlated with such difficulties in Chemistry and Physics.

Rote learning as a reason for difficulty in learning is comparatively more prominent in all other subjects except Mathematics. Feeling of difficulty due to need for rote learning is correlated with such feeling in physics. Difficulty due to perceived uselessness in daily life is relatively low Mathematics when comparing to other reasons. Such difficulty is more in Physics when compared with Mathematics. Difficulty in Mathematics is correlated with such difficulties in other subjects except Malayalam.

The study implies meeting the challenges arising out of nature of Mathematics and employing strategies for reducing the difficulties arising out of methods of learning which cause difficulties for students to learn. The difficulties related to methods of learning like Need for strenuous attention, Repeated Practice, Need for external support, Understanding questions, Need for rote learning and Uselessness in daily life need adoption of appropriate strategies. Student's difficulties from need for external support can be met through facilitating peer interaction, multiple ability grouping, remedial instruction and supporting parental involvement. Students who find it difficult to understand questions may be supported through exercises in analysing questions, question words and hint words. Building up mathematical vocabulary through explicit focus on language of Mathematics will help not only in this respect but also in in mastering symbols, notations and mathematical terms which have their own contribution in causing difficulty in learning mathematics. Meaningful learning needs to be encouraged through relating every concept and skill in mathematics to daily life situations. Mathematical exercises encouraging self-regulatory strategies may find useful to develop attentive behaviour. Frequent revision with an explicit purpose of integrating the concepts need to be exercised in a regular manner such that students get opportunity to relate lessons taught during different periods of the year which may find useful in supporting problem solving, retaining the concepts which are originally learned in a spaced out manner.

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