A MODEL FOR THE CORRELATES OF STUDENTS' CREATIVE THINKING

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ABSTRACT

The present study was aimed to explore the relationships between organisational or school variables, students' personal background variables, and cognitive and motivational variables. The sample for the survey included 373 students drawn from nine Government schools in Andhra Pradesh, India. Students' creative thinking abilities were measured by the verbal and non-verbal Tests of Creative Thinking developed by Baqer Mehdi. The researcher developed the tools for this purpose and data was collected by means of questionnaires for students, a scale for assessing teachers' encouragement of pupils in the classroom, and a checklist for headteachers regarding out-of-school activities. To analyse the data, quantitative techniques such as Multiple Regression Analysis and the Path Analysis were used to study the direct and indirect effects of variables on the dependent variable creativity. The analysis showed a model, where out-of-school activities, mother's education, teacher encouragement and mother's income had causal relationships with students' creative thinking.

INTRODUCTION

Modern society is characterised by rapid change and technological advancement. Perhaps, never in the history of mankind have so many changes occurred simultaneously and with such acceleration over so broad a spectrum of man's affairs (Raina, 1989). Changes witnessed during the recent past are seen to represent an even greater acceleration compared to those of previous decades. People are required to be both flexible and resourceful if they are to adjust to the "rapid multidimensional transformation of social, political, economic, demographic and cultural aspects of life" and increasing globalisation (Ayman, 1993). But the economic, social, and political aspects are not the only contextual factors. The increasing role played by information and communicative technology, arguably requires greater creativity and also offers greater scope for it (Craft, 2005). To cope with the demands of the future, people will have to be quick thinking, flexible and imaginative. They will need to be competent in producing effective solutions to unfamiliar problems in unclear situations (De Bono, 1993, Fryer, 1996). Creativity is required to make sense of what is happening, to cope with novel conditions and to achieve a new equilibrium somewhere between chaos and stagnation (Sturner, 1987).

The greatest joy of the teacher and greatest hope for a better world lies in the cultivation of creative power. "To teach towards creativity is to teach towards the future of society" (Lowenfeld and Brittain, 1964). Torrance and Myers (1970) suggest that creativity be encouraged by allowing children to work alone. Teachers encouragement play an important role in improving children's capacity to be creative and they can offer valuable insights on teaching and learning. Teachers who are really keen to develop creativity prefer to teach in a whole variety of ways and value every child's contribution (Fryer, 1996). Thus it may be broadly hypothesised that teacher's perception of the students has a substantial bearing on his classroom climate, either promoting or hindering the creative development of students

(Agarwal, 1992,).

School is the only place where perhaps an organised effort can be made to ensure a continuous flow of trained intellect. Alencar (1993) argues that "there are several aspects that need to be cultivated in the school to favour the development and expression of creative abilities. The school is an interpreter and moulder of society and is itself a society in miniature (Powell Jones, 1972). As Lowenfeld and Brittain (1982) suggest, "Creativity does not just happen. It is an essential part of the learning process". A stimulating school environment, proper physical facilities, and a free atmosphere help in fostering creativity among children (Passi, 1989). Adequate resources, such as, better buildings and equipment, and greater ranges of opportunities are needed to promote creativity (Woods, 1990).

But the whole focus of teaching learning practices is on examinations and grades, with added emphasis on covering a large amount of the syllabus; teaching is mostly done to deliver rather than to derive meaning (Raina, 1989, Chadha, 1990, Alencar, 1993, Rather, 1998). Research in India has largely neglected the role of teachers and schools in the process of development of creativity in students. This research will attempt to re address this balance.

A critical survey of literature has shown that creativity and its related variables like gender, age, SES, and school type etc, are playing an important role in promoting creativity. Some of the related studies are presented to explore the predictor variables needed to determine the research framework.

Past Research

Creativity and Gender

With regard to the topic of sex, differences in creativity has intrigued generations of psychologists and educational researchers. Despite considerable research there are still contradictory views about sex differences in creativity. Some studies have shown the superiority of males over females (eg. Raina(1969), Awasthy,1979, Shukla, 1982), others the reverse (eg. Passi, 1972, Chadha and Sen, 1981, Ahmed, 1987), some have reported non-significant differences between males and females (eg. Badrinath and Satyanaryana, 1979, Singh, 1993).

Creativity and Age

Creativity increases with age up to a particular age level beyond which it starts decreasing (eg.Torrance, 1962a, 1967, Sudhir Kumar, 1992).

Creativity and Socio Economic Status (SES)

)SES influences creativity; usually higher the level, the greater the creativity (eg. English and English, 1958, Ogletree and Ujlaki, 1973, Sharma, A. K.(1979), Sharan, 1986, Sudhir Kumar, 1992). Some studies have revealed that there is no significant difference in the creativity scores of high, middle and low SES students (*e.g.* Seetharam and Vedanyagam, 1979; Guptha, A.. K, 1980; Chadha and Sen, 1981).

Sudhir Kumar (1992) reported that father's education and mother's education were found to foster higher creative thinking ability; the students with well educated parents attained higher creativity scores than those with illiterate parents. However, parental occupation was not found to be a factor related to the creativity of children. Raina (1968) found that a higher creative group came from parents who were comparatively better educated than the parents of lower creative students. Srivastava (1977) also observed that the children of highly educated parents scored significantly higher than the children of less educated parents on a creativity test. . Ahmed (1980) found a significant difference in the verbal and non-verbal creativity of students coming from advantaged and disadvantaged home backgrounds, favouring the former.

A more recent study by Mukhopadhyay, Chakrabarti and Kundu (1990), revealed that parents' higher level of education was a favourable factor for the development of creativity in their children. Overall, the research tends to suggest that there is a relationship between SES, parental education and creativity.

Creativity and type of school

Students studying in various managements differ significantly in creativity. The effect of different kinds of schooling has been subject to many investigations,

Rastogi (1967) and Chatterjee (1970) both found that the students of well-equipped and advantaged schools did better on creativity tests than students of ill-equipped schools. Ahmed (1980) studied different types of schools, viz., extremely advantaged schools, slightly disadvantaged schools and extremely disadvantaged schools (The schools' category were defined in relation to the adequacy of buildings, library, furniture, teacher-pupil ratio, sports facilities etc.). It was found that pupils in the extremely advantaged schools scored higher on creativity.

The study by Agarwal (1992) compared four types of schools and concluded that Kendriya Vidyalayas (managed by Central Government) were most creative; next in order were the students of public, government (managed by state government) and aided schools (grant maintained). The type of educational administration in a school is also a significant factor in developing creativity. The efforts of Kendriya Vidyalayas get due rewards in the form of the growth of creative potential of their students.

Gupta (1978) and Sarsani (1989) in their studies found that the students from private schools were superior in all aspects of creativity over Government school students. A study by Sehgal (1978) revealed that the students of model schools were more creative than those of government and private schools. Hence, a comprehensive study with a large sample of students with sleeted variables is needed to develop a deeper understanding of the real situation and emerging issues and problems in Government schools.

Development of an exploratory model for the correlates of students' Creative Thinking (CT)

As studied by Sharma (1979), Chadha and Sen (1981) creativity is a function of intelligence, Socio-Economic Status (SES), and sex among the secondary grade school students. Sharma (1982) explored the relationship of creativity with certain background, such as psychological and organisational factors of students of government, private, aided, public and central schools. The study concluded that creativity was significantly related to organisational variables, like the management of schools.

Sharma (1991) revealed that background factors like sex, type of family, SES, and number of siblings could predict creativity of the students. Psychological variables like intelligence, perception of teacher behaviour and scholastic achievement in previous grade level were found to be significant predictors of creativity. In the regression analysis, management of school emerged as the significant predictor of creativity among organisational variables. Agarwal (1992) studied that creativity of the students is a function of the joint effect of background (SES), environmental (Classroom climate and perception of teachers) and organisational variables (type of school).

Thus creativity amongst adolescents is a combined function of background, psychological and organisational variables. It would seem that there is a need to develop an exploratory model for a study that attempts to take account of all of these factors in considering creativity. From the literature review of creativity and with previous experience in the field, the researcher has proposed a framework that creative thinking (dependent variable) of students is a function of the combined effects of background, organisational and cognitive and motivational characteristics. The formulated hypothesis is that variation in creative thinking is a function of the variables classified under the above categories.

Methodology

A survey approach was used for the investigation. The main purpose of the study was to examine students' performance in creative thinking ability of Government schools in relation to selected variables such as gender, age, SES, type of the school, medium of instruction, teachers' encouragement and activities organised in schools to promote creativity.

A total of 373 students were selected from nine schools from the list of 98 government high schools in Hyderabad (Andhra Pradesh, India) by applying stratified sampling technique. The sample comprised was both boys

(N=147) and girls (N=226) studying in government boys', girls' and co-educational schools. Students' age varied from 12 to 17 years and the average age was 14 years.

Two tests of 'Creative Thinking' (Verbal and non-verbal) constructed and standardised by Baqer Mehdi (1973, 1985) were adopted for the study. As there were no right or wrong responses for the test, each item was scored for originality, flexibility, fluency and elaboration. The summary of the scores and procedure for converting raw scores into standard scores (T-scores) were carried out as mentioned in the test construction manual.

The Student Information Sheet (SIS) was devised to collect students' personal and parental background data; the Teachers' Encouragement Scale (TES) measured the degree of encouragement given by the teachers as perceived by their pupils. A 20 items list of TES covered relevant important areas like, accepting students' feelings in the classroom, classroom questioning, teachers' praise and criticism, teacher-pupil relationships, organisation of classroom activities, and Encouragement/discouragement of students' interests and other activities.

In addition to this, information regarding 'out of school activities' was collected from the schools through a Check-list for Head Teachers (CFHT). It was supplied to the head teachers to fill with regard to the activities organised by the schools for the promotion of creativity. A list of 28 activities were classified into six broad categories such as, 1. Expressive and Explorative Activities, 2. Exhibiting Art and Related Activities, 3. Handicraft and Related Activities, 4. Outings and Related Activities, 5. Competitive and Voluntary Activities, and 6. Decorative and Artistic Activities.

These instruments were drafted in English and translated into Telugu, the official language of the state of Andhra Pradesh. After the development of the research tools, the researcher conducted a pilot study on a small sample (N=75) from one government high school having both teaching media, English and Telugu, to test the feasibility of the research questions, the clarity of the instruments and trend of the results.

The researcher visited the schools to collect data. Rapport was established with the head teacher, teachers and students by giving a self-introduction and by explaining the purpose and objectives of the study. The subjects in the study were assured the maintenance of confidentiality of their responses. To maintain anonymity the students and teachers were not asked to provide their names on the questionnaires.

The standardised creative thinking tests (both verbal and non-verbal) and the translated Telugu version (both verbal and non-verbal) were administered to IX standard students in normal classroom conditions with good light and ventilation with the help of the head teacher and class teacher. Special instructions were given to the group. Students were asked to read the directions given in the booklet, and the researcher read them again aloud.

The TES (Teachers Encouragement scale) was administered in the normal classroom with the same students. The students of English and Telugu medium were asked to rate all their subject teachers. The students were discouraged from writing their name on the TES. The TE scale was pre-coded with the list of students, which were randomly given. Later the researcher decoded the corresponding names. This was done to maintain confidentiality. While administering the instrument, the researcher was present in the classroom to clarify any doubts about filling in the scale. No teachers were present, as the presence of teachers might have greatly affected the responses.

The wordings of items in the scale was made as clear as possible and technical terms were kept to a minimum. The students were asked to rate their teachers in the classroom using the five point scale as Always, Usually, Often, Sometimes and Never. If an item given in the scale was positive, then the scores were awarded in the order 4,3,2,1 and 0 respectively; if the item in the scale was negative, then the reverse procedure was followed. The total score gives an indication of the degree of freedom and encouragement in the classroom. A low score indicates a lack of freedom and encouragement.

To establish the reliability and validity of the instruments,

various methods were applied. The test-retest reliability coefficients for the verbal and non-verbal tests of creativity (including their components) were high, ranging from 0.856 to 0.970 and 0.88 to 0.918 respectively. The item validity coefficients were highly or moderately correlated with the activity and grand total scores (the 'r' values significant levels ranged from 0.05 to 0.001). There was also a high level of correlation between activities and verbal creativity scores ('r' ranged from 0.58 to 0.86). Similarly, a high relationship was found between activities and non-verbal creativity ('r' from 0.40 to 0.80). Factor validity of verbal and non-verbal creativity was established by correlating scores with factors. All the correlations were highly significant.

A more detailed analysis to examine the construct validity of the TES was attempted through factor analysis of all 20 items. Firstly, the Principal Component Analysis (PCA) was employed, to extract the latent trait or the underlying factors of the 20 TES items. A Cronbach's Alpha was used to estimate the reliability coefficient for the Teachers Encouragement Scale (TES). It was found to be 0.75. The method of Spearman-Brown Split for reliability coefficient for the whole test was 0.70, which indicated internal consistency. The intrinsic validity of the TES was found to be 0.84. In addition content validity and construct validity were also established. For construct validity, all the items were correlated with the total scores of TES. They ranged between 0.23 and 0.58.

Variables selected for the Model

The independent variables selected for this study have been classified as Organisational Variables (OVs), Background Variables (BVs) and Students' Cognitive & Motivational Characteristics (SCMC).

- Background Variables include Students' Sex (X_1), Age (X_2), Parental Education (Father Education-X_3, Mother Education-X_4), Occupation (Father OccupationX_5, Mother OccupationX_6) and Income (Father Income-X_7, Mother Income-X_8), and School Activities- X_{13}.
- Organisational Variables include (a) Medium of Instruction (Medium-X_9) and (b) Type of school Gender (Boys-X_{10}, Girls-X_{11}).
- Students' Cognitive & Motivational Characteristics include teacher encouragement as perceived by their students-(X_{12})
- Creative thinking is the dependent variable-composite score, that were obtained by adding Verbal and Non-verbal Tests of Creative thinking developed by Baqer Mehdi- (X_{14})

The data was analysed by applying quantitative statistical techniques with SPSS such as multiple regression analysis and Path Analysis. To predict the variables contributing to developing creative thinking among the Indian government school students, initially, a Stepwise Multiple Regression Analysis was performed. The variables were divided into three categories: background, organisational and cognitive and motivational. The variables under these categories were combined to study their relative contribution to develop creative thinking. Finally, the Path Analysis was applied to see the direct and indirect effects of variable hypothesised as the causes of variables treated as effects.

Multiple Regression Analysis

The process of constructing a linear equation that will predict the values of a target (dependent) variable from knowledge of specified values of a regressor (Independent variable) that can readily be extended to situations where we have data on two or more independent variables. The construction of a linear regression equation with two or more independent variables (or regressors) on the right hand side is known as Multiple Regression.

There are two approaches to multiple regression. In simultaneous multiple regression, all the available independent variables are entered into the equation directly. In Stepwise Multiple Regression, the independent variables are added to (or taken away from) the equation one at a time, the order of entry (or removal) being determined by statistical considerations. Despite the appeal of the second approach, however, there is the disconcerting fact that the addition of another 'Independent' variable can completely change the apparent contributions of the other regressors to the

variance of score on the dependent variable (Kinnear and Gray, 1997,p.262)

Initially, those variables which were hypothesised to have an effect on creative thinking were entered into a Stepwise Multiple Regression equation where creative thinking was regressed on the selected variables. A total of 14 variables, were considered for the Multiple Regression Analysis.

Path Analysis

Path Analysis was developed by Sewall Wright as a method for studying the direct and indirect effects of variables hypothesised as the causes of variables treated as effects. In Wright's words:..... "the method of path coefficients is not intended to accomplish the impossible task of deducing causal relations from the values of the correlation coefficients. It is intended to combine the quantitative information given by the correlations with such qualitative information as may be at hand on causal relations to give quantitative interpretations" (Wright, 1934, p.193).

The advantage of using Path Analysis is that it provides a means by which the nature of the problem addressed by an empirical study may be summarised. The path diagram is a useful device for displaying graphically the pattern of causal relations among a set of variables. In the causal model, a distinction is made between *exogenous* and *endogenous* variables. An exogenous variable is a variable whose variability is assumed to be determined by causes outside the causal model. An endogenous variable is that one whose variation is explained by exogenous or endogenous variables in the system.

Path Coefficients: a path coefficient indicates the direct effect of a variable hypothesised as a cause of a variable taken effect (Pedhazur, 1982). The symbol for a path coefficient is P with two subscripts, the first indicating the effect (or dependent variable) and the second subscript indicating the cause (the independent variable). Accordingly P_{32} indicates the direct effect of variable 2 on variable3.

The assumption about the causal order or direction is explicitly represented by the direction of the arrow, and the assumption of closure is explicitly indicated by the absence of a connecting line between X and the latent variable E_y which represents all the residual causes of Y. The latter assumption is sometimes called the assumption of independent error or independent disturbances (Fig. 1).

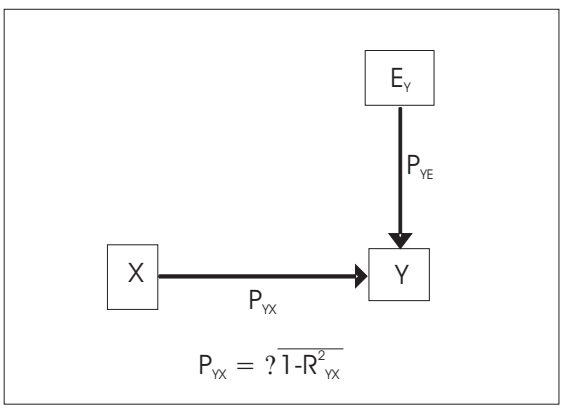


Fig 1. Path Coefficients

The path coefficients can be represented by either the ordinary regression coefficients or standardised betas. It is customary to use the Beta values (Nie and etal., 1975,p.387). The path coefficients represented in the model (Fig. 1) were Beta weights drawn from the tables-1, 2 and 3. The straight lines with the arrowheads indicate the direction of effect. This usage is partly due to Wright's original formulation and partly due to conveniences of interpretation. It is also customary to estimate path coefficients from latent variables (i.e., all residual causes) associated with X_i by $1-R^2$, where the multiple R is a part of the regression equation in which X_i is the dependent variable and all causally prior variables are used as predictors.

In this model, X_{12} and X_{13} were endogenous variables (or mediating) while the rest of the variables were exogenous variables.

Structural Equations

Each endogenous (dependent) variable in a causal model may be represented by an equation consisting of the variables upon which it is assumed to be dependent, and a term representing residuals or variables not under consideration in the given model (Kerlinger and Pedhazur,

1973, p.310). For each independent variable in the equation there is a path coefficient indicating the amount of expected change in the dependent variable as a result of a unit change in the independent variable. The exogenous variables were represented by their residuals (e_1,e_2,e_3.....).

The equations for the ten explanatory variables expressed in the standard score form (Z-score) are:

$$Z_1 = e_1 \quad (1) \qquad Z_3 = e_3 \quad (2)$$

$$Z_4 = e_4 \quad (3) \qquad Z_8 = e_8 \quad (4)$$

$$Z_9 = e_9 \quad (5) \qquad Z_{10} = e_{10} \quad (6)$$

$$Z_{11} = e_{11} \quad (7)$$

$$Z_{12} = P_{121} Z_1 + P_{123} Z_3 + P_{129} Z_9 + P_{1210} Z_{10} + P_{1213} Z_{13} + e_{12} \quad (8)$$

$$Z_{13} = P_{131} Z_1 + P_{139} Z_9 + P_{1310} Z_{10} + P_{1311} Z_{11} + e_{13} \quad (9)$$

$$Z_{14} = P_{141} Z_1 + P_{143} Z_3 + P_{144} Z_4 + P_{148} Z_8 + P_{149} Z_9 + P_{1410} Z_{10} + P_{1411} Z_{11} + P_{1412} Z_{12} + P_{1413} Z_{13} + e_{14} \quad (10)$$

Results

Table.1 shows selected parts of the output (SPSS) for the forward stepwise regression of creative thinking (dependent variable) on all the 13 regressors (independent variables). Out of 13, only 4 independent variables were entered by SPSS into the regression equation. The remaining 9 variables did not reach the criteria (see note under table 1 for the list of variables). In this analysis, variables with the F-ratio smaller than 4.0 were not entered into the equation. The variables with the highest correlation with the dependent variable were entered into the equation first.

Variables in the equation	C	Unstandardised Regression coefficient		Standardised Regression coefficient	R	R^2	Increment in R2	F-ratio	df
			SE	Beta					
1. School activities (X_{13})	200.73	2.08	0.25	0.40	0.40	0.16	-	70.18***	1/371
2. Mother education (X_4)	185.87	5.25	1.27	0.19	0.44	0.19	0.03	45.16***	2/370
3. Teacher encouragement (X_{12})	167.70	0.48	0.15	0.15	0.47	0.22	0.03	34.02***	3/369
4. Mother income (X_8)	167.08	6.04	2.40	0.12	0.48	0.23	0.01	27.46***	4/368

C = Constant; β = Regression coefficient;
SEβ = Standard Error of Regression Coefficient ;
Beta = Standard regression coefficient;
df = degrees of freedom; *** = Significant at 0.001
Note: Sex (X_1); Age (X_2); Father Education (X_3), Occupation (X_5), and Income (X_7); Mother Occupation (X_6); Medium of Instruction (X_9); and Type of the school (two Dummy variables-TS-Boys (X_{10}) and TS-Girls (X_{11})) were not entered in the equation.

Table 1. Stepwise multiple regression analysis of combined variables (background, organisational and cognitive and motivational variables) with creative thinking as the dependent variable (X_{14})

In the first step, school activities (X_{13}) contributed 16% of the variance. In the second and third steps, mother's education (X_4) and teacher encouragement (X_{12}) as perceived by the students contributed another 3% each. In the final step, mother's income (X_8) was entered, providing an additional 1% contribution. The total contribution of all these independent variables yielded a maximum contribution of 23% for the prediction of creativity in students.

The above regression analysis suggests that school activities, mother's education, teacher encouragement and mother's income are the most important factors in determining a student's creativity. The correlations of the above factors with creativity were also very high and significant above the 0.001 level; they were 0.40, 0.18, 0.23 and 0.16 respectively.

In the next stage, school activities were regressed on all variables (excluding creative thinking). The result of the multiple regression is presented in table 2.

Variables in the equation	C	Unstandardised Regression coefficient		Standardised Regression coefficient	R	R^2	Increment in R2	F-ratio	df
			SE	Beta					
1. Medium of the instruction (X)	26.05	-5.18	0.70	-0.36	0.36	0.13	-	55.40***	1/371
2. Type of School dummy (TS-Boys-X)	26.04	7.07	1.09	0.33	0.47	0.22	0.09	51.91***	2/370
3. Sex (X)	28.58	-5.81	0.76	-0.40	0.57	0.33	0.11	59.48***	3/369
4. Type of School dummy (TS-Girls-X)	27.73	5.60	1.15	0.36	0.61	0.37	0.04	53.33***	4/368

C = Constant; β = Regression coefficient;
SEβ = Standard Error of Regression Coefficient ;
Beta = Standard regression coefficient;
df = degrees of freedom; *** = Significant at 0.001

Table 2. Multiple Regression with school activities as the dependent variables

The results indicate that medium of instruction contributed

13%, and type of school (dummy TS-boys-X_{10}) 9% of variance in the organisation of school activities. Sex and type of school (dummy TS-girls-X_{11}) contributed another 11% and 4% respectively. Altogether the variance explained by the four variables on school activities was 37%.

In the next stage, teacher encouragement was regressed on the remaining variables, which was expected to have significant effects on it. Table 3 reveals that five variables had a significant effect on teacher encouragement. School activities contributed 4% of the variance, sex and medium of instruction contributed 2% each; and type of the school (dummy boys-X_{10}) and father's education (X_3) added another small contribution of 1% each.

Variables in the equation	C	Unstandardised Regression coefficient		Standardised Regression coefficient	R	R^2	Increment in R2	F-ratio	df
		SE	Beta						
1. School activities (X_{13})	39.74	0.30	0.08	0.19	0.19	0.04	-	13.77***	1/371
2. Type of School (Dummy TS -Boys X_{10})	39.77	4.00	1.75	0.12	0.22	0.05	0.01	9.58***	2/370
3. Sex (X_1)	41.66	-3.66	1.34	-0.16	0.26	0.07	0.02	8.99***	3/369
4. Medium of instruction (X_9)	47.20	-4.29	1.60	-0.19	0.29	0.09	0.02	8.66***	4/368
5. Father education (X_3)	45.01	0.80	0.80	0.11	0.31	0.10	0.01	7.95***	5/367

C = Constant; β = Regression coefficient;
SEβ = Standard Error of Regression Coefficient ;
Beta = Standard regression coefficient;
df = degrees of freedom; *** = Significant at 0.001

Table 3. Multiple Regression with Teacher Encouragement(TES) as the dependent variables

Altogether, 10% of the variance was accounted for by these five variables.

The direct and indirect effects of the independent variables on creative thinking were calculated and are presented in Table 4.

The table shows that school activities had a significant and direct effect (.40) on creative thinking. The indirect effect of this variable was very minimal (0.03), even though it mediated between CT^+ and other exogenous variables. Mother's education and teacher's encouragement had significant direct effects on creative thinking, (.19 and .15 respectively) but no indirect effect was found for these two variables. Teacher's

Variable	Zero order correlation	Equation for the correlation with creative thinking (with composition of the path coefficients		Direct effect	Indirect effect	Total effect
		Direct Effect	Indirect Effect			
1. School activities (X_{13})	0.40	$r_{13\,14} = P_{14\,13} + P_{12\,13}P_{14\,12}$ $= .40 + (.19)(.15)$		0.40*	0.03	0.43*
2. Mother's Education (X_4)	0.17	$r_{4\,14} = P_{14\,4}$		0.19*	0.00	0.19*
3. Teacher's Encouragement (X_{12})	0.23	$r_{12\,14} = P_{14\,12}$		0.15*	0.00	0.15*
4. Type of the school (Dummy TS-Girls-X_{11})	-.05	$r_{11\,14} = P_{14\,11} + P_{13\,11}P_{14\,13}$ $= -0.011 + (.36)(.40)$		-0.01	0.14*	0.13*
5. Mother's Income (X_8)	0.16	$r_{8\,14} = P_{14\,8}$		0.12*	0.00	0.12*
6. Type of the school (Dummy TS-Boys-X_{10})	0.03	$r_{10\,14} = P_{14\,10} + P_{12\,10}P_{14\,12} + P_{13\,10}P_{14\,13}$ $= -0.048 + (.12)(.15) + (.33)(.40)$		0.05	0.15*	0.10*
7. Father's Education (X_3)	0.15	$r_{3\,14} = P_{14\,3} + P_{12\,3}P_{14\,13}$		0.03	0.02	0.05
8. Sex (X1)	0.05	$r_{1\,14} = P_{14\,1} + P_{12\,1}P_{14\,12} + P_{13\,1}P_{14\,13}$ $= 0.084 + (-.19)(.15) + (-40)(.40)$		0.08	0.19*	0.11*
9. Medium of Instruction (X9)	-.12	$r_{9\,14} = P_{14\,9} + P_{12\,9}P_{14\,12} + P_{13\,9}P_{12\,13}P_{14\,12}$ $= -.0269 + (-.19)(.15) + (-.36)(.19)(.15)$		-0.03	-0.04	-0.07

Note: Age (X_2), father occupation (X_5), mother occupation (X_6), and father income (X_7), were not included in this model because they were not entered in the multiple regression equations.

Table 4. Summary of direct and indirect effect of explanatory variables on creative thinking (CT)

encouragement is a mediating variable for many exogenous variables. It also had an indirect influence on CT^+. The other variable, mother's income, also directly and significantly affected CT^+, but it had no indirect effect on CT^+.

Type of school (girls) had a small non-significant direct effect on CT but it exerted a significant indirect effect through school activities, with the result that the total effect of this variable was significant (.13). Similarly type of school (boys) also had a small non-significant direct effect, but it exerted a significant indirect effect through teacher's encouragement and school activities. Therefore the total effect was significant (.10).

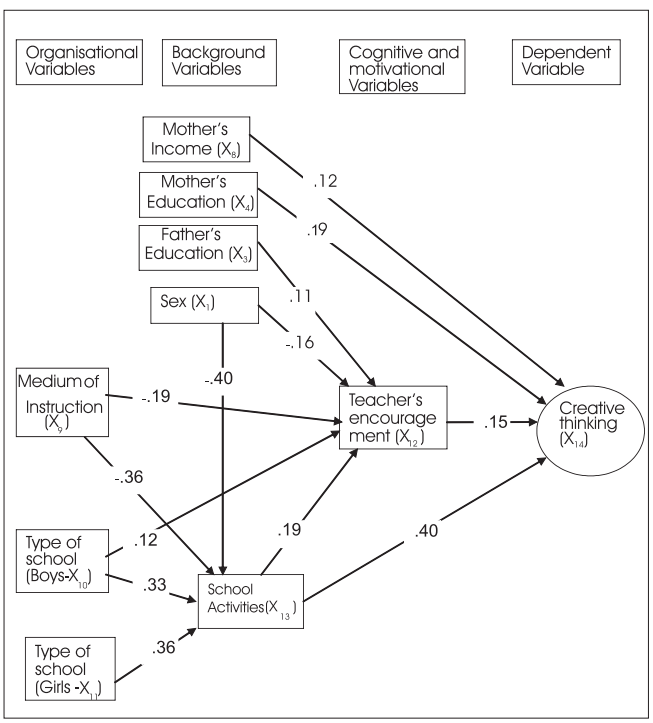
Sex had a non-significant direct effect on CT^+, but an indirect effect through school activities and teacher's encouragement which was significant. The total effect of sex was significant (-.11). It indicated that boys have been found to score higher in creativity than girls. Father's education and medium of instruction had neither direct nor indirect effects on CT. Their total effects were also not

significant.

Exploring the model for correlates of students' of Creative Thinking (CT)

A major focus of the study was identifying the variables most influential on creative thinking ability with a view to represent a model of the correlates of creativity among secondary school students in India. The method adopted was 'path analysis' chosen to study the direct and indirect effects of variables and display graphically the pattern of relations among the selected variables. The purpose of Path Analysis was to explain, specify and quantify the effects on selected variables on creative thinking.

To construct the model, a regression analysis was undertaken. The result showed that when school activities were entered first, the multiple correlation coefficient (R) was .40 (16% of variance). In step 2 and step 3, mother's education and teacher encouragement contributed another 3% each. In step 4, only 1% was contributed by mother's income level. Altogether the variance explained by the four variables on creative thinking ability was 23%.



Note: Age (X_2), Father occupation (X_5), Mother occupation (X6) and Father income (X7) were not included in this model because they were not entered in the multiple regression equations.

Figure. 2: A Model for the correlates of creative thinking

School activities (X_{13}) and teacher encouragement (X_{12}) were found to mediate between the exogenous variables and creative thinking ability. The variance explained is less than it might have been, because of non-inclusion of some factors, for example students' cognitive and motivational factors.

Overall, creative thinking (X_{14}) seems to be directly and largely influenced by activities organised in the schools (0.40), mother's education (0.19) and teacher encouragement (0.15), and mother's income (0.12). It is indirectly influenced by type of the school -TS-girls (0.14), type of the school -TS-boys (0.15) and sex (-0.19). In the model, father's education (0.05) and medium of instruction (-0.07) seem to have non-significant effects on creative thinking, although these emerged in a comparative analysis (Fig. 2).

Conclusions and Discussion

The research was designed to look at government schools in greater detail than had previously been the case, because the literature survey revealed that these schools were under-performing not only in relation to academic performance but also in developing creative abilities among the students when compared to private school students. The main purposes of the study were to examine students' performance in creative thinking ability in relation to selected variables, and also examined teachers' behaviour as perceived by their students and activities organised in schools to promote creativity.

In this research Multiple regression analysis was undertaken to determine the relationships between the variables measured and creative thinking. The 'path analysis' was chosen to study the direct and indirect effects of variables and display graphically the pattern of relations among the selected variables. To construct the model, a regression analysis was undertaken. A multiple R of .48 was obtained in regressing school activities (0.40), mother's education (0.19), teachers' encouragement (0.15) and mother's income (0.12) on measured creative thinking. The more sophisticated model developed through path analysis demonstrated the direct influences of other variables on school activities and teacher

encouragement. These included father's education, sex, medium of instruction and type of school boys or girls.

With regarding parents' education, similar results were found by Raina (1968), Mukhopadyay, Chakrabarti and Kundu (1990), and Sudhir Kumar (1992), that where parents had a higher level of education this was a favourable factor for the development of creativity in their children. As King (1990) argues, "a more educated mother raises a healthier family; she can better apply improved hygiene and nutrition practices. She may have fewer and better-educated children, she is more productive at home and in the workplace and is better able to get further education". Women's enhanced ability to earn an income to support their families is becoming increasingly important, as more become heads of households and enter the labour force in search of paid work. "Indeed, failure to raise women's education to a par with men's exacts a high development cost- - in lost opportunities to raise productivity and income, and improve the quality of life". The level of schooling that women have achieved is only one aspect of female education affecting a country's development (p.1).

If the intention of the government and the schools is to develop the competency of the students attending them, then they should jointly plan at least some programmes for educating and assisting in improving the earning power of women. In this process, voluntary organisations can also be encouraged to play an important role as catalyst between Government, school and parents. If necessary some classes at the weekend may be arranged to educate women in small-scale[1] industries and marketing.

While this may put an extra burden on schools, it may be worthwhile for the future. It may also encourage parents to show concern and regard for the school. They may come forward to help the school in many ways. It will also help in developing rapport with the school. The responsibility of the school is not only to teach the children, it should also hold responsibility for building and developing the nation.

The head teacher should also try to make his/her teachers realise that they are respected not only as individuals but also as important partners in the development of the school. There must be a feeling of general acceptance, respect and support among the head teacher and teachers (Raja Gopal, 1972). The head teacher should provide opportunities for the teachers to work together in planning programmes for the improvement of instruction. The knowledge of creativity is essential for educational administrators at the highest level and head teachers at school level. They must realise the importance of creativity. Only then, they will take appropriate measures to develop creative skills to assist the child in his future life.

Like many other studies, the present study indicates that there is a need for involvement of parents fully in the process of educating the children. Bastiani and Wolfendale (1996) emphasise the role of parents and teachers' mutual understandings. Teachers can share their learning objectives with parents and can ask for their willingness to work on creative tasks such as modelling or cooking, bringing in artefacts, talking about their experiences or helping with tasks like costume design or productions.

This "contact between parents and teachers needs to be a "two-way process", from home to school and from school to home. Inadequate communication between the two may considerably hinder the scholastic progress of the child. This is especially true when considering creative work" (Powell Jones, 1992, p.32). Powell further suggests that the teacher must act as interpreter of the child's work to his parents, who can mistakenly stifle creative growth through imposing adult standards and ideas on him and attempting to correct anything which does not conform to a conventional standard. This contact must be maintained in Parent-Teacher Associations (PTA), open days, school visits, home visits, planned home-school conferences and study groups.

Parents should be invited to school often, to discuss or share their ideas in relation to the progress of their children and school (which is very common in British schools). The school should organise Social Evenings at regular intervals, perhaps two or three times a year depending upon the response from the parents. Frequent visits to school will develop a good rapport and concern about

the school. This may also develop positive attitudes towards the school rather than parents misunderstanding[2] the school.

As the World Education Report (UNESCO, 1998, p.55) pointed out, *"if education is to be expected to help the poor to lift themselves out of poverty, then in the poorest countries education itself needs first to be lifted out of poverty".* From this perspective, structural adjustment programmes designed to eliminate wastage in public service could usefully be complemented by investment in the physical infrastructure of education: providing schools with water and electricity and reasonably solid walls and roofs, plus furniture and of course textbooks and other teaching materials.

Particularly in India, the parents of students attending government schools are busy during the daytime with their routine work. So contacts with school are negligible. Teachers and parents do not know each other and there is a wide gap in communication between them. As the Review committee of NPE'86 (1990) commented, *"the teachers, by and large, see themselves as responsible for teaching certain assigned subjects and doing certain other assigned tasks. They have little or no links with the concerns and situations of the community in which the school is placed and for the people, whose children they teach. This 'alienation' has to be put to an end. We see the imperative need for every school to be, in the real sense, a 'Community School'* [3] *(p.24).*

Recommendations

As a result of this study, that is designed to investigate the promotion of creativity among secondary school children in India and from the literature survey, the following recommendations are made.

- Provision may also be made for students' presentations in class and enabling them to write imaginative stories, poems, draw cartoons or pictures and build models by using various materials. Children should be provided with a sufficient variety of materials and experiences to give them a wide choice of activities for their leisure time.
- Teachers can identify the children who have curiosity and interest in particular areas and can form subject clubs e.g. science clubs, mathematics clubs and cultural and literary clubs or committees. Teachers should build-up confidence among students to take up projects or encourage the children to become involved in practical activities. This can be done after school hours.
- Teachers and parents should make every effort to make their children independent and self-reliant in order to express their creativity. Children must be free from the imposition of too much pressure of academic work, and ample opportunities need to be provided for freedom of expression by respecting their thoughts and ideas, developing curiosity and encouraging experimentation.
- Schools should maintain rapport with parents through Parent Teachers Association (PTA) and try to make occasions where the parents can become involved in the education process and let them share responsibility for their child's development. The parents should be fully informed about the importance of developing creativity and the role that they can play in promoting it, and helping their children in future career selection.
- Extra-curricular activities like drama, film, the art and crafts and sports are an essential part of everyday learning. Conducting debates[4], brainstorming[5] and synectics[6] are very important for developing creativity.
- The school should provide the infrastructure facilities, adequate instructional materials, a high quality of teaching, and provide an exciting and adventurous atmosphere for the children. School should also give proper guidance, encouraging children to undertake creative work by organising stimulating creative activities and exposing the children to the outer world by conducting educational tours and field trips.
- The curriculum should be flexible and according to the students' present day world needs. At secondary level, the syllabus must be reduced and a fixed

portion should be allotted in order to improve creative thinking.

Footnotes

1. Garments, knitted goods and laces, pickles, jams, tomato-sauce, butter, cheese, curd, snacks and sweets, which are manufactured in a small scale or home-made.
2. Misunderstanding, lack of understanding between parents and the school. Parents think that "the teachers are paid employees, they are not doing a proper job, students are not taught well". In their terms school is an isolated socialising agency. Teachers think, "Parents never care about their children's studies and show little concern for School. Hence, the school is isolated day by day from society.
3. A Community School would mean that the school is not only teaching the children from the community or area that it serves but is organically linked with the community, has emotional attachment with it, and hence is actively involved with and extends itself into the life and concerns of the community.
4. The process of debate provides practice in organising, developing and presenting ideas in an orderly and efficient manner. Debate forces the students to look at the situation from all sides, to react quickly, defend and attack / respond to the issues before them.
5. Brainstorming is a group activity: the members of the group are seated in a circle and encouraged to call out their ideas for given tasks, listing all the possible ideas and each member of the group ranks the importance of the listed ideas in order of preference. Finally they summarise the results.
6. Synectics is a procedure for bringing together elements which do not seem to belong together. It seeks to systematise the process of seeing connections between elements of experience and knowledge, which are not normally regarded as belonging together.

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