

Construct Validity of Reading Motivation Questionnaire

Debdulal Dutta Roy

Indian Statistical Institute, Kolkata

The article reports results of two consecutive studies designed to extend knowledge about construct validity of reading motivation and to examine its utility in the prediction of academic achievement. In first study, data were collected from 881 students of primary education through reading motivation questionnaire with seven domains. Correspondence analysis reveals two latent traits (intrinsic and extrinsic) of reading motivation. In the second study, reading motivation questionnaire was administered to 200 students and their academic performances in schools were collected. Results reveal inverse relation between latent traits. Composite scores of intrinsic reading motivation were positively and those of extrinsic reading motivation were negatively correlated with academic performance.

Development of any theoretical construct requires examination of construct validity. Construct validity is a necessary condition for theory development and testing. It pertains to the degree of correspondence between constructs and measures. The extent to which the questionnaire measures a theoretical construct for which the questionnaire has been developed is called construct validity. High construct validity indicates higher accounting of variances from the same construct by the sets of variables measured by questionnaire.

Every variable is likely to reflect a variety of constructs as well as purely random error. The following equation illustrates this fact (Judd, 1981) :

$$Y=C_1+C_2+\dots\dots\dots C_n+E$$

Where Y refers to measured variable, the set of C refers to a set of unmeasured theoretical constructs that contribute to variation in Y. And E refers to the random error or simply 'noise' in the measurement of Y. Factorial, convergent and discriminant validities are three basic techniques to assess construct validity. Factor analysis is

used for extracting latent traits or factors. Correspondence analysis instead of usual factor analysis provides information about latent traits through correspondence map. Correspondence map provides extent of closeness among sets of variables. Close locations occur when the variables are interrelated with each other. The higher the inter correlations, the higher the correspondence as variances of variables occupy same places on the map. Therefore, based on extent of locations, one can assume latent traits or factors. Study 1 tends to explore latent traits of reading motivation. Validation of latent traits was examined using convergent and discriminant properties of reading motivation when latent traits were correlated with academic performance in study 2.

Reading motivation

Reading motivation is the process to put more effort on reading activity. This is framed with one's appraisal of relationship between reading and the reading outcomes. For example, a child is motivated to read when he experiences his mastery over reading. In

literature, before the work of Wigfield and Guthrie (1995), reading motivation has been studied in the broad area of academic motivation. Waugh (2002) identified several models of academic motivation in the literature, each emphasizing different aspects, some of which are interrelated. These models are arousal and anxiety model, needs model, achievement and social goal model, behavioural motivation model involving rewards, reinforcement and intrinsic motivation, attribution theory, self-regulated learning model, perceived self-efficacy model that relates personal beliefs to actions to achieve, personal investment model involving tasks, ego, social solidarity and extrinsic rewards. By reviewing self-efficacy model of Schunck (1991), Schunck and Zimmerman (1997), task model of Eccles et al. (1983), reading attitude model of Alexander and Fuller, (1976), reading interest model of Schiefele (1996), Wigfield and Guthrie (1995) developed one questionnaire measuring seven reading motives. (i) reading curiosity (the desire to learn about a particular topic of interest to the child), (ii) reading challenge (the satisfaction of mastering or assimilating complex ideas in text), (iii) reading importance (subjective task values), (iv) reading involvement (the enjoyment of experiencing different kinds of literary and informational text), (v) competition in reading (the desire to outperform others in reading), (vi) recognition for reading (the gratification in receiving a tangible form of recognition for success in reading) and (vii) reading for grades (the desire to be evaluated favorably by the teacher). Wigfield and Guthrie validated reading motivation construct by correlating it with breadth of reading (Wigfield & Guthrie, 1997). In India, Dutta Roy and Paul (2002) using content analysis of interview responses from Indian children in primary schools has noted that individual prefers to read for seven reasons. These are (i) reading for acquiring knowledge (rKnow), (ii) reading

for application (rApp), (iii) mastery over reading (rAch) (iv) reading for pictures or font style (rAes or aesthetic), (v) reading for affiliation (rAff), (vi) reading for recognition (rRecog), and reading for avoiding punishment (rPunish). It is assumed that first four represents motivation to read for own satisfaction and later three represents motivation to read in order to satisfy others. A multiple choice questionnaire with forty-two items had been developed to assess one's preference to different reading motives (Dutta Roy, 2003). Current study examines construct validity of reading motivation questionnaire.

Study 1

Objective of this study was to explore latent traits of reading motivation questionnaire.

Latent traits indicate underlying relation among interrelated variables. This is important for theory development.

Methods

Sample:

Sampling was done in two stages- (a) selection of sample schools from four school types- Government, Government aided, corporation and Missionary schools under the West Bengal Board of Primary Education (b) selection of sample students. For selection of sample schools lists of government, Government aided, Kolkata corporation and Missionary schools were collected from different sources -Calcutta District Primary School Council, Calcutta Municipal Corporation and Police stations of different areas. Data were collected from 3 Government schools, 5 schools financially aided by the Government of West Bengal, 7 schools of Kolkata corporation and 3 missionary schools under the West Bengal Board of Primary Education. In sampling, attention was paid to the equal representation of schools across north, south, east, west and central Kolkata. Finally 881 data were

collected from 234 students of Government, 230 of Government aided, 202 of corporation and 215 of Missionary schools. Thus simple stratified random sampling was followed in sampling the students from 4 strata - 5 zones of kolkata (North, South, Central, East, and West) X 4 school types (Government, Government-aided, Corporation and Missionary schools) X 2 grades (grades III and IV) X 2 genders (boy and girl).

Instrument:

Reading motivation questionnaire or RMQ (Dutta Roy, 2003) includes 42 questions measuring 7 reading motives – rKnow, rApp, rAch, rAes, rRecog, rAff, rPunish. Scoring is based on subjects' preference to number of alternative answers for each category of variable. For each variable, maximum possible score is six and the minimum possible score is zero. Some items of the questionnaire are given below:

1. Suppose, after promotion to a new class you are offered to read two books with two different titles. Which one will you like to read first?

(a) Learning of mathematics through daily activities.

(b) Study of animals of different countries.

2. Suppose, on one day you were absent in school. Next day you ask your friends to give their copy. You get two copies. Which one will you like to read first?

(a) A newly covered copy with good handwritings.

(b) The copy of your best friend.

Test-retest reliability of RMQ was examined by using paired t-test and product moment correlation between scores of 7 sub tests using 70 students of same school within interval of 8 months. Results noted 83% of item means in both sessions did not differ significantly. And product moment correlation

coefficients of 7 subtest scores varied from 0.69 to 0.97. 5 subtest scores were above 0.90. Item-total correlation was used to assess content validity of each subtest using 516 samples. All coefficients were significant at 0.01 level (Dutta Roy, 2003).

Analysis of data:

Initially, data quality of 7 subtests was examined through box whisker plot. Next correspondence analysis (CA) was used to determine extent and nature of correspondence or association among the subtests. It is assumed that when research variables are internally consistent, they lie very close to each other in the correspondence map. Latent trait of the questionnaire was explored by the analysis of close association among subtests. Significance of associations is tested by chi-square analysis. CA provides a joint plot of points representing both the rows and columns of the table. In CA, instead of trying to compare rows using proportions a smaller number of coordinates are created so that each successive coordinate axis accounts for a decreasing portion of the total association between the rows and columns as represented by the familiar Pearson Chi-square statistics. This reduction is also noted in principal component analysis. CA is often called as PCA for categorical data. The first coordinate accounts for the largest part of the total association, the second for the next largest part and so on like PCA. Correspondence analysis (CA) is an exploratory technique to investigate magnitude and the substantive nature of association between the row and column categories of cross tabulation rather than to confirm or reject hypothesis about the underlying process which generates the data (Greenacre and Blasius, 1994). It is the technique to display row and column variables of a two – way contingency table graphically as points on a corresponding lower

dimensional vector spaces. According to Andrews (1978) graphical display of data is comprehensible to human minds, thus uncovering structure of the data and detecting departure, if any, from the structure.

CA follows certain steps as (I) testing independence between row and column variables by chi-square analysis. Significance of chi-square represents that CA provides a “strong model” of the row column dependence; (II) assigning weights (mass) to the row and columns variables by dividing total row or column frequencies by the total sample size. This mass has important role in plotting the points on axis; (III) extracting factors from row and column variables by principal component analysis. Factor extraction helps in identifying a sub-space of lower dimensionality which comes close to the points presented by column and also row variables; (IV) graphical presentation of the points of row and column variables on low dimensional plane, usually two dimensional planes. Since CA follows principal component analysis of a set of row and column variables, it is expected that CA possibly would provide more information about data structure, especially closeness of row and column variables than simple frequency or percentage analysis of data.

Results

Box whisker plot:

Figure 1 shows no outlier in the distribution of 7 tests suggesting good data quality. Medians of three subtests namely rAppt, rKnow and rAch fall almost same lines suggesting similarity in the responses to three variables. Second, locations of their medians are above the other four variables. This suggests high preference to the above three for reading. Though it has been assumed that rAes is related to first three subtests, results show that it's median is not at par with them.

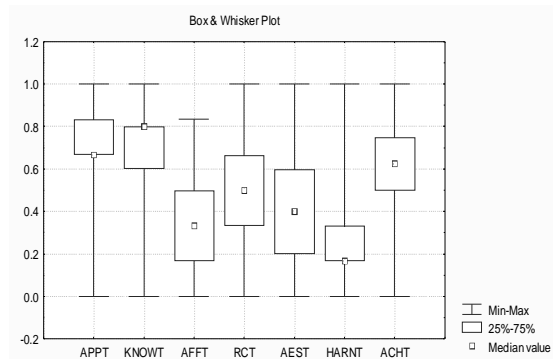


Figure 1 Box-whisker plot of subtests of the reading motivation questionnaire

Correspondence analysis:

Frequency data of input table (Table 1) were used for correspondence analysis through STATISTICA'99. Rows were names of 7 subtests and columns were frequencies of total scores on each subtest. Scores were categorized into 7 columns from score 0 to score 6. Initial analysis shows strong model of row and column dependence (Chi-square (36) = 3041.4, $p < 0.00001$) suggesting dispersion of scores across subtests. Table 2 shows that all the variables of reading motivation can be explained in terms of two broad dimensions accounting for 97.93% of total variances.

If we assume category 3 as the cut-off point to study high (category 4 to 6) and least preferred (category 0 to 2) reading motivation variables. It is noted that 57%, 78%, and 72% of responses are in the high category for rAch, rAppli and rKnow successively. On the other side, 47%, 63%, 82% and 42% responses are in the low category for rAes, rAff, rPunish and rRecog successively. This suggests that students feel motivation to read for application and knowledge and to avoid punishment and loss of love more than other motivating factors.

Table 1: Frequency and percentage distributions of Reading Motivation Variables across Scoring categories

	Scoring Categories														Total
	0		1		2		3		4		5		6		
	f	%	F	%	F	%	F	%	F	%	F	%	F	%	
Achievement	6	3.68	31	3.22	115	8.85	236	16.99	265	21.58	201	21.11	48	15.00	902
Application	1	0.61	20	2.08	50	3.85	126	9.07	274	22.31	296	31.09	135	42.19	902
Knowledge	3	1.84	22	2.28	68	5.23	156	11.23	239	19.46	304	31.93	110	34.38	902
Aesthetic	29	17.79	146	15.16	249	19.17	270	19.44	155	12.62	43	4.52	10	3.13	902
Affiliation	29	17.79	219	22.74	320	24.63	202	14.59	109	8.88	23	2.42	0	0	902
Harm avoidance	85	52.15	417	43.30	239	18.40	100	7.20	45	3.66	13	1.37	3	0.94	902
Recognition	10	6.13	108	11.21	258	19.86	299	21.53	141	11.48	72	7.59	14	4.38	902
Total	163	100	963	100	1299	100	1389	100	1228	100	952	100	320	100	6314

Correspondence map (Figure 2) exhibits two broad clusters of reading motives. First cluster includes rAch, rKnow, and rApp whereas second cluster includes rRecog, rAes, rAff, and rPunish. Since first three variables represent motivation to read for own sake, this is called intrinsic reading motivation. Second cluster represents reading for other's sake. This is called extrinsic reading motivation. Table 2 shows that all the variables of reading motivation can be explained in terms of two broad dimensions

Intrinsic reading motives were more close to high scoring categories - S_4, S_5, S_6 than the variables of extrinsic reading motives. This supports earlier findings about

more preference to intrinsic reading motives.

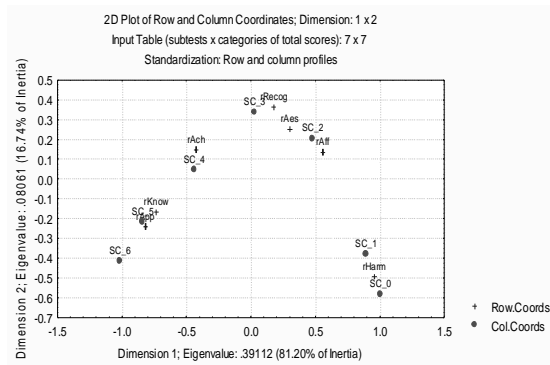


Figure 2. Correspondence map of Reading motivation

Table 2. Eigen values and Inertia for all Dimensions

	SingularValues	Eigen-values	Percent of inertia	Cumulative percent	Chi-square
1	0.63	0.39	81.20	81.20	2469.50
2	0.28	0.08	16.74	97.93	508.99
3	0.08	0.01	1.30	99.23	39.55
4	0.05	0.00	0.42	99.65	12.81
5	0.04	0.00	0.32	99.97	9.62
6	0.01	0.00	0.03	100.00	0.96

Discussion

When theoretically assumed constructs are internally consistent they form cluster. Reading motivation questionnaire includes 7 constructs - rKnow, rApp, rAch, rAes, rAff, rRecog and rPunish. Correspondence analysis reveals two clusters named as

intrinsic and extrinsic reading motivation. Intrinsic cluster consisted of r Know, rApp, rAch denotes motivation to read for own sake and extrinsic cluster consisted of rAes, rAff, rRecog and rPunish denotes reading motivation for other's sake. Extracting two clusters as assumed suggest factorial validity

of reading motivation questionnaire. rAes belongs to extrinsic reading motivation cluster though it is assumed as the content of intrinsic reading motivation cluster. This separation may be due to its own extrinsic properties, i.e., book reading for fonts or pictures. Results also revealed that children preferred intrinsic to extrinsic reading motives. Out of three contents of intrinsic motivation cluster, children prefer more rKnow and rApp. And out of 4 contents of extrinsic motivation cluster, children least preferred rPunish. This finding is important in designing reading motivation strategies for children. Convergent and discriminating validities are useful to validate extracted factors with available theories. Study 2 examined these by examining correlation between two constructs and their relation with academic performance.

Study 2

Objective of this study was to examine convergent and discriminant validity of two latent traits extracted in the study 1. In estimation of convergent validity, attention is paid to examine whether extracted factor is correlated with theoretical measure or not. For example, intrinsic reading motivation is supposed to be correlated with academic performance as the due to own desire when a child reads, his breadth of knowledge increases. And breadth of knowledge is related to academic performance (Stanovich & Cunningham, 1992). Likewise, in estimating discriminant validity, attention is paid to understand whether the extracted factor is uncorrelated with different theoretical concepts or not. It describes the degree to which the operationalization is not similar to (diverges from) other operationalizations that it theoretically should not be similar to Campbell and Fiske (1959). Another approach in estimation of discriminant validity is examination of negative correlation between extracted factors and theoretical measure. Campbell and Fiske (1959) introduced the concept of discriminant validity

within their discussion on evaluating test validity. They stressed the importance of using both discriminant and convergent validation techniques when assessing new tests. Wigfield and Guthrie (1997) noted that an intrinsic motivation composite predicted amount and breadth of reading more strongly than extrinsic motivation composite. Study 2 aims at correlating reading motivation with academic performance of students to examine its convergent and discriminant validity. It is assumed that the more intrinsic reading motivation is correlated positively with academic performance, the more is the convergent validity. On the other hand, the more extrinsic reading motivation is correlated negatively with academic performance, the more is discriminant validity of the questionnaire. This assumption is due to prior theories of reading motivation (Eccles et al., 1983; Deci & Ryan, 1985; Nell, 1988; Wigfield & Guthrie, 1997).

Method

Reading motivation questionnaire or RMQ (Dutta Roy, 2003) was administered to 200 students of classes III (50 boys and 50 girls) and IV (50 boys and 50 girls). Their first language was Bengali and second language was English. They just started letter recognition in case of Second language but they could read and write stories with simple sentences in first language. In arithmetic, they could solve problem sums with simple sentences. Their last examination marks in different subjects were obtained for assessment of academic achievement.

Results and Discussion

Initially, composite scores of intrinsic reading motivation were estimated by adding the scores of rAch, rKnow, and rApp. Likewise, by adding scores of rRecog, rAes, rAff, and rPunish, composite scores of extrinsic reading motivation were calculated. Finally, composite scores were correlated with examination marks of Bengali (first language), English

(second language) and total marks. Table 3 shows that both intrinsic and extrinsic reading motivation are negatively correlated with each other. This supports the basic assumption that the students concerned with intrinsic reading motivation do not want to read for extrinsic motivating factors and vice versa. Extrinsic motivation inhibits high marks in examination. Possibly due to this reason, extrinsic reading motivation was negatively correlated with examination marks in different subjects. This negative correlation suggests discriminative validity of the questionnaire. On the other hand, intrinsic reading motivation is positively correlated with examination marks suggesting high convergent validity.

other hand, they find high task values in learning first language and mathematics. Finding high task values, they possibly feel flow experience (Csikszentmihalyi, 1978), losing track of time and self-awareness when becoming completely involved in an activity such as reading a book resulting high score in the examinations of first language and arithmetic.

General Discussion

The research has examined both conceptual and measurement issues arising from the development of construct of reading motivation. The findings suggest that reading motivation has two broad latent traits as intrinsic (reading for own sake) and extrinsic

Table 3. Correlation matrix of reading motivation and examination marks (n=200)

Variables	1	2	3	4	5	6
1.Extrinsic	1.00					
2.Intrinsic	-0.91**	1.00				
3.Bengali	-0.38**	.41**	1.00			
4.English	0.10	-0.04	0.22**	1.00		
5.Arithmetic	-0.33**	0.36**	0.79**	0.28**	1.00	
6. Total	-0.25**	0.30**	0.83**	0.65**	0.88**	1.00

**p<0.01

This is noted that neither intrinsic nor extrinsic reading motivation is related to marks in 2nd language. Results can be understood through task components theory of Eccles et al (1983) defined different components of task values, including interest value (defined as how much the individual likes the activity), attainment value (defined as importance of the activity), and utility value (the usefulness of an activity). No significant correlation of English marks with both intrinsic and extrinsic reading motivation suggests that students do not find any interest and interest value in learning English. They assume that they can solve regular problems in life by first language. So they feel little attainment value in scoring English or 2nd language. On the

(reading to satisfy others) reading motivation. Intrinsic reading motivation is positively correlated with school examination performance and extrinsic is negatively related. Furthermore both are inversely correlated with each other suggesting both convergent and discriminating validity.

Second, study highlights correspondence analysis in extracting latent structure of variables like principal component analysis. CA also provides the information that maximum variances of reading motivation was explained by two axis of correspondence map.

Third, pattern of relation of two latent constructs with academic performance gives

insight as how to teach students for development of intrinsic reading motivation.

Results show that student performs better in the examination when he is intrinsically motivated to read.

References

- Alexander, J. E., & Filler, R. C. (1976). *Attitudes and reading*. Newark, DE: International Reading Association.
- Andrews, D.F. (1978). Exploratory data analysis. In W.H. Kruskal, W.H. and J.M. Tanur. (Eds.). *International Encyclopedia of Statistics*.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105.
- Csikszentmihalyi, M. (1978). Intrinsic rewards and emergent motivation. In M. Lepper & D. Green (Eds.) *The hidden costs of reward: New perspectives on the psychology of motivation*. (pp.205-216). Hillsdale, NJ: Erlbaum.
- Dutta Roy, D. & Paul, M. (2002). Reading motivation of children in grades III and IV, *Indian Educational Review*, 38, 43-51.
- Dutta Roy, D. (2003). Development Of The Questionnaire For Assessment Of Reading And Writing Motivation Of Boys And Girls Of Grades III And IV. Project report submitted to the Indian Statistical Institute, Kolkata.
- Eccles, J.S., Adler, T.F., Futterman, R., Goff, S.B., Kaczala, C.M., Meece, J., & Midgley, C. (1983). Expectancies, values and academic behaviors. In J.T. Spence (ed.), *Achievement and achievement motives* (pp.75-146). San Francisco: Freeman.
- Greenacre, M. and Blasius, Jong (1994). *Correspondence analysis in the social sciences: Recent developments and applications*. New York.: Academic press.
- Judd, C.M. (1981). *Estimating the effect of social interventions*. Cambridge: Cambridge Press.
- Schiefele, U. (1996). Topic interest, text representation, and quality of experience. *Contemporary Educational Psychology*, 21, 3-18.
- Schunk, D.H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 233-262.
- Schunk, D.H., & Zimmerman, B.J. (1997). Developing self-efficacious readers and writers: The role of social and self regulatory processes. In J.T. Guthrie & A. Wigfield (Eds.), *Reading engagement: Motivating readers through integrated instruction* (pp.34-50). Newark, DE: International Reading Association.
- Stanovich, K.E. & Cunningham, A.E. (1992). Studying the consequences of literacy within a literate society: The cognitive correlates of print exposure. *Memory and cognition*, 20, 51-68.
- Waugh, R.F. (2002). Creating a scale to measure motivation to achieve academically: Linking attitudes and behaviours using Rasch measurement. *British Journal of Educational Psychology*, 72, 65-86.
- Wigfield, A. & Guthrie, J.T. (1995). Dimensions of Children's motivations for reading : An initial study (Research Rep. No. 34). Athens, GA: National Reading Research Center.
- Wigfield, A. & Guthrie, J.T. (1997). Relations of children's motivation for reading to the amount and breadth of their reading. 89, 420-432.

Received: June 06, 2010

Revision received: August 26, 2010

Accepted: November 22, 2010

Debdulal Dutta Roy, PhD, Psychology Research Unit, Indian Statistical Institute
Kolkata