REVIEW OF RESEARCH
IMPACT FACTOR : 5.7631(UIF) UGC APPROVED JOURNAL NO. 48514 ISSN: 2249-894X
VOLUME - 8 | ISSUE - 1 | OCTOBER - 2018

CONSTRUCTION AND VALIDATION OF ATTITUDE TOWARDS MATHEMATICS SCALE

N. NavaneethaKrishnan[1] and Dr. C. Barathi[2]
[1]Research Scholar, Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamil Nadu, India .
[2]Assistant professor, School of Education, Tamilnadu Open University, Chennai.

ABSTRACT

Human behaviour gets manifested because of the urge of the internal factors present in the individual. One such internal factor is attitude. Though it takes quite a long time to develop a form of attitude towards something, once it gets crystallized, it starts deciding the behaviour of the individual towards that particular thing. Travers (1973) has defined attitude as a readiness to respond in a way that behaviour is given a certain direction.

KEYWORDS: *construction, Mathematics, Behaviour, Attitude & Manifested.*

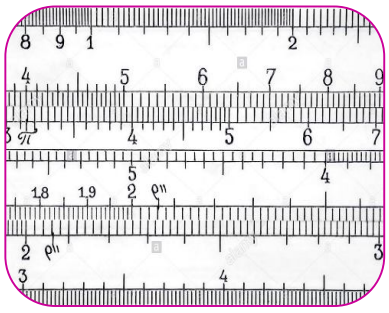
INTRODUCTION

The direction for readiness to do something is the task of that particular attitude. As it involves Internal preparedness and an External response, attitude is thought of as a two factor construct. Similarly, Lin, Shu-Hui and Huang, and Yun-Chen (2016) have established three factor constructs of attitude as in the case of Sanchal, Anantika and Sharma, Sashi (2017). However, the Researcher has identified six areas pertaining to attitude towards mathematics. On the basis of this, the present research tool is being constructed.

RATIONALE

Ufer, Stefer, et al (2017) have confirmed that the subject oriented *interest* is an important predictor of successful learning process. To substantiate this Rico, Nseente Michelle, M (2014) established that teacher's interest gets manifested in student's interest especially in the achievement of mathematics. Therefore, the Researcher has inducted *Interest in mathematics* as a dimension of the proposed Attitude towards Mathematics Scale.

It is observed that mathematics dominates the scientific domain with unique processing applications of symbols, notations, formulas and other mathematical terms. It requires a good mental calibre of a person to remember facts, sort out similar ones, guess the relation between concepts and link them to arrive at the answer (Michael, L and Stanislaw, S, 2017). Dennis, Minyisheh, et al (2016) have also shown different types of instructional approaches and instructional components contributive to improve mathematics performance. Therefore, the Researcher has considered *Difficulty in mathematics* as a construct of attitude towards mathematics.



Belbase, Shashidhar (2013) found the relationship between the ability to relate images, formation of anxieties and attitude towards mathematics. The images being formed play a significant role in the development of attitude towards mathematics. As the Researcher has considered the use of mathematics which is possible

by the formation of suitable images of mathematics is an important construct to evolve attitude towards mathematics, he has inducted the same as a dimension of attitude towards mathematics.

The study of Awofala, Adeneye, O. A, et al (2013) is considered as an important milestone in establishing the difference among the individuals in considering their orientation towards mathematics. The study indicates that the male students are found to claim a higher level status orientation of mathematics than their female counterparts. Thus it explains the internal awareness of the individuals about their *Status of mathematics* is a 'hidden factor' affecting one's attitude towards mathematics. Therefore, it is treated as a dimension of the newly constructed tool.

The research findings of Jong, Cindy and Hodes, Thomas (2015), Karjanto, N (2017), Lin, Shu-Hui and Huang, Yun-chen (2016) have established *Involvement in mathematics* as an important contributive factor for the forming of one's attitude towards mathematics. Therefore, it has been inducted as one of the dimensions.

As success breeds success, in learning mathematics also achievement in mathematics brings in further achievements in mathematics. It has been aptly indicated in the findings of Nwoke, et al (2016), and Perry, S Marshall, et al (2016) that the status of *Achievement in mathematics* decides the nature of attitude towards mathematics. Therefore, it has been treated as one of the dimensions of attitude towards mathematics.

PREPARATION OF TEST ITEMS

After fixing the dimensions of attitude towards mathematics, the Researcher prepared the statements suitable for each dimensions and structured the draft tool consisting of 34 statements to be responded by the respondents on a Five Point Scale.

ESTABLISHING VALIDITY

Content Validity

It has been established by the scrutiny of the draft tool by three experts. The suggestions given by them were duly carried out and the content validity was established.

Item Validity

To establish the item validity of the tool, the Researcher adopted Goodness of fit test. The draft tool comprising 34 items was administered to 100 subjects randomly chosen and the obtained scores were subjected to Goodness of Fit test. On the basis of the values, Four items were deleted, retaining 30 items.

Table 1

Goodness of Fit value of Items of the Attitude towards Mathematics Scale

S.NO	Chi square value	Remark on H_0	S.NO	Chi square value	Remark on H_0
1	44.59	Rejected	18	14.99	Rejected
2	30.24	Rejected	19	29.04	Rejected
3	33.92	Rejected	20	40.88	Rejected
4	41.84	Rejected	21	8.29	***Accepted***
5	7.59	***Accepted***	22	26.00	Rejected
6	38.20	Rejected	23	23.44	Rejected
7	19.60	Rejected	24	36.72	Rejected
8	54.56	Rejected	25	14.24	Rejected
9	35.36	Rejected	26	40.24	Rejected
10	6.61	***Accepted***	27	35.28	Rejected

11	27.36	Rejected	28	43.32	Rejected
12	40.24	Rejected	29	39.76	Rejected
13	36.40	Rejected	30	28.40	Rejected
14	14.96	Rejected	31	37.04	Rejected
15	56.72	Rejected	32	44.48	Rejected
16	71.84	Rejected	33	39.76	Rejected
17	39.44	Rejected	34	9.08	***Accepted***

9.49 Significant at 5% Level & 13.28 at 1% Level

Construct Validity

It was established by computing item – dimension total correlation. Three of the items which were deficient in the correlation coefficient were deleted. Thus the tool comprises only 27 items.

Table 2

Item- Dimension Total correlation value of Items of the Attitude towards Mathematics Scale

S.NO	***r value***	***Remark***	***S.NO***	***r value***	***Remark***
1	0.23	*Retained*	16	0.35	*Retained*
2	0.26	*Retained*	17	0.46	*Retained*
3	0.30	*Retained*	18	0.62	*Retained*
4	0.27	*Retained*	19	0.28	*Retained*
5	0.21	*Retained*	20	0.59	*Retained*
6	0.26	*Retained*	21	0.43	*Retained*
7	0.20	*Retained*	22	0.51	*Retained*
8	0.35	*Retained*	23	0.49	*Retained*
9	0.10*	***Deleted***	24	0.11*	***Deleted***
10	0.22	*Retained*	25	0.40	*Retained*
11	0.45	*Retained*	26	0.64	*Retained*
12	0.62	*Retained*	27	0.28	*Retained*
13	0.29	*Retained*	28	0.34	*Retained*
14	0.34	*Retained*	29	0.46	*Retained*
15	0.17*	***Deleted***	30	0.38	*Retained*

Factorial Validity

The modified draft tool was administered to randomly chosen 100 subjects, coded and tabulated. Then the data were subjected to factor analysis following extraction method; principal component analysis extracting factor loading for each item in respect of the seven components as directed by the initial Eigean values. The final outcome of principal component analysis has indicated that all the 27 items were valid enough to structure the respective constructs. Thus the factorial validity of the tool has been established.

Reliability

The reliability coefficient of the tool has been established by Cronbach's Alpha method. The computed reliability coefficient ***0.79*** shows that the tool is highly reliable.

Thus the validity and reliability of the newly developed Attitude towards Mathematics Scale have been established. The final form of the tool is given with scoring scheme.

Table 3

Attitude towards Mathematics Scale

Note:-

Kindly go through each one of the Twenty Seven statements given carefully and give your response under any one of the Five responses Strongly agree, Agree, Undecided, Disagree, and Strongly disagree by putting a tick mark (√). Kindly answer all the statements without fail.

S. No.	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	I like mathematics very much.					
2	It is easy to learn mathematics.					
3	Knowledge of mathematics increases one's thinking capacity.					
4	People who are good in mathematics are honoured everywhere.					
5	I am very attentive in mathematics classes.					
6	My attainment in mathematics is low when compared to other subjects.					
7	Since I have understood the basic of mathematics at the early age itself, I like mathematics.					
8	It is enough to know the steps for solving a mathematical problem, but for learning other subjects one has to memorize a lot.					
9	People who are strong in mathematics can learn all other subjects effectively.					
10	The people who occupy higher positions are all competent in mathematics.					
11	I will follow the instructions of the teacher sincerely while working out mathematical sums.					
12	I don't get the expected marks however best I try to study mathematics.					
13	The fear of mathematics affects me greatly at the time of examinations.					
14	I never go to sleep without working out a mathematical sum.					
15	People who are expert in mathematics are considered as philosophers.					
16	Knowledge of mathematics is essential for higher education.					
17	By practicing the solving of the mathematical problems, one can easily develop the skill of doing mathematics.					
18	I don't feel tired off doing mathematics for a long time.					
19	By working mathematical sums often, one can easily develop the skill of solving problems quickly.					
20	In mathematics alone, for every question there is only two answers, either yes or no, therefore one can score one hundred out of one hundred in mathematics.					
21	All research findings are declared acceptable or non acceptable only on the basis of mathematics.					
22	A renowned mathematician of a country is considered as a citizen of all countries.					
23	I never leave out the mathematical exercises given by my teacher.					
24	I feel nervous when the examination marks are given for mathematics.					

25	Mathematics is very useful for researches pertaining to space, medicine, etc.					
26	I get the help of my classmates for working out unknown sums at the time of examinations.					
27	I am confused with mathematical symbols and formulas.					

The items meant for different dimensions of the Final Form of the Tool are furnished in table 4.

Table 4

Items of the Attitude towards Mathematics Scale – Dimension wise

Dimensions	***Statements***
Interest in Mathematics	1, 7, 18, 19,
Difficulty in Learning Mathematics	2, 8, 17, 20,
Uses of Mathematics	3, 9, 16, 21, 25
Status Orientation of Mathematics	4, 10, 15, 22,
Involvement in Mathematics	5, 11, 14, 23, 26
Achievement in Mathematics	6, 12, 13, 24, 27

Scoring Scheme

The 27 items of the scale are in statement form. For each item the respondent is to show his / her preference by putting tick mark under the 5 point scale ranging from ***Strongly Disagree, Undecided, Disagree, Agree***, to ***Strongly Agree***. The scheme of scoring is given hereunder.

Table 5

Scoring scheme of Attitude towards Mathematics Scale

Choices	***Statement***	***Strongly Agree***	***Agree***	***Undecided***	***Disagree***	***Strongly Disagree***
Positive	1, 2, 3, 4, 5, 7, 8, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26,	***5***	***4***	***3***	***2***	***1***
Negative	6, 9, 12, 13, 24, 27	***1***	***2***	***3***	***4***	***5***

REFERENCES

Awofala, Adeneye, O. A, et al (2013). Effects of Framing and Team Assisted Individualised Instructional Strategies on Senior Secondary School Students' Attitudes toward Mathematics, *Acta Didactica Napocensia*, Vol. 6, No. 1, 2013

Belbase, Shashidhar (2013). Images, Anxieties, and Attitudes toward Mathematics

Dennis, Minyisheh, et al (2016). A Meta-Analysis of Empirical Research on Teaching Students with Mathematics Learning Difficulties, *Learning Disabilities Research & Practice*, Vol. 31, No. 3, Aug 2016.

Jong, Cindy and Hodes, Thomas (2015). Assessing Attitudes toward Mathematics across Teacher Education Contexts, *Journal of Mathematics Teacher Education*, Vol. 18, No. 5, Oct 2015.

Karjanto, N (2017). Attitude toward Mathematics among the Students at Nazarbayev University Foundation Year Programme, *International Journal of Mathematical Education in Science and Technology*, Vol. 48, No. 6, 2017.

Lin, Shu-Hui and Huang, and Yun-Chen (2016). Development and Application of a Chinese Version of the Short Attitudes toward Mathematics Inventory, *International Journal of Science and Mathematics Education*, Vol. 14, No. 1, Feb 2016.

Michael, L and Stanislaw, S, (2017). Interest Development during the First Year at University: Do Mathematical Beliefs Predict Interest in Mathematics?, *ZDM: The International Journal on Mathematics Education*, Vol. 49, No. 3, Jun 2017.

Nwoke, et al (2016). Effect of blended e-learning on pre-service teachers' achievement in mathematics: a case for sustainable teacher education, Europearn journal of education studies, Vol. 3, No. 10, 2016.

Online Submission, International Journal of Education in Mathematics, Science and Technology Vol. 1, No. 4, Oct 2013.

Perry, S Marshall, et al (2016). Teaching, Academic Achievement, and Attitudes toward Mathematics in the United States and Nigeria, *Journal for Leadership and Instruction*, Vol. 15, No. 2, Fall 2016.

Rico, Nseente Michelle, M (2014). Effects of perceived teacher practices on Latino high school students' interest, self-efficacy, and achievement in mathematics. *The Journal of Experimental Education*, Vol. 82, No. 1.

Sanchal, Anantika and Sharma, Sashi (2017). Students' Attitudes towards Learning Mathematics: Impact of Teaching in a Sporting Context, *Teachers and Curriculum*, Vol. 17, No. 1, 2017.

Travers (1973). In Do homework assignments enhance achievement? A multilevel analysis in 7th-grade mathematics. *Contemporary Educational Psychology*, Vol. 27, No. 1.

Ufer, Stefer, et al (2017). Interest in Mathematics = Interest in Mathematics? What General Measures of Interest Reflect When the Object of Interest Changes, *ZDM: The International Journal on Mathematics Education*, Vol. 49, No. 3, Jun 2017.