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Creativity and Innovations

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BACKGROUND

The approaches to studying creativity called the '5-P's', namely, person, process, product, press, and potential, are quite popular. These approaches are further reinforced by more specific questions about the researchers of creativity, and the area and the methodology of research. Some of the questions are related to those who conduct studies in the area of creativity. These questions are: What motivates those who study the subject of creativity? What would actually be the object of their research studies? Who would be involved in studying creativity, or what disciplinary or methodological expertise should they hold? What would some of the benefits be and how would these findings be translated into practical outcomes? What would be the changing research scenario in the coming transitional decade? Like these, many more questions and innovations are constantly emerging in the arena of creativity. We ought to find out the answers although there are some difficulties in the way.

One of the main difficulties to conduct research in creativity lies in our failure to formulate an acceptable definition. Some of our definitions predominantly support the importance of studying the domain of creativity from the viewpoint of its effects on the society whereas some other definitions recognise the importance of personal expressions of the human activity. Hence, extrinsic and intrinsic importance is coming to the fore.

There are some who hold an outright assumption that creativity is a mysterious phenomenon, one which defies systematic analysis and inquiry, something which is not clearly defined. Others hold that creativity is a mystical concept which is elusive, challenging implicit and scientific study. Yet, others think creativity is a magical phenomenon. Accordingly, there are only a few blessed individuals who have had real creativity, implying thereby that these geniuses have been specially gifted. Rather than a deliberate attempt to find the nature of such gifts or how to nurture them in others, this particular myth promotes the belief that it is more productive to simply appreciate the manifestations of these given geniuses.

Another difficulty in the study of creativity is the belief that to be creative, one must be abnormal, crazy, bizarre, or neurotic. Creativity is often equated with pure novelty, which by definition must be outside the realm of traditional and established patterns of human behaviour. Over emphasis on novelty may often involve madness. Still another source of resistance lies in the belief that creativity involves fun, entertainment and merry-making, and cannot, therefore, involve anything of hard work leading to serious inquiry. Such views have also been expressed by Isaksen, S.G. and Murdock, M.C. (1988).

Despite these definitional divergences and difficulties, there has been a consistent growth of research about this complex and multi-faceted

phenomenon of creativity and innovation. One of the basic assumptions underlying the inquiry about creativity is that creativity is seen as a natural human phenomenon. Further, the enhanced awareness of creativity will help to examine the imaginative and productive applications of this knowledge for improving the quality of our lives.

About fifty years ago, the trend of research in the area of creativity changed. Guilford, J.P. (1950), as the President of the American Psychological Association in an address pointed out: "Of approximately 121,000 books and papers listed in *Psychological Abstracts* in about twenty-three years, only 186 seemed to have some bearing on the topic of creativity." Today, of course, the proportion looks decidedly healthier. The number of studies for the year-and-a-half of 1965-66 equalled that of the preceding ten years, which in turn equalled that of the preceding 100 years (Parnes, S.J. and Brunelle, E.A. 1967). Much of the literature bore on areas other than education, such as industry, science, business or the arts. Deutsch and Shea, Inc. (1958) reported a bibliography on creativity in these areas. It lists some 350 studies from the early 1950s alone. While 6% of the references of a bibliography on giftedness for 1950-60 dealt with creativity (Gowan, J.C. 1961), its successor for 1960-64 listed 50% of its titles under creativity (Gowan, J.C. 1965).

Indian researchers have shown interest in the area of creativity in education, but we have yet to undertake significant educational problems. The research climate, in India, is improving marginally. The depressing environment continues to coexist due to a number of factors, viz., a long period of de-empowering of teachers, increasing rigidity of teaching-learning situations, the intense standardisation of educational substance, ongoing concentration of resources, increasing centralisation of the decision-making process, frequent interference of politicians, traditional bureaucratic managements, overcrowding student population, increasing proportion of first-generation learners, and declining financial resources available for school systems. However, apart from indirect government efforts, a few positive efforts of innovative schooling can be seen in institutions like: Bal Bhavans, Jnana Prabodhini, Mirambika, Rishi Valley School, Netarhat Residential School, a few Public Schools, selected Mission Schools, Navodaya Vidyalayas, and some of the emerging schools sponsored by private organisations. Nevertheless, we must note that many of these efforts need the much wanted research support. Some of the decisions are *ad hoc*. The general picture of research in creativity in India is cheerless in the first phase. Up to 1970, only five studies were completed. But the situation is gradually improving. In 1993, as many as 214 research studies have been completed in India. The survey of these studies is being given under different headings like: review of research trends, review of research methods, review of researches in creativity, development of creativity, training of personnel, systems approach, and coming decades.

REVIEW OF RESEARCH TRENDS

Some of the following authors have reviewed researches in creativity. This trend report has used the structure and substance of these reviews. These reviews are: Raina, M.K. (1980), Passi, B.K. and Jarial, G.S. (1981), Passi, B.K. et al. (1982), Passi, B.K. and Mohanty, G. (1989), Passi, B.K. and Buch, M.B. (1989), Raina, M.K. (1991), Stein, M.I. (1975), Taylor, I.A. and Getzels, J.W. (1975), Torrance, E.P. (1986), Feldhusen, J.F. and Clinkenbeard, P.R. (1986), Isaksen, S.G. (1987), and Gronhaug, K. and Kaufmann, G. (1988) abroad. Comments about the selected reviews are presented briefly.

Some of these reviews have classified the research studies under different headings like: nature of creative thinking; personal dispositions related to creativity; external determiners and applications, particularly in connection with education and training; techniques and programmes of developing creative thinking; studies at institutional level; transcendental

meditation (TM) theoretical/philosophical; identification and measurement of creativity; intelligence, achievement and creativity; socio-cultural factors; nurturing of creativity; surveys and compilations; textbooks; trends in programme alternatives; instructional materials and strategies; developing creativity and other tool skills; and other trends of the decade. For example:

(a) Raina, M.K. (1980) edited a book on *Creativity Research: International Perspective*, in which many eminent scholars developed trend reports in the context of their countries. Probably, a thematic review could have given a better picture of research in the area of creativity. The substance of the abstracted findings could have been used to develop the theme.

(b) Passi, B.K. and Jarial, G.S. (1981) developed a review article entitled, "Research on Creativity Training in India". They tried to focus on secondary data available in the form of other reviews. Some of these reviews were conducted by Parnes, S.J. (1967); Torrance, E.P. (1972); and Mansfield, R.S., Busse, T.V. and Krepelka, E.J. (1978). The findings were categorised as: special programmes for developing creativity; techniques for developing creativity; transcendental meditation; training in creative appreciation, creative perception, creative problem-solving and divergent thinking; creative teaching methods; reward and punishment; ongoing studies; and studies at institutional level. They reported the innovations being conducted in different institutions. This is a marked feature which attracts the researchers to this particular review. Nevertheless, we find that the future directions of research were missing in this review.

(c) Based on the research abstracts and publications of NCERT, ICSSR, AIU, and the first two *Surveys of Research in Education*, Passi, B.K., et al. (1982) have published a review monograph: *Creativity in Education*. They classified the studies into three clusters of correlates: demographic, cognitive, and affective. The demographic cluster included age, birth order, sex, locality and socio-economic status variables. The second cluster included variables like academic subjects, intelligence and scholastic achievement. The third cluster included variables related to values and personality. This review is limited to Indian studies and, is yet to be updated. It is heavily dominated by findings of master's degree research dissertations.

(d) Passi, B.K. and Buch, M.B. (1989) reviewed 166 studies out of a lot of 4,703 research studies reported in the four *Surveys of Research in Education*. Out of these 166 studies, about 300 odd relevant findings on creativity were identified. Meaningful clusters of these findings having a bearing on specific educational practices were obtained. In-depth implications of these 300 research findings were drawn for developing guidelines for teachers. This was done for improving the educational processes for stimulating pupils' creativity. This research review has limitations as it could focus primarily on Indian researches alone. Incidentally, this review could not provide future guidelines for further research efforts.

(e) Passi, B.K. and Mohanty, G. (1989) identified the research findings related to creativity from all the doctoral and project studies reported in the *First, Second, Third* and *Fourth Surveys of Research in Education*. The research findings were classified into subheadings: what is creativity, importance of creativity, can creativity be developed? creativity blocks, characteristics of creative students, personality, socio-economic status, sex, achievement,

intelligence, subject, locale, birth order, sibling, age, hobby, caste, language, climate, grade-level, testing procedure, non-testing procedure, special problems of creative students, curriculum, textbook, methods of teaching, teaching aids, school environment, and quality of teachers. Generalisations were arrived at through the voting method. One would appreciate it if more sophisticated methods of meta analysis and synthesizing measures were used.

(f) Raina, M.K. (1991) wrote a trend report on "Research in Creative Functioning" in the *Fourth Survey of Research in Education*. Comprehensively, he brought to light the national and the international perspectives. One hundred and thirty-six studies were classified into six major areas: theoretical/philosophical; identification and measurement of creativity; intelligence, achievement and creativity; personality correlates of creativity; socio-cultural factors and creativity; nurturing of creativity. Raina made an appreciable effort at reviewing both the national and the international studies. However, one feels a subtle overplay of the international perspective. Clear-cut suggestions for future research could have been given.

(g) Feldhusen, J.N. and Clinkenbeard, P.R. (1986) identified and described different creative-thinking instructional materials. Of these, the Purdue creative-thinking programme was given a special face-lift while the productive-thinking programme, creative problem-solving, and other programmes were underplayed.

(h) Torrance, E.P. (1986) published a review, *Teaching Creative and Gifted Learners*. Its six major headings were: Surveys and compilations, textbooks, trends in programme alternatives, instructional materials and strategies, developing creativity and other tool skills, and other trends of the decade. He has painstakingly elaborated the survey reviews by different scholars over the years, supported by his own observations and comments. He has given a gestalt overview presenting tables depicting: a summary of successes in teaching students to think creatively; a comparison of successes of different approaches to teaching creative thinking; and the criteria used in the studies of effectiveness of creativity training. Nevertheless, Torrance has exclusively focused on the researches of Western scholars.

REVIEW OF RESEARCH METHODS

Research in creativity has been completed both at Ph.D. and project levels. Out of the 214 studies completed so far, 194 have been done at the Ph.D. level and 20 at the project level. A close scrutiny of Table 1 indicates that only three research studies were completed at the Ph.D. level up to 1970. Then there has been a gradual increase in the Ph.D. and the institutional level research in this area. During the period 1971-80, there has been an abrupt rise in the number of research studies, and thereafter, this trend has continued. It seems that the researchers have realised the importance of creativity.

Table 1

Year-wise Distribution of Studies Completed at Doctoral and Project Levels in India

Year	*Doctoral Level*			*Project Level*	*Total*
	Education	*Psychology*	*Others*		
1961-70	03	01	—	01	05
1971-80	55	13	04	05	77
1981-90	61	33	09	10	113
1991-93	11	03	01	04	19
Total	130	50	14	20	214

Different types of institutions are engaged in research in the area of creativity. Departments of education completed 130 research studies and departments of psychology completed 50. There are 14 other studies which have been completed by polytechnics and the departments of physical sciences. The physics department of Aligarh Muslim University made appreciable efforts to probe into the field of creativity. It completed two research projects. There is need for many other professional institutions to take up research in creativity.

Research is financed by various agencies. The NCERT has been one of the pioneer agencies to finance creativity projects. These projects were related to school education. The other funding institutions are: ICSSR, CIIL, SCERT and UGC. These agencies sponsored creativity at the elementary and the higher education levels. One big research project has been completed by Jnana Prabodhini, Pune. This institution developed a battery of tests on the lines of Guilford's model of structure of intellect. Another developmental project, called "Navodaya Vidyalayas", is meant for rural talented students. These schools are funded by the Ministry of Human Resource Development.

Methodology

Most of the studies are descriptive and experimental following the popular quantitative methodology. Generally, the studies are micro in nature. About 25% research studies which have developed tools for measuring creativity are descriptive. These tools are generally based on the theoretical framework proposed by Guilford, Getzels and Torrance. About 60% research studies are correlational. These researches studied creativity in relation to personality, intelligence and other socio-cultural variables. About one-seventh of the studies employed experimental designs. Cross-cultural and longitudinal studies are missing. There is a need to use multiple methodologies, such as, historical and cross-cultural methodology, qualitative approaches, case studies, naturalistic inquiries, and longitudinal developmental studies. Macro-level studies having a bearing on the larger socio-cultural systems have not been undertaken.

Sample

Samples of different size and nature have been employed by the researchers depending upon the purpose of the study. Survey-type studies used samples ranging from 12 to 500 students. The experimental studies used samples ranging from 10 to 200. The studies aimed at standardising tests used a sample size of up to 700 students. Compared to other research areas, the samples are limited. The trend of using limited samples is, perhaps, due to the tedious and lengthy scoring procedures of creativity tests. The researchers have restricted their samples to secondary schools, urban areas, and students belonging to normal school systems. The researchers have selected samples mainly from the nearby localities where they had been pursuing their research effort. Convenience has been a major consideration while designing studies.

No study has employed samples drawn from the pre-primary and primary school student population. Similarly, there are very few studies at the post-graduate and professional levels. Another striking feature is that the formal classroom events and settings are sampled. It means that by default the inherent creativity of out-of-classroom or out-of-school persons, agencies, situations, and activities has been excluded from our framework of research. Therefore, the samples of parents, sports teachers, social workers, and agents working in non-formal agencies could not be considered.

Depending upon the nature of the population, and the purpose of the study, researchers have employed a variety of sampling methodologies. Some of these are: simple randomisation, multi-stage randomisation, simple and multiple stratified sampling, random stratified sampling, and clustered sampling. The

diversity in the nature, size and methodology of sampling is so wide that it is difficult to make a comment of generalisations about sampling.

Tools Employed

Creativity has been measured by various approaches, including different types of tests. The most widely used tests have been the Torrance Tests of Creative Thinking (46 studies), the Passi Tests of Creativity (32 studies), and the Baqer Mehdi Tests of Creativity (26 studies). Some of the researchers adapted or translated these tests in their regional languages. These tests were used for measuring verbal and non-verbal creativity.

Apart from general creativity, the researchers also made efforts to measure subject-specific creativity. For this purpose they used specific tests for measuring Mathematical Creativity, Language Creativity and Scientific Creativity. In some cases the researchers developed their own tests to measure subject-specific creativity. However, the tests to measure creativity in the expressive arts, such as, folk arts, music and painting need our attention. The other talent areas, such as social leadership, psychomotor domains of human endeavour, and applied spirituality need planned efforts for tool development.

The correlates of creativity identified by the researchers have been measured with the help of available standardised tools related to intelligence, personality, self-concept, etc. About four dozen studies used 16 PF for measuring personality. Intelligence was measured by tests developed in India and abroad. Other tools, like questionnaires, and observation schedules have been developed and used on the basis of a tailor-made approach.

Statistical Techniques Employed

There are two broad categories of research studies: correlational and experimental. In the case of correlational studies, the researchers have used statistical techniques like correlation, factor analysis, regression analysis and prediction. Some of the researchers used different statistical tools to compare groups and treatments. In such cases the researchers made use of analysis of variance, analysis of covariance, t-test, chi-square, sign-test, Mann-Whitney's U-test, etc. The most favoured statistical tools have been taken from the parametric statistics. The non-parametric tests have not been as popular as parametric tests. The qualitative techniques of data analysis are not popular among the researchers.

The experimental studies have used different types of experimental designs. These include simple pre-test—post-test designs, factorial designs, experimental-control groups designs, and mixed designs. The most common among these are pre-test—post-test experimental-control groups designs. The main feature of such studies has been that the researchers have claimed the designs employed by them to be true experimental designs. The researchers have tried to employ physical, selective, as well as statistical controls. In some cases the inadequacies of the controls have affected the results so much that the internal and external validity is doubtful.

The correlational and factor-analytical studies have aimed at identifying factors implicit in the structure of different variables and situations. Regression studies have aimed at establishing multiple regression equations, extentness of multiple correlations between predictors like personality traits, intelligence, etc., and the criterion variables of creativity. The experimental designs employed ANOVA and ANCOVA for analyses.

Research in creativity has evolved through five hierarchical stages: Nature of Creativity, Correlates of Creativity, Development of Creativity, Training of Personnel, and Systems Approach.

NATURE OF CREATIVITY

In order to be effective within any given area of inquiry, we must define our terms, recognise

basic assumptions, and develop explicit guidelines for sharing and communicating our knowledge. This calls for a sound philosophical edifice of creativity. Further, if creativity has to become a distinctive discipline of inquiry, we must be concerned with the philosophical categories of ontology (the nature of its reality), epistemology (the nature of its knowledge) and axiology (the nature of its value) Isaksen, S.G. and Murdock, M.C. (1988). Further, we have to consider factors like field, boundary, methodology and approach as ingredients of discipline.

In fact, one of the most basic suppositions underlying productive probing into the complex and multi-faceted concept of creativity is that it is seen as a natural human phenomenon. It is often argued as to how we can have a widely utilised definition of this intangible concept of creativity. How can one study something which is not clearly defined? Regardless of the fact that there are a few definitions and theories of creativity, one artistic expression of this concept of mind is the infinity mirror relating and reflecting unrelated ideas. After reviewing 22 definitions of creativity, Welsch, P.K. (1980) found significant levels of agreement on the key attributes of these definitions. She proposed the following definition from her review of the literature:

- Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator.

Contrastingly, while reviewing a number of viewpoints and definitions of creativity, Passi, B.K. (1972) had defined creativity as:

- A multi-dimensional (verbal and nonverbal) attribute differentially distributed among people and includes chiefly the factors of seeing problems, fluency, flexibility, originality, inquisitiveness and persistency.

There are many other definitional openings to creativity, most of which are derived from some particular theoretical frame of reference. Researchers have also studied the managerial and organisational applications of creativity and innovation, making and communicating meaningful new connections in order to think of many possibilities, think and experience in various ways and use different points of view, think of new and unusual possibilities, and guide in generating and selecting alternatives, to name a few.

After completing a review of the relevant literature, a lack of substantive research in the area of the theoretical/philosophical basis of creativity can be evidently perceived. This area of creativity research still remains practically virgin. Raina, V.K. (1991) reported only one study in the theoretical/philosophical field, which by any yardstick is negligible. Sharma, P.K. (1991) searched for a viable concept of the nature of creativity in education. Nevertheless, research on the theoretical/philosophical perspective does not cover a well identified set of areas of study. Penetrating attention should be given to questions related to the subject-matter and the concept of structure of creativity, philosophical analyses of creativity research methods, and the like.

MEASUREMENT OF CREATIVITY

During the last few decades efforts have been made to measure creativity through testing and non-testing approaches. The testing-based psychometric approach narrows down the concept to the extent of the nature and scope of test items. Measurement of creativity through the test approach is an uphill task. However, broad principles for test construction could be established. Based on the lines of Guilford and Torrance, many investigators developed their own tests. Attempts have been made to measure creativity by instruments developed by Mehdi, B. (1970), Passi, B.K. (1972), Gillitwala, P.J. (1978), Singh, C. (1978), Jhag, D.S. (1979), Mishra, A. (1981), Tripathi, S. (1987) and Singh, B. (1988a).

Tests were developed to measure general creativity by Mehdi, B. (1970), Passi, B.K. (1972), Gillitwala, P.J. (1978), Jhag, D.S. (1979) and Singh, B. (1988a). Some of these tests are verbal whereas the others are nonverbal. Literary creativity tests were developed by Kundley, M.B. (1977) and Rao, V.R. (1982). Besides this, tests were developed for measuring scientific creativity by Singh, C. (1978), mathematical creativity by Parasnis, H.N. (1985), physical science creativity by Gupta, S.M. (1980) and language creativity by Malhotra, S.P. and Sucheta, K. (1989). These tests have high reliability, ranging from 0.89 to 0.97. Split-half and test-retest methods have been used to establish reliability. The sample size for establishing reliability ranged from 150 to 250 students. Most of these samples are drawn from the secondary and senior secondary stages. No test has been developed for pre-primary children. The face validity, convergent validity, discriminant validity, and concurrent validity have been established. Some of the criterion chosen for establishing concurrent validity are not appropriate. Establishing norms is not popular with test constructors. Except Passi, B.K. (1972) no other study has reported the establishment of detailed norms for creativity tests.

The creativity test responses are popularly scored for fluency, flexibility, originality, and elaboration. Manuals are silent, especially, on the scoring of elaboration. Apart from this, a few other dimensions, like persistency and inquisitiveness, have been included in the definition and measurement of creativity by Passi, B.K. (1972). Other than these dimensions, Torrance, E.P. (1974) developed streamlined scoring. He incorporated five norm-referenced measures and thirteen criterion-referenced measures in his conceptual framework of creativity. The five norm-referenced measures include: fluency, originality, abstractness of titles, elaboration and resistance to premature closure. The criterion-referenced measures include: emotional expressiveness, story-telling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines, synthesis of circles, unusual visualisation, extending or breaking boundaries, humor, richness of imagery, colourfulness of imagery, and fantasy.

Most of these tests have been constructed through the medium of the English and/or Hindi languages. Very few tests have been developed in regional languages Kundley, M.B. (1977), Rao, V.R. (1982), and Tripathi, S. (1987). It is expected that the verbal tests of creativity should have been developed in many more regional languages. A few investigators have merely translated the tests of Torrance, Guilford, Passi, etc., in their own languages.

As mentioned above, measuring creativity is an uphill task; likewise, scoring of responses on creativity tests is also a difficult task. For scoring, trained hands are very essential. This problem can be solved by providing a detailed training procedure in the test manuals.

Many a time our investigators have used artificial and unrealistic testing situations. The stimulus items of the tests include fancy rather than real-life situations. However, investigators like Kumari, V.M.C. (1993) and a few others have developed creative problem-solving tests based on age-specific realistic situations. The inclusion of life-like realistic situations is duly emphasised in the writings of many thinkers, including Edward de Bono. Apart from the usual testing techniques some other approaches, like biographical assessments, interviews, group discussions, real field tests, role playing, and long-term observation, could be used. The bio-medical approaches to measure creativity could be potential means in future.

CORRELATES OF CREATIVITY

The increasing awareness about the importance of creativity is generating many more research questions. What factors promote creativity? How far do these factors contribute towards the development of creativity? A lot of research has been undertaken and a few reviewers have also made efforts to synthesise various research issues. Yet, a clear picture has not emerged.

Classification of 214 studies, including 194 doctoral studies and 20 research projects conducted or sponsored by various agencies, has been undertaken on the basis of the nature of the variables. There are non-organismic variables like demographic factors and socio-cultural factors. The variables in the second category are organismic variables, such as intelligence, achievement and personality factors. The breakdown of researches in different categories of non-organismic and organismic correlates is not mutually exclusive. At times, researchers have included multiple variables in their studies. Such studies might crossover both organismic and non-organismic correlates of creativity.

Studies having non-organismic correlates of creativity considered variables like age, birth order, sex, etc., and correlates of achievement are categorised under the heading of demographic correlates. The other variables like locality, socio-economic status, etc., have been categorised under sociological correlates of creativity.

There are about five dozen researches which study demographic correlates, such as age, sex, birth order, and many more. The studies categorised under this heading found out the relationship between demographic variables and creativity. Sometimes, such studies have compared the creativity scores of one set of individuals with those of the other. The variable-wise findings of these researches are presented below.

Age and Creativity

Raina, M.K. (1970) studied the relationship between the variables of age and total creativity and its components. Of these, the variables of total creativity, originality, and elaboration were found to be positively and significantly related with age. The relationship between age and fluency was negative and significant while it was not significant in the case of age and flexibility. Lalithamma, M.S. (1973) observed that creativity and age were positively and significantly related to each other. Khire, U.S. (1971), and Badrinath, S. and Satyanarayan, S.B. (1979) reported that creativity increases up to the age of 13 years, whereas, Joshi, R.J. (1974), and Gakhar, S. (1974) found that creativity increases up to the age of 15 years. Ahmed, S. (1980), and Gupta, K.K. (1988) reported a significant increase in the verbal and non-verbal creativity from Classes VII to XI. On the other hand, Passi, B.K. (1972), and Thammaprateep, V. (1976) found a negative relationship between age and creativity. Vohra, I.N. (1975), and Shukla, J.P. (1980) observed a negative relationship between non-verbal creativity and age among the primary school students, whereas, Singh, R.J. (1978) observed the same relationship between creativity and age among the teacher trainees. Similarly, Rawat, M.S. and Agarwal (1977) reported that from 12 to 16 years creativity was negatively related with age in the case of boys whereas the relationship between these two variables was positive in the case of girls. Apart from these studies, Bhargava, M. (1979) reported that there exists no relationship between creativity and age.

The studies reported so far were not longitudinal ones. The investigators selected samples having different age-groups and they compared these groups on creativity. On the basis of these comparisons they drew conclusions about the increase in creativity. These studies inferred the presence of a relationship between age and creativity. The conclusions regarding the presence of an increasing trend in creativity across different age-groups would have been accepted, provided the researchers could carry out longitudinal studies while employing all the controls and using age-relevant tests.

Torrance, E.P. (1963) believes that there is a discontinuity in the degree of creativity expressed at various age-levels. For almost all creative thinking abilities, there is a drop at the age of 5 as the child enters the juvenile stage with its demands for acceptance of authority outside the home. Another drop, the most

pronounced, occurs at 9 years, that is, at the onset of pre-adolescence with its demands for peer approval; again, at the age of 13 at the onset of adolescence it is evidently marked by the increased anxieties and striving for approval from the opposite sex and finally, at the age of 17 years. Such observations need to be tested. Findings showing trends of creativity from childhood to adulthood would be useful.

Sex and Creativity

On this aspect, the findings of about six dozen studies were collected and reported in this review. Of these, Passi, B.K. (1972), Bedi, R.K. (1974), Singh, R. (1975), Rawat, M.S. and Garg, M.K. (1977), Arora, G.L. (1978), and Jarial, G.S. (1981) found that the female students were significantly superior to the male students on verbal creativity. They were also significantly superior on non-verbal creativity as reported by Bedi, R.K. (1974), and Jarial, G.S. (1981). Hussain, M.G. (1974), and Pandit, R. (1976) reported that the females were significantly superior to the males on the fluency, flexibility and originality dimensions of creativity. Raina, M.K. (1971), Goyal, B.R. (1973), Raina, K. (1986), Ramkrishana, A. (1986), and Datta, K.L. (1989) found that the females were significantly superior to the males only on fluency and flexibility dimensions of creativity. Singh, C. (1978) reported that the female students were superior to the male students on fluency and originality dimensions of creativity. Hussain, M.G. (1974), found that the female students were superior to the male students in originality.

Male students scored higher than their female counterparts on verbal creativity, Prakash, A.O. (1966), Rawat, M.S. and Agarwal (1977), Badrinath, S. and Satyanarayan, S.B. (1979), Sharma, S.C. (1979), Singh, O.P. (1982), Mishra, K.S. (1982), Tripathi, V.K.D. (1983), Chauhan, Y. (1984), Kundu, D.A. (1984), Reddy, S.Y. (1991), Ghosh, M.C. (1991), and Mary, S.G. (1992). On nonverbal creativity too, the male students were significantly superior to the female students, Passi, B.K. (1972). With respect to different dimensions of creativity, it was reported that the male students scored higher than the female students: on originality, Raina, M.K. (1971), Awasthy, M. (1979), Badrinath, S. and Satyanarayan, S.B (1979) and Pandey, M.M. (1980); on fluency, Awasthy, M. (1979) and on elaboration, Singh, C. (1978).

No significant differences were found between the male and the female students with respect to verbal creativity — Raina, V.K. (1970), Gakhar, S. (1974), Thammaprateep, V. (1976), Dutt, N.K. et al. (1977), Lal, G. (1977), Thorat, N. (1977), Singh, C. (1978), Gupta, A. (1979), Masih, S. (1979), Pandey, M.M. (1980), Shukla, J.P. (1980), Mishra, K.S. (1982), Bindal, V.R. (1984), Desai, N.N. (1987), John, C.D. (1988), Gupta, K.K. (1988), Gautam, S. (1992), Singh, R. (1992) and Vohra, I.N. (1975) found that girls and boys of primary grades did not differ significantly on non-verbal creativity. Out of about six dozen studies reported here, 25 studies have supported the superiority of the males over the females with respect to creativity and its components, while an equal number of studies have observed the reverse trend. On the other hand, 14 studies have reported that there exists no significant difference among the male and the female students with respect to creativity and its components. From these observations it may be concluded that gender plays its role in creativity. However, the problem of generalisation is a difficult task. Some studies have indicated males to be superior whereas the other studies suggest the females to be superior. Gender seems to play a wedging role. The presence of socio-cultural stimulation, differential incentives for growth and development in the home, school or college environment, availability of resources for creative output, and such other factors need to be considered while interpreting the diverse results. Purposive case studies may be undertaken to understand the issue of gender and creativity. Assumptions underlying the gender differences in creativity need to be examined. Gender-fair creativity tests need to be devised.

Locality and Creativity

As early as 1969, a study was conducted by Aaron, P.G., Marihal, V.G. and Malatesha, A.N. where they explored the differences on creativity among the rural and the urban students. These investigators concluded that there existed no significant difference in creativity among the students belonging to rural and urban areas. Sehgal, K. (1978) also reported similar findings. In a recent study Patwardhan (1994) found that women coming from rural and urban areas fell apart on concept formation, reasoning, decision-making, and problem-solving; but were not different on creative thinking. On the other hand, Sharma, K.P. (1974), Gupta, K.K. (1988), and Afshan (1991) reported that rural students were more creative than the urban students. Studies conducted by Passi, B.K. (1972), Singh, C. (1978), Srivastava, R. (1978), Singh, R.P. (1979), Reddy, S.Y. (1991), and Singh, R. (1992) reported that the urban students were more creative than their rural counterparts. More than half the studies have reported the superiority of the urban students over the rural students. Locale and creativity results are quite interesting. The rural students excelled on some creative tasks whereas the urban students excelled their rural counterparts on some other dimensions of creativity.

Let us recall that creativity-test tasks are open-ended and testees respond subjectively depending upon their socio-cultural experiences. The test manuals are silent about locale-specific norms. Such norms will provide a new perspective about rural/ urban creative talent. India is a land of rural habitats. We need to develop new insights into setting-based creativity tests.

Socio-economic Status and Creativity

In the creativity studies, the socio-economic status was measured with the help of the following tools: the Banasthali Vidyapith's Socio-economic Status Scale, Kapoor and Kocher's Socio-economic Status Scale, Kuppuswamy's Socio-economic Status Scale, Nair's Socio-economic Status Scale, and Salm's Scale of Cultural Background.

Raina, M.K. (1968), Vohra, I.N. (1975), Rawat, M.S. and Agarwal (1977), Singh, A. (1977), Thorat, N. (1977), Singh, C. (1978), Srivastava, R. (1978), Awasthy, M. (1979), Badrinath, S. and Satyanarayan, S.B. (1979), Bhargava, M. (1979), Sharma, M. (1980), Ahmed, S. (1980), Sharma, A.K. and Jarial, G.S. (1980), Singh, A.K. (1980), Jarial, G.S. (1981), Srivastava, B. (1982), Shair, B. (1988), Singh, K.P. (1988), Mukhopadhyay, K.K. et al. (1990) and Kumari, K. (1992) studied the relationship of creativity and socio-economic status. About 75% of these studies have reported that creatives come from high SES — Vohra, I.N. (1975), Rawat, M.S. and Agarwal (1977), Singh, A. (1977), Thorat, N. (1977), Singh, C. (1978), Srivastava, R. (1978), Singh, A.K. (1980), Jarial, G.S. (1981), Srivastava, B. (1982), Sharma, K. (1982), Rao, V.R. (1982), Singh, O.P. (1982), Sharma, K.P. (1984), Sharma, A.L. (1986), and Kumar, G. (1989). Comparing the students coming from small, average and large families, Jarial, G.S. (1981) found that the students of small families were superior in fluency, flexibility and composite creativity, when compared to the students of average and large families. But Raina, M.K. (1968) and Awasthy, M. (1979) reported that they come from the average SES strata. On the other hand, researchers like Lalithamma, M.S. (1973), Badrinath, S. and Satyanarayan, B.S. (1979), Chadha, N.K. and Sen, A.K. (1981), Agrawal, K.P. (1982), Raina, K. (1986), Desai, N.N. (1987), Datta, K.L. (1989), Kumari, K. (1992) and Gautam, S. (1992) reported that there exists no significant difference in the creativity of students coming from high, average and low SES. From these studies, it may be concluded that the SES as a correlate plays differentiated roles which are unpredictable due to the presence of uncontrolled and interacting situational variables. Multi-site case studies may be undertaken for solving such why-and-how questions of creativity and SES. We have to visualize and study new intervening variables

capable of proposing answers.

Is it true to say that due to the poverty of an individual his total energy is sapped in arranging two meals and thus he is inhibited from thinking creatively? If yes, how do we explain the real-life situations when many exceptionally creative individuals have excelled amidst adverse circumstances? Is it that these persons had the intrinsic motivation of self-actualisation? Our future researchers must conduct case studies explaining how adversity and poverty facilitate or inhibit the development and expression of creative persons. Should we explore the moderating role of technology in the changing concept of SES and its relationship with creativity? Due to the biased nature of existing items and the tools of measuring SES, the traditional tribal families are being mis-labeled as low-SES groups. We know that tribal families possess a different type of physical-cultural resource, They provide a rich environment for the development of artistic creativity. Therefore, it is being suggested here that our researchers should use culture-specific tools and further conceptualise the intervening variables between the observed relationships. The situation can be further boosted with exploration in the fields of social anthropology and the sociology of knowledge.

Birth Order and Creativity

The relationship between birth order and creativity has been explored in a few studies. Of these, Srivastava, B. (1978), Jarial, G.S (1981), Dave, J.G. (1981), Sharma, H.L. (1986), Raina, K. (1986), and Santhana, K.S. (1990), found that first-borns were superior to later-borns with respect to different components of verbal creativity. On the other hand, Srivastava, S.S. (1977), Srivastava, R. (1978), Badrinath, S. and Satyanarayan, S.B. (1979), and Sharma, K. (1982), reported no significant difference in the verbal creativity of students of different birth orders. There is a need to examine these findings with respect to the nature of the in-home environment elements like: child-rearing practices, size of the family, joint-nuclear family, and liberal-conventional outlook. The nature of sibling relations, the feeling of being isolated during childhood, over-protectiveness by parents, recognition of autonomy and non-conformity, and broken homes, might be influencing the creative growth of children. What can a family do to prepare the child for formal but creative schooling? Such research studies will help in designing parents training programmes for organising creative rearing family atmosphere.

Intelligence and Creativity

The relationship between creativity and intelligence has always remained a point of great interest among our investigators. Many studies have been conducted wherein intelligence was measured by using Raven's Standard Progressive Matrices, Jenkin's Non-verbal Group Test of Intelligence, Mohsin's Group General Test of Intelligence, Jalota's Group General Mental Ability Test, Joshi's Non-verbal Test of Intelligence, Prayag Mehta's Test of Verbal Intelligence, Phatak's Draw-a-man Scale, Madhookar Patel's Intelligence Test, Saxena's Test of General Intelligence and the Desai-Bhatt Group Test of Intelligence.

The majority of the studies reviewed under this heading have reported a positive and significant relationship between intelligence and creativity, Phatak, P. (1962), Raina, M.K. (1968), Trivedi, R.C. (1969), Sharma, K.N. (1971), Passi, B.K. (1972), Sharma, K.P. (1974), Bedi, R.K. (1974), Goyal, R.P. (1974), Joshi, R.J. (1974), Dhaliwal, A.S. and Saini, B.S. (1976), Dutt, N.K. et al. (1977), Gakhar, S. and Kaura, N. (1977), Singh, R.B. Mathur, J.R. and Saxena, S. (1977), Singh, R.J. (1978), Patel, A.S. and Joshi, R.J. (1978), Badrinath, S. and Satyanarayan, S.B. (1979), Gulati, S. (1979), Gupta, A. (1979), Jarial, G.S. (1979), Gakhar, S. et al. (1980), Gupta, A.K. (1980), Bhaduria, S.P.C. (1980), Menon, P. (1980), Qureshi, A.N. (1980), Chadha, N.K. and Sen, A.K. (1981), Singh, O.P. (1982), Sharma, K. (1982), Chaudhary, G.G. (1983),

Dey, B. (1984), Ramakrishna, A. (1986), Desai, N.N. (1987), Trimurthy, S.P. (1987), Gupta, K.K. (1988), Patel, R.P. (1988), Sahoo, P.N. (1990), and Pal, Y. (1991). Dutt, N.K. et al. (1977) reported that the highly creative need not be necessarily highly intelligent. The correlation between creativity and intelligence in the above mentioned studies, ranged from 0.10 to 0.44 with a median around 0.30. Thus, the median common variance shared by these two variables is nearly 9%. Further, while partialling out the effect of academic achievement, no significant relationship was found between intelligence and creativity. Khire, U.S. (1971), Lalithamma, M.S. (1973), Rawat, M.S. and Agarwal (1977) reported that the two variables under discussion were not significantly related. Badrinath, S. and Satyanarayan, S.B. (1979) found that non-verbal creativity was not related with intelligence, whereas, verbal creativity was positively and significantly related to it. Mehdi, B. (1977) and Muddu, V. (1980) reported a negative correlation between creativity and intelligence for the students coming from the urban locality while it was positive in the case of students coming from the rural locality. Further, Raina, M.K. (1984) found that there existed no relationship between creativity and intelligence.

The researches reported so far show contradictory findings. Some are reporting the positive relationship, others negative, and still others showing no relationship. There can be many possible explanations for such discrepancies. One is that there is a phenomenon of 'threshold' IQ beyond which creativity and intelligence become independent of each other. A second explanation lies in the argument that a difference in the school atmosphere and the method of teaching accounts for discrepant results. The researchers collecting their data from institutions having a permissive and flexible environment will find results dissimilar to those found by researchers handling data from closed-climate institutions.

Thirdly, it is seen that when creativity tests accentuate ideational fluency, the relationship between intelligence and creativity decreases. On the other hand, when creativity tests accentuate verbal facility and vocabulary use, the correlation between intelligence and creativity increases.

The fourth explanation lies in the measurement of creativity. The creativity tests developed so far have generally measured factors of fluency, flexibility, originality and elaboration supposed to run across various types of tasks and areas, viz., science, language, music or arts. These factors when correlated with intelligence produced a variety of results. Both creativity and intelligence scores as measured by such tests are affected by personality factors, socio-cultural factors and many other moderating variables. One should partial out these influences while reporting the correlations. The researchers need to conduct in-depth case studies of creative people so as to understand the relationship of creativity and intelligence.

Long-term predictive studies related with real-life creative performance are needed. Well-designed longitudinal studies may be useful. There are instances where some children were labeled as disadvantaged on the basis of intelligence tests, but in their later life the inherent creativity in these children sprouted and bloomed. Studies of such cases will help to expose the implicit mischief of the usual intelligence tests.

Scholastic Achievement and Creativity

The relationship between scholastic achievement and creativity has been studied by many Indian researchers. In these studies the achievement of students in the annual examination was considered as an index of their scholastic achievement. Among them Raina, M.K. (1968), Khire, U. (1971), Lalithamma, M.S. (1973), Bagga, D. (1973), Bedi, R.K. (1974), Pandit, R. (1976), Jain, R. (1977), Mehdi, B. (1977), Singh, R.B. Mathur, S.R. and Saxena, S. (1977), Singh, C. (1978), Awasthy, M. (1979), D'lima, C.D. (1979), Gupta, A. (1979), Masih, S. (1979), Asha, C.B. (1980), Jarial, G.S. (1981), Dave, J.G. (1981), Singh , (1982), Dey, B. (1984),

Ramjee, L (1984), Brar, S.S. (1986), Rani, R. (1986), Raina, K. (1986), Desai, N.N. (1987), and Gore, C.V. (1990), Loomba, S. et al. (1990), Dhalla, T. (1990), and Srivastava, S. and Srilatha, R. (1992) reported a positive and significant relationship between creativity and scholastic achievement. In the above studies, creativity scores were singly and collectively correlated with achievement in school subjects. Paramesh, C.R. (1973) found that there was a positive and significant relationship between creativity and student's achievement in English, science and elective subjects, respectively, whereas, no significant relationship was observed in other subjects. Joshi, R.J. (1974) found that there was a positive and significant relationship between creativity and achievement in English, but in the case of other school subjects, a low and positive correlation was reported. Dhaliwal, P.S. and Saini, B.S. (1976) reported no relationship between creativity and achievement in mathematics but the dimensions of creativity, namely, fluency and flexibility were positively and significantly related with achievement in history and geography separately. Originality was positively and significantly related with achievement in Hindi. Contrary to the above findings, Bagga, D. (1973) reported that the achievement of students in science subjects was negatively though negligibly related to composite verbal and non-verbal creativity. On the other hand, no relationship between creativity and scholastic achievement was found by Phatak, P. (1962), Singh, A. (1977) and Badrinath, S. and Satyanarayan, S.B. (1979).

These studies found that scholastic achievement and creativity are positively related. We can find out the explanatory reasons of this relationship. Most of the creativity tests used in these studies are divergent-thinking tests. They mainly measure word fluency, associational fluency, ideational fluency and expressive fluency. We know from experience that fluency is one of the over emphasised factors in scholastic tests. We need to examine the research implications of this aspect of testing. Perhaps, our researchers ought to look at creativity beyond fluency, flexibility and originality. Now, when the differential functioning of the left and right hemispheres of the brain has been delineated, the researchers need to establish those brain functions which are common to creativity and academic achievement.

The researches in creativity and diversity of achievement in different school subjects have to be looked into much more carefully. An interesting research question regarding the common characteristic of creative people across diverse fields has been raised. What is common in those people who have made breakthroughs of different types in sciences, arts, business and government?

Values and Creativity

Which value patterns are held by the creatives? The Indian adaptation of the Allport Vernon and Lindzey Study of Values and an Indian tool called PVQ, by Sherry and Verma, were used to find the value patterns of students. Misra, K.S. (1978), Kumar, S.K. (1978), and Pandey, M.M. (1980) found that high-creative students possessed values related to social service, independence, variety, knowledge and aesthetics. Singh, A. (1977), and Singh, C. (1978) reported that economic values were more prominent in high creatives, whereas, Paramesh, C.R. (1970), and Misra, K.S. (1978) reported that economic value was more prominent in the average and the low creatives. The theoretical values were more prominent in high creatives as reported by Kumar, S.K. (1978), but Singh, C. (1978) counter-reported that these are found to be more prominent among low creatives. Among the low creatives, the power value was more dominant, (Misra, K.S. 1978). On the other hand, Singh, L. and Gupta, G. (1977) found no relationship between the traditional values and creativity. Lastly, Pandey, M.M. (1980) reported that creative and non-creative pupil teachers did not differ significantly with respect to value patterns. We tend to

summarise that values held by high creatives differ from those of the average and the low creatives. Based upon such findings we formulate a hypothesis that most indiscipline in the educational institutions and the value crisis in the society are because of lack of the environment to utilise the enthusiasm of the creatives.

Institutional case studies aiming to understand the relationships among institutional philosophy, educational environment, value patterns and creativity of the students ought to be conducted. Delinquents are another gap area of research in creativity. Is it that the existing social biases are impinging upon the creatives to the extent that they become delinquent? Our researchers must help to find the potentials and the psyche of the intelligent but delinquent who are suffering from faulty value patterns. We should generate empirical evidences as to why and how the value crisis is plaguing society.

Personality and Creativity

A few researchers have studied creativity in relation to personality traits. They also tried to discover the role played by these personality traits in specific creative activities. Research questions have been posed asking whether creative individuals exhibit high sensitivity, aesthetic sense, initiative and performance for perceptual novelty? The researchers have used various tools such as: Cattell's 16 PF, High School Personality Questionnaire, Edward's Preference Schedule, Rorschach Ink Blot Test, Thematic Apperception Test, M.P.I. Neymann-Kohlested's Introversion-Extroversion Inventory, Taylor's Manifest Anxiety Scale, Welsch Figure Preference Test, California Test of Personality, Cognitive Test of Thurstone, Bell's Adjustment Inventory, Eyseneck's Multiphasic Personality Inventory, Vernreuter Personality Inventory, Meier's Art Judgment Test, Bernreuter Personality Inventory, Gough's California Psychological Inventory, Deo's Personality Word List, Dutt's Personality Inventory, Chawala's Test of Cognitive Simplicity-Complicity, Nisha and Gupta's *Aap Kis Prakar Ke Vyakti Hain Parikshan*, Kerala University Personality Scale, Kerala University General Anxiety Scale, Mukerji's Achievement Motivation Scale, Sen's Personality Inventory, Sinha and Singh's Adjustment Inventory, and Shah and Bhargava's Level of Aspiration Test.

As early as 1956, Bhattacharya, S.B. conducted a study where he reported that high creatives possessed shallow feelings for life, high sensitivity and ability for pre-logical thinking. Later, in 1960, he said that there were two types of creative persons. Of these two, the first type were those who were born creative, and the second type were those who acquired creativity. While studying the personality characteristics of these two types of persons, he found that the former were introverts whereas the latter were extroverts. Biswas, P.C., Pares and Biswas, S. (1991) reported that high creatives were more distinctly marked by their emotional and temperamental traits. They were aggressive, varied in affective life, sensitive to shift in mood tones, tolerant of frustrated experiences, and exhibited signs of intra-psychachic conflict about the Oedipal relationship. Their achievements were found to be determined by super-ego demands and a need to satisfy narcissistic desires. Further, they were characterised by a preference and tolerance for ambiguity, stimulus complexity and structural openness. Raina, M.K. (1968) reported that high creatives were characterised by greater achievement, autonomy, change and endurance.

Gore, C.V. (1990) and Kumari, K. (1992) found that high creatives were very much motivated, less modern or radical but more conservative. Bhan, R. (1972) reported that none of the factors of sociability were related significantly to the creative potential. Later, in 1973, he reported that the level of aspiration in the case of high creatives was elevated but it was within the productive resources of these individuals. They were self-actualising and competent enough to maintain harmony between their aspiration level and creative

potential. High-creative students were characterised by prominent intellect, more super-ego strength, high self-sentiment formation and high energic tension, Joshi, H.R. (1973). Lalithamma, M.S. (1973), Sharma, G.S. (1988), Varparhi, K. (1988), Pandey, A.K. (1989), Setia, P. (1989), and Roy, B. (1990) found that creativity was positively and significantly correlated with positive self-concept, intelligence and negative aesthetic self-concept. High creatives had less need for social approval. Rehman, A. and Hussain, M.G. (1973), Verma, R.S. (1973) and Roy, D.K. (1990) reported that traits of autonomy, non-conformity, and openness of mind were dominant in high creatives. They also possessed social boldness, high self-sentiment and high guilt proneness, Goyal, R.P. (1974). In the same year, Joshi, R.J. (1974) reported that creatives were more intelligent, possessed high super-ego strength, felt more protected, more radical, more self-sentimental and had high energic tension. Paramesh, C.R. and Narayanan, S. (1974) reported that high creatives were significantly higher than low creatives with respect to their interest in persuasive linguistic, artistic and musical interest areas. According to Gakhar, S. (1975) creatives possessed high intellectual efficiency, more flexibility, high self-acceptance and self-sufficiency. Nair, P.M. (1975) reported that creatives were characterised by high self-reliance, sense of personal worth, sense of personal freedom, feeling of belongingness, freedom from withdrawing tendencies, freedom from nervousness symptoms, more social standards, more social skills, freedom from anti-social tendencies, and were more involved in family relations, school relations and community relations. Rao, B.P. (1976) found that creatives were characterised by more field independence and integrative complexity.

During 1977, Chauhan, N.S., Dasgupta, S., Gupta, A.K., Lal, B.N. and Chilana, M.R., Mallappa, K.R. and Upadhayaya, R.C. Paramesh, C.R. and Narayanan, S. Singh and R.G., Mathur, S.R. and Saxena, S. attempted to find the personality traits of high creatives. It was found that creativity was positively and significantly related with introversion—Chauhan, N.S. (1977), Srivastava, R. (1978), Gulati, S. (1979), Verma, L.K. (1980), Kumar, A. (1981), and Varparhi, K. (1988)—while it was negatively related with extroversion (Bhargava, M. 1979). Dasgupta, S. (1977) reported that compared to low creatives, the high creatives suffered more from the parental relationship, and were more involved and non-conforming in their beliefs and attitudes. Psychotic and neurotic tendencies were more prominent in high creatives. They possessed high self-concept—Gupta, A.K. (1977), Singh, A. (1978), and Sharma, S.B. (1988), less achievement motivation, Lal, B.N. and Chilana, M.R. (1977)—high intelligence, more social boldness, stronger self-sentiment and less tension—Mallapa, K.R. and Upadhayaya, R.C. (1977), and Bal, S. (1989). Paramesh, C.R. and Narayanan, S. (1977) reported that creatives possessed less sociability, enjoyed the company of others less, experienced difficulty in making friends, were less sympathetic, less cooperative less agreeable and felt more secured than non-creatives—Singh, R.B. Mathur, S.R. and Saxena, S. (1977).

High creatives were found to possess rational optimism, high ego strength, realistic and healthy attitude towards life, openness to experience, dedicated persistence, sense of worth, assertiveness, self-confidence and self-actualization—Jha, S.K. (1975), Mehra, R. (1988), and Sharma, G.S. (1988)— and were more achievement motivated (Kumar, S.K. 1978). They were more conscientious and persistent, more undemonstrative, inactive and phlegmatic than low creatives, (Kaur, R. 1978). Creatives were found to be more intelligent, emotionally stable, venturesome, self-assured, undisciplined, self-confident and relaxed, (Singh, 1978). Creatives were further found to be having high achievement motivation and less insecurity, (Singh, K.P. 1988).

Bhargava, Gulati, Gupta, Sharma and Verma explored the personality correlates of creativity. Of these, Bhargava, M. (1979) reported that creativity was negatively and significantly related

to anxiety, extroversion, alert-poise, and was positively and significantly related to independence. Gulati, S. (1979) found that with respect to different components of creativity, namely, fluency, flexibility and originality, introverts performed better than the extroverts. Artistic aptitude was found to be positively and significantly related to fluency, flexibility and originality, (Gulati, S. 1979). High creatives possessed more sense of humor, less feminity and less conformity than the low creatives, (Gupta, A. 1979). Research studies also reported that creatives were more happy-go-lucky, impulsive, lively, gay, enthusiastic, trusting, adaptable, free from jealousy, relaxed, easy to get along with, tranquil, torpid, and unfrustrated. They were also outgoing, warm-hearted and participating, emotionally mature, stable and realistic about life, enthusiastic, persevering and conscious about their self. They were self-sufficient, resourceful, preferring their own decisions, self-controlled, self-disciplined and had high self-concept, (Verma, O.P. 1979). In 1981, Bhardawaj, R.L. found that fluency promoted agricultural interest in the students of poor socio-economic status but the interest decreased in the students of high socio-economic status. Fluency was also found to promote the interest in scientific pursuits, (Bhardawaj, R.L. and Gupta, R.P. 1981). Kaur, T. (1980), and Pandey, A.K. (1989) found that creativity was positively and significantly related with positive intelligence self-concept, positive character self-concept, positive aesthetic self-concept, positive adjustment self-concept, positive emotional adjustment self-concept, self-concept character and self-concept social adjustment. Lidhoo, and Zargar, A.H. (1980) found that creativity was negatively related to neuroticism. Sharma, S. (1992) studied the perception of teachers about the personality characteristics of the students. He found that different teachers have uniform perceptions for all their creative students.

There are a few studies which have explored the personality characteristics of male and female creatives. These studies are conducted by Goyal, R.P. (1974), Arora, G.L. (1976), Nisha, B. Singh, R.P. and Gupta, K. (1976), Singh, (1978), Pandey, M.M. (1980), Reddy, S.Y. (1991), and Santhana, K.S. (1990). Of these, Goyal, R.P. (1974) reported that the female creatives were characterised by intelligence and venturesome traits. They tended to be victims of self-conflict, and were moralistic and socially precise, and exhibited socially bold actions. On the other hand, male creatives were characterised by tough-mindedness and suspiciousness. According to Arora, G.L. (1976) anxiety was curvilinearly related to the creativity in the case of males while it was negatively related to in the case of females. Among the males, fluency, original power and ingenious solutions to problems were significantly related the creative personality while in the case of females, fluency and original power were significantly related to the creative personality, (Nisha, B.; Singh, R.P. and Gupta, K. 1976). Singh (1978), and Reddy, S.Y. (1991) reported that creative males were adventurous while creative females were shy, timid, restrained and threat-sensitive. Further, creative males were self-assured, placid, secure, confident, relaxed, tranquil, torpid and unfrustrated, whereas, creative females were apprehensive, worrying, depressive, troubled, tense, frustrated, driven and overwrought. Lastly, Pandey, M.M. (1980) found that creative male pupil-teachers were more good-natured, easygoing, emotionally expressive, cooperative, unconventional, and imaginative. than the non creative males, whereas, female pupil-teachers were fault-finders, highly intelligent, self-assured, independent-minded, socially bold, ready to try new things, imaginative, and interested in intellectual matters. Lastly, Singh (1980) reported that creativity was not related to the level of aspiration and frustration reactions. Goyal, R.P. (1974), Sharma, S.C. (1979) and Gakhar, S. and Joshi, J. N. (1980) explored the personality traits of those students who scored high in fluency, flexibility and originality dimensions of creativity. Of these, Goyal, R.P. (1974) found that flexible students were more guilt-prone and less imaginative, while Sharma,

S.C. (1979) reported them to be fault-finders, imaginative, adventurous, having interests in different activities and thoughts, sensitive to visualize relations and problems, and had complex thinking patterns and were self-confident, discontented, curious and relaxed. He further reported that the fluent students were found to be good observers, constructive, participating, had interest in various types of activities, sensitive towards observations and problems, adventurous, less contented in deals, relaxed, curious and had a desire to do high acts with sincerity. The original students, on the other hand, were reported to be independent, had desire to do great and unique things, were complex thinkers, self-confident, fault-finders, imaginative, discontented, curious, relaxed, adventurous, innovative, participating, radical and sensitive. Gakhar, S. and Joshi, J.N. (1980) reported that highly fluent and flexible students were characterised by a high degree of socialisation, greater communality and low capacity for status whereas highly original students were characterised by greater self-acceptance, high sense of well-being, greater responsibility, emotional balance and stability, high degree of self-sufficiency, extroversion, greater dominance and a high degree of confidence in themselves.

Goyal, R.P. (1974), Gopal, A.K. (1975) and Ray, T. (1989) studied the personality traits of high creatives studying different subjects. Among them, Goyal, R.P. (1974) and Ray, T. (1989) reported that science students were characterised by high emotional stability, tough-mindedness and better adjustment. These characteristics differentiated this group from the language group. According to Gopal, A.K. (1975) the creative science group was more reserved, assertive, expedient, conservative, group-dependent and undisciplined, while engineering students were more reserved, emotionally stable, assertive, sober, expedient, venturesome, suspicious, imaginative, shrewd, experimenting, self-sufficient, and relaxed. Ray, T. (1989) studied the difference between the scientist and the visual artist groups. He found that female creatives in both the groups were more masculine than their non-creative counterparts.

Babu, N. (1977) conducted a study by having a sample of those students who scored high on creativity as well as on intelligence. This double-talented group was found to possess non-anxious disposition, group and individual adjustment, social conformity, performance anxiety and freedom orientation.

There have been various studies where the personality characteristics of low creatives were studied. In (1968), Raina, M.K. reported that low creatives were characterised by the heterosexuality trait and greater anxiety. They possessed a high level of aspiration with ambition outstripping the resources of a creative personality. They did not maintain harmony between the aspiration level and the creative potential, (Bhan, R. 1973). Further, low creatives had high need for social approval, (Rehman, A. and Hussain, M.G. 1973). Joshi, R.J. (1974) reported that low creatives had mental defects, lacked rigid standards, were relaxed, secure, conservative, had poor self-sentiment, and high tension. On the other hand, Gakhar, S. (1975) described that they had less intellect, less flexibility, low self-acceptance and less self-sufficiency; they had high anxiety, (Nair, P.M. 1975) and possessed low integrative complexity (Rao, B.P. 1976). The less creative were high achievement-motivated, (Lal, B.N. and Chilana, M.R. 1977), less adjusted, (Singh, A. 1977) and felt less secured, (Singh, R.B., Mathur, S.R. and Saxena, S. 1977). Sansanwal, D.N. and Jarial, G.S. (1979) found that low creatives were less intelligent, sober, prudent, serious, taciturn, suspicious, self-opiniated, hard to fool, tense, frustrated, driven, and wrought. They were dependent on others, more attention-seeking, tender-minded, more tense, driven and frustrated (Verma, O.P. 1979).

Some of the following studies have reported that no difference was found on certain personality characteristics of low and high creatives. They did not differ with respect to self-concept, (Passi, B.K. and Lalithamma, M.S. 1975) and on ego strength (Verma, O.P. 1979).

Further, Dutt, N.K. et al. (1977) reported that high and low creatives did not differ on extroversion and neuroticism, and aspiration level, (Rawat, M.S. and Garg, M.K. 1977). Lastly, Paramesh, C.R. and Narayanan, S. (1977) found that students belonging to high and low levels of creativity did not differ on active, vigorous, impulsive, dominant, stable and reflective traits of temperament. Singh, I.H. (1991) found that high creatives of different tribal areas did not differ in their vocational preferences.

Kumari, K.A. (1975), Singh, R. (1975), Gupta (1976), Pandit, R. (1976), Misra (1978), Singh, A. (1977), Sinha, N.C.P. and Sharma, M. (1978), Singh, A.K. (1980), Kaur, T (1980), Singh (1980), Setia, P. (1989) and Kumari, K. (1992) studied the adjustment of various levels of creative students. Of these, Singh, R. (1975) reported that all components of creativity were positively and significantly related with emotional adjustment and originality and elaboration were positively and significantly related with social adjustment. Creativity was found to be positively and significantly related to adjustment in the social, emotional and educational areas, (Gupta, 1976). Creatives were found to be better adjusted, (Pandit, R. 1976) and (Singh, A. 1977). On the other hand, Sinha, N.C.P. and Sharma, M. (1978) reported that high creatives were found to be less adjusted in the home, health, and emotional areas than their lower counterparts, while, Kaur, T. (1980) found that high creatives had more problems than low creatives in the socio-psychological areas. Creatives were found to have a high sense of personal freedom and higher social standards than non-creative students, Singh (1980). Creativity was found to be positively and significantly related to the total social and educational aspects of adjustment but not to emotional adjustment, (Singh, 1980). Apart from all these, Singh (1975) reported that fluency was negatively and significantly related to family and social aspects of adjustment, and flexibility was negatively and significantly related to social aspects of adjustment whereas Kaur, T. (1980) found no relationship between creativity and adjustment. Lastly, creativity was found to be related to adjustment, Kumari, K.A. (1975) and Misra (1978).

Associated with creativity is the adventure need which demands willingness to take risks. Pandey, S.S. (1992) and Singh, R.C. (1992) tried to find the relationship between the individuals risk-taking behavior and creativity. They found no relationship between risk-taking and any of the sub-dimensions of creativity. But while studying the tribal sample, Krishnegowda, B. (1991), and Singh, R.C. (1992) found a significant relationship between creativity and risk-taking.

The other studies show that creatives are self-sufficient, non-conformists, introverts, highly intelligent, highly motivated, autonomous, enthusiastic, have high self-concept, high sense of personal worth, high intra-psychic conflict, more self-actualisation, more super ego strength, high energic tension and high self-sentiment formation. Namdeo, N.P. (1993) has explored the relationship between creativity and study habits.

In some of the studies on personality, the researchers have asked the question: what personality characteristics do creative individuals have? These studies identified creative individuals on the basis of their performance on creativity tests or individuals who were recognised for their creativity. Predictive studies of creativity are needed. The personality trait syndrome has to be outlined.

To what extent are the intellectual operations like cognition, convergent production, and evaluation related to creativity? How does inventive thinking processes of information transformation relate to personality traits? How do curiosity, tolerance to ambiguity, liking for disorder, and challenging assumptions relate to personality? The human personality is so complex that this as an area of investigation will always project a large number of problems for the researchers. Deeper research probes are needed.

DEVELOPMENT OF CREATIVITY

The research reviews related to the nature, measurement, and correlates of creativity provide the basis for the next phase of the review, namely, development of creativity. Some studies that have been conducted show that creativity develops with age and experience. Several other investigators have found it to be otherwise. By implication, one can hopefully infer that if conducive environment and methods are deliberately provided, creativity can be developed. The quantum of research in this area is very meagre.

There are a large number of methods for developing creative thinking, such as: brainstorming, brain calming, mind control, synectics, morphological analysis, bionics, random stimulation, value engineering, free association, scenario writing, altered states of consciousness, awareness development, bio-feedback training, deep relaxation, creative dreaming, gestalt therapy, enhancing incubation, sociodrama, psychodrama, meditation, sensitivity training, sounds and images, analogies, attribute listing and scamper, reversal method, destructuring- restructuring, etc. Some of these have been tried out by different researchers in the field of education.

Pillay, G.S. (1978), Nair, P.N.G. (1978), Shah, B.B. (1981), Vora, G.C. (1984), Talegaonkar, A. (1984), Gupta, P.K. (1985), Singh, B. (1985) Nandanpawar, B.S. (1986), Patel , J.Z. (1987) and Amin, M.J. (1988), tried creative thinking programmes, creative methods, divergent thinking programmes, and teaching strategies. They found that fluency, flexibility, originality, language proficiency and mathematical creativity can be developed among secondary students. These researchers assumed that when individuals are made to think divergently, they come out with different ideas. The experimental groups were exposed to different types of treatments and later on measured with respect to fluency, flexibility and originality. After the treatment which continued over a month, these researchers found change in their subjects on the chosen dependent variables.

Another group of researchers, Pillay, G.S. (1978), Miyan, M. (1982), Yawalkar, V. (1985), Patel, R.P. (1988) and Jawaharlal (1990), applied brainstorming and morphological analysis as experimental treatment techniques for enhancing creativity and divergent thinking in secondary school students. The techniques were mainly concerned with encouraging children to produce a large number of creative ideas. Researchers like Malhotra, S.P. and Sucheta, K. (1989) hypothesised that if metaphorical abilities are developed among children, creative thinking can be enhanced. In a very interesting study, Venkataraman, D. (1993) investigated the effect of synectics training on creativity and hemisphericity of higher secondary students of Tamil Nadu. In a two phased study, Passi, B.K. and Martis, A. (1993) asked research questions whether synectics could be used by teacher educators for the training of teacher trainees who in turn could transfer this method in real school situations? Whether synectics is effective in terms of developing component factors of creativity and favourable attitudes? The fluency, flexibility, and originality of ideas was later tested with the help of PTC and TTCT. The results showed improvement in fluency, flexibility and originality of students of the experimental groups. Students exposed to such treatments were found to have greater ideational and verbal fluency.

Researchers like, Nirpharake, A.M. (1977), Miyan, M. (1982), Rai, S. (1982), Reddy, M.S. (1989) and Kumari, U.M.C. (1993) tested various methods of problem-solving with guided discovery. The students were exposed to tasks and problems and were encouraged to produce a large number of creative solutions. Kumari, U.M.C. (1993) measured creative problem-solving ability with the help of a realistic and interesting test. The results of all these studies supported their hypotheses regarding the usefulness of guided discovery methods and educational materials across different types of assessment tools and samples.

The role-playing method was another treatment used for developing creative thinking

process among students (Nirpharake, A.M. 1977). The students imagined and played divergent roles for ideas and feelings of different persons and objects. The effect of this treatment was found to be significant with respect to divergent production and problem-solving abilities.

Some researchers also worked, developed and tested the utility of a particular type of instructional material. Researchers like Jarial, G.S. (1981), Bhaskar, S. (1982), Gakhar, S. (1991) and Sharma, D. (1994) tested this cluster with a group of secondary school students for forty to sixty days. The treatment was found to be effective.

While realising the role of the media, Ponnuswamy, S. (1980) and Sharma, H.L. (1986) used audio-visual methods and media techniques. The students were exposed to different visuals and asked to express their ideas in different ways. On being tried through creativity tests, the treatment was found to be effective.

Mandal, J.M. (1992) evolved an autonomous creativity cultivation programme for school students and found it not to be effective for creativity development.

Research work in creativity has been restricted to secondary and senior secondary levels of formal school students. There is an urgent need to conduct many more studies regarding the creativity of adults and children. Most of the studies have been conducted with normal children. There is need to conduct researches in the area of special education within the groups of creative children. Mehta, D.H. (1994) attempted to develop metacognition-based thinking strategies for overcoming the learning disabilities of students. The researcher has painstakingly conceived the theoretical framework by giving adequate explanation of the concepts like: learning disability, learning process, thinking, cognitive approaches, metacognition, and learning strategies. Attempts should be made to help the learning-disability children who are otherwise creative and talented.

For conducting nomothetic studies large and representative samples are desirable. Our researchers in creativity have employed samples ranging from 10 to 200. Ideographic studies are conducted with small and purposive samples. One may restrict oneself to a study having a single case as a sample. There is need to conduct serious case studies (Buno, L. 1989).

Many researchers claim to have used true experimental designs. But the researchers have usually designated the intact groups as "experimental" and "control". It has been found that the short-duration studies are more rampant. The duration usually ranged from 30 to 45 hours. Isolated methods of developing creativity are being tried out in artificial and controlled conditions. Alternative studies in a naturalistic setting should be encouraged in our future research attempts.

The Torrance Tests of Creative Thinking, the Passi Tests of Creativity, and Mehdi Tests of Creativity have been frequently used. Some of the investigators developed their own tests so as to meet the medium, cultural, regional and conceptual needs of a study. The future investigators should develop situation-specific and realistic testing and non-testing approaches for fulfilling the objectives and conditions of research.

As far as the data analysis is concerned, most of the researchers have employed quantitative techniques like, ANOVA, ANCOVA, t-test, and U-test. The non-parametric techniques may be examined. The qualitative techniques must be tried out for the relevant studies. Depending upon the objectives and the nature of the data, both quantitative and qualitative approaches may be applied jointly.

TRAINING OF PERSONNEL

Training here has two meanings. One is to teach creatively. It requires that our teachers should acquire creative teaching skills. Second, training should develop such management skills that responsible persons can organise the desired

environment for developing creative skills among children. The former is a concern of teacher education institutions. The latter is linked with providing talent-developing orientation programmes for parents, media persons, and the community in general.

In order to assist teachers for developing creative teaching, many programmes have been instituted and certain strategies and tactics have been tried out. Some of the strategies have been used at the in-service and the others at the pre-service levels.

In-service Training

It is observed that the newly appointed school-teachers leave the universities and return to the schools to do to their children what was done to them in their schools and universities. In other words, the teachers perpetuate the same methods of teaching that they had experienced themselves. We must break this vicious circle. The development of research-based materials, and conceiving feasible treatment strategies for school and college teachers, teacher educators, parents, media personnel, and community members must be given top priority.

Recently, researchers have employed new training strategies for enhancing creative teaching skills through models of teaching in particular and selected models called "inquiry training", and synectics. The training strategy included: providing orientation in the chosen model, giving demonstration, practicing with peers and later practising in real situations. The obtained teaching competence scores in different practice lessons were compared and it was found that the teacher educators improved in their skills to handle the creative teaching models. Later, these teacher educators experimented with their pre-service student teachers. The results of the student teachers were similar to those of teacher educators.

Such institutional training of teachers is a welcome trend in creativity research. More institutional and field-based research is required. It is quite desirable, yet a difficult task. The usual doctoral students cannot organise such studies due to the limited amount of educational authority and resources.

Research-based materials were developed for the teachers by the Navodaya Vidyalaya Samiti with a view to promote creative thinking in their students. These materials provide directions for identifying the creative students in the first stage and explain the priciples of developing creativity in the second stage. This effort of material preparation for the teachers is worthwhile. However, there is need to develop the materials in a more systematic manner. Different implementation strategies should be visualised. A comprehensive programme evaluation is essential. The Indian researchers have to play a direct role.

Pre-service Training

At pre-service level there are not many institutional facilities for training teachers on a full-time basis. Even Navodaya did not initiate full-time degree-giving pre-service creative teacher training programmes. An humble effort is made at Mirambika and the Institute of Education, Indore. It is called "Activity Programme". Passi, B.K. and Malhotra, S.P. (1994) studied the effectiveness of this programme through a naturalistic case study. The results were encouraging. The approach to prepare teachers at Mirambika looks more flexible, open, and potent for developing creativity in teachers. The Hoshangabad Science Teacher Training activity could be upgraded to the level of a pre-service degree-awarding programme. The Institute of Education, Indore and the 'Eklavya' group are making cooperative efforts towards creative social science curriculum development and teaching.

At pre-service level, Martis, A. (1991) trained student teachers for the synectics teaching model. She found that a training treatment consisting of theory, discussion, demonstration and practice helped in developing teaching competence. The student teachers trained

through the synectics model developed fluency, flexibility and originality. Apart from these findings, Martis demonstrated that creativity-oriented teacher training is possible provided one desires to implement it.

We find that there are very few studies in the area of training of teachers in creativity. The dominance of institutional culture characterised by uniformity and standardisation is the primary impinging hindrance against innovations and long-term field studies. The rigidity of the curriculum of teacher training institutions becomes its own barrier. The doctoral students cannot overcome this barrier. Larger institutional arrangements for macro-level research and development have to be visualised.

Most of our researchers have drawn their samples from urban secondary teacher education institutions. Research problems addressed to the development of creativity and innovations in pre-school, primary school, and higher education have to be undertaken. Teacher education programmes have to be designed afresh. We may have to establish mission-mode managed autonomous institutions for specified time-bound targets.

Training and Education of Parents and Community

It has been observed that children spend a large amount of their waking time under the active or nominal supervision of their parents. If the established parental supervision and encouragement of diligence are narrowly directed towards traditional areas of child development, creativity in the children is suspended forever. The training of the parents is, therefore, necessary to develop in them skills to handle the gifted children. For this purpose, parent-teacher interaction programmes can be organised in such institutions which believe in the development of whole-brain education. The future researchers must plan parent and community development studies. Let us find the constraints within which the parents and the teachers will have to work. New networking and collaboration between parents, media persons, community leaders, and other informal institutions should be developed for encouraging talent in the children.

THE SYSTEMS APPROACH

In a rapidly changing world, the cultivation of a creative personality, sensitive and open to problems in his environment, is not only important but is also urgent. A special care and personalised support system is, therefore, imperative to nourish the creative potential of children. The age old myths that special programmes for the talented are undemocratic, and talented children will solve their own problems without any external help, have often been questioned. In fact, these days it is felt that there is a special need to provide help to the creatives. The talented children require special protection from the dominating environment leading towards standardisation. There is need to conduct studies for outlining diversity as well as stimulating congenial conditions for preparing students.

We, as human beings, possess different uniform levels of creative thinking. Creative talent is expressed in diverse areas. As a result of our varying areas of talent and individual differences in our levels, schools have to design unique and child-centered educational programmes. Two factors have to be kept in mind. The first is the psychological safety to experiment, to make errors, to bring forth unfinished thought products without being afraid of harsh external evaluation. And the second is psychological freedom, which implies giving the individual complete freedom of symbolic expression, thereby encouraging the spontaneous juggling of ideas, concepts and meanings. Our researchers have to invent new systems of encouraging external and internal environment for our children.

Optimising the Existing Systems

Continuous pursuit for improving the system

beyond limits is a very special characteristic of creative persons. The Japanese word *Kaizen* describes the meaning with full import. Our systems must help gifted children to understand themselves. The creative and the gifted must be helped so that the children become capable to transform the environment for creating excellence around their external world and happiness in their internal world. Educational institutions must carry out micro and macro research inside and outside the popular framework of the classroom.

Fostering Creativity in the Classroom

Fostering creativity in the classroom demands a special climate. The objective of this climate is to enhance creative thinking in children in general and gifted children in particular through enrichment activities running across a wide range of school subjects. We need to satisfy the intellectual curiosity of children which is normally not satisfied within the framework of regular educational programmes. Some schools, like Jnana Prabodhini, have been experimenting with the idea of involving the talented students in groups for solving the real problems of a given society. Specially designed projects are arranged for children with an aim to develop their ability to think and act creatively. Students pose more pertinent questions which are not usually asked by teachers in the regular classroom. The students pose these questions after a thorough and stimulating interaction with the participants of the project. We should undertake research studies for evaluating such problem-based teaching. We should also find process explanations as to how the creative abilities develop through such project-based teaching.

Sharma, D. (1994) conducted an experimental study by organising activities like brainstorming, problem-solving, quiz and project work in a science-teaching class. She found that after the investigation, the students of the experimental group showed significant gains with respect to verbal fluency, verbal flexibility, verbal originality and non-verbal creative thinking. In what ways can these activities be grouped together so as to get the maximum advantage in the classroom? How can interdisciplinary activities be organised amongst the students so that their knowledge of the sciences be linked to social sciences and languages and vice versa?. All such questions need to be answered empirically by teacher educators.

Enrichment of the Curriculum

Bhandarkar, S. (1989) in her study of 140 ninth grade creative students from 15 different secondary schools found that the existing curricular practices were suppressing highly creative students. She advocated the merit-enhancing programme to increase creativity among the students. Similarly, Woloszynowa, L. and Borzym, I. (1980) elaborated special profile classes being created in the secondary schools of Poland in the subjects of mathematics, physics, humanities, biology and chemistry. These classes have no special textbooks. Classes are organised in schools which are provided with teachers having higher professional standards. The children have a free choice to attend these classes. However, the children are selected for these classes on the basis of grades in the primary classes, their interest in the subject and their future plans. They further reported that in Poland, Special Interest Clubs and Associations gather those talented children whose interests are sometimes very specialised. They are provided more scope for creativity than can be expected normally within the school system. According to the recent research studies, the able pupils generally attend physics, mathematics, and technology clubs. A few other countries are experimenting with diversified, flexible, and multi-level curriculum. In India, the over emphasising role of the 10+2 pattern of education has perhaps hampered the creativity of schools. We should ask research questions about this issue and organise our research studies in the areas of

educational structure and curriculum development.

Building Creativity into Textbooks

Our textbooks must facilitate the development of creative thinking skills in children. Research questions should be asked about the role of stories, fiction, local-specific reading materials, interesting puzzle problems, analysis of paradoxes, divergent practical experiments, interdisciplinary illustrations and graphics, and child-centered activities. Edward de Bono has developed very useful and interesting material in the form of the CoRT Thinking package which can be useful for students across all cultures, grade levels, and curricular areas. The CoRT package includes: Breadth, Organisation, Interaction, Creativity, Information and Feeling, and Action. We ought to study the usefulness of such packages. May be, alternative modules and packages can be developed by our curriculum development units.

Athaide, M. (1994) tried out the effectiveness of locally adapted materials caled Erehwon for developing divergent thinking with different types of participants.

Specialised Teaching Methods

We have reported in an earlier section "Development of Creativity" that our researchers have designed various types of teaching techniques and also tested their effectiveness. More organised research is needed to find out talent specific methodologies. Have we identified special methods for the development of different scholastic areas of divergent thinking of social leadership in children of expressive arts, and of the psychomotor areas of personality? Do we know what type of teaching methods would be required for left-dominant or right-dominant children? How can we transform the mixed-brain children into integrated-brain thinkers? How would methods vary with changing grade levels and changing cultural milieu? How can we organise competition-cum-cooperation teaching methods across different curricular areas and grade levels? Similar questions should be met with new insights and vision.

Specialised Evaluation Techniques

Education in our schools is dominated by examinations which are detrimental for the development of talent, creativity, and innovation. The creativity is adversely affected by characteristics of centralisation, standardisation, over emphasis of the written mode, externality of examiners, over emphasised traditional concept of objectivity, over emphasis on quantification, and single-examiner based evaluation. Concepts like cooperative evaluation, peer group evaluation, self-evaluation, participatory evaluation, programme evaluation, qualitative evaluation, continuous comprehensive evaluation of left-right brain activities, productive evaluation, evaluation through role play, evaluation interviews, observation, and system-evaluation are to be developed through research in the Indian education scenario.

In countries like the USA and France, some Patent Bureaus exist which provide a new and original way of detecting young technical talent. These patents collaborate with technical magazines, clubs and associations for children. Inventions and designs in technology sent by children are evaluated and accepted if the idea is new. Our National Talent Search Programme launched by the NCERT, the Scheme of Navodaya Vidyalayas, activities like Children Science Congress, National Rural Talent Search Scholarship Scheme, etc. must be reviewed and integrated through long-term sponsored research projects. The Future Problem-Solving Project run by the Torrance Center for Creative Studies in Georgia is an excellent example of organised effort for nurturing and assessing talent through a different format of evaluation.

New innovations in the area of evaluation should go a long way in favour of the deprived sections of our society. We must exercise enough care so that our evaluation system

provides a judicious chance for the identification of talent lying dormant in our rural children, drop-outs, backward classes, Scheduled Tribes, Scheduled Castes children, the girl child, and residents of backward, and underdeveloped areas. The known and unknown biased politics of examination through medium, mode, cultural contents, process mechanism and such other hidden tools of oppression should be identified after careful research efforts.

Organising New Systems

Environment affects creativity. Taking cognisance of this fact, the Indian schools and educationists have come out with various innovative institutions. We should conduct researches to find ways and means of providing child-based specific environment. The organisation of specific teaching-learning-creating environment with specific degree of difficulty optimal for the individual child is desirable. However, the given standardised school curriculum will be an obstacle in achieving this. Creative teaching should never be unilateral. Self-motivation can be created by confronting children with problems to be solved. Creativity should be encouraged and appreciated. Both the teachers and the parents of the gifted should be sufficiently instructed and helped to deal with them.

With this background in mind, a few educational institutions have appeared on the scene of the Indian education system. Some of these institutions and organisations are: Navodaya Vidyalayas; Jnana Prabodhini, Pune; Aurobindo Ashram School, Pondicherry; Aditi School, Bangalore; Rishi Valley, Madanpalli; Hasanat High School, Bombay; Kiddieland, Bombay; Little Pearls, New Delhi; Mirambika, New Delhi; and Vasant Valley, New Delhi. Many more institutions are playing their roles. It is difficult to mention all. It is a welcome trend that some of our enlightened administrators have stopped over emphasising first divisions in school board examinations. The quality of schools is being redefined. Some of our schools are becoming conscious of protecting our talented children. The main characteristics of such institutions are:

(I) these institutions generally imbibe and represent the philosophy of a particular thinker or experiences of a guiding person;

(ii) the students are provided educational experiences through a set of self-chosen and self-developed activities which might not be having relevance to the generally prescribed curriculum;

(iii) efforts are made to create meaningful and enjoyable learning environment;

(iv) students do not feel the stress of external examinations or competition;

(v) the project method and the discussion approach are applied for the teaching-learning-creative process;

(vi) modern technology like computers, audio-visual aids, role play, are utilised to lure the attention and involvement of the students;

(vii) teachers are empowered to explore their own directions;

(viii) generally flexible management styles are prevalent in these schools; and

(ix) parents are involved in the teaching-learning-productive process of the schools.

Thapa, V.J. (1994) in a qualitative analysis found that these innovative schools helped the children to go happily roistering down the boulevards of life. The question, however, remains: Do these innovative schools foster creativity in children? Does the freedom to learn help in developing the left-brain and right-brain activities of the young children? If so, then how should these strategies be implemented in the larger educational system of the country? Further, the problem faced by these innovative schools is that they provide quality education to the children in the schools, but outside the school system the pass-outs are not accepted for further study in the traditional colleges and the universities. The researchers will have to find a practical answer as to how to harmonise

the system of innovations of schools with the conventional existing higher education system.

Networking the Systems

Optimisation of educational systems would demand internal consistency and external acceptability. Sometimes the newly created school systems might mismatch with other interdependent systems like admission to higher education institutions, employment in the work market, the procedures of public service commissions for selection tests, and the living styles in the community. We, as researchers, must undertake mega studies where inter-institutional linking and networking are visualised, tried out, and implemented on a larger level. Accordingly, we might try two routes to meet this challenge: (a) utilising the mass media for providing relevant information about the existing institutions and environment in general, and (b) creating an apex body for developing creativity in subsequent life situations. Many countries are cogitating over the creation of a ministry of thinking which looks after the programme of creativity on a long-term basis. A similar type of body can be thought of within our country. However, the functioning of such institutions will depend on empirical research. The major concern of such bodies should involve sponsoring large theoretical studies, i.e., identification of creativity, creative process in the arts, developing research skills, increase in the efficiency of creative scientists, and generating a creative climate in our political bodies. Research should also develop educational material for creativity in different fields.

THE COMING DECADES

In the wake of global changes and challenges, Indian researches in the field of creativity must display the courage to grow in a realistic educational environment. There is a growing body of literature as well as an increasing number of scholars and journals within which to share research. The opportunity to begin important international networks is currently increasing the dynamism of the field. We must approach our problems with faith in our researchers, allow them to complete their research, share and publish research findings through various modes and for different types of users.

In all fairness, we must give due importance to the field of creativity so that it can emerge as a distinctive area of study. A paradigm shift from disciplinary to multidisciplinary to interdisciplinary to transdisciplinary should be exploited. In reviewing the definition of interdisciplinary studies our educational foundation is getting reformulated through new structures and related functions. The early indicators are available in the form of shifting emphasis from old to new educational practices. It is expected that the new paradigms would contribute to the preparation of a new man. The future researchers will have to play a major role in this regard.

The innovative system of new learning, teaching, and the methodologies for such inquiry should be diverse, comprehensive and appropriate to the multifaceted nature of the creativity field. We have to extend boundaries and go beyond the usual functions of mastery over the subject, conduct research and organise extension to a new man-making-process. The shift requires to:

(i) initiate, conduct and follow our research procedures through new processes;

(ii) tap new areas of thinking skills, learning skills and other- higher-order cognitive abilities gaining in popularity and substance;

(iii) define research strategies, propose new guidelines and develop action frameworks on major developmental issues in different regions in an integrated way;

(iv) promote the development of efficient

research, training and information programmes dealing with both local and global issues;

(v) mobilise at international, regional and national levels, a wide array of institutional, social and economic researchers and the media to promote programmes aimed at improving the quality of life and achieving development that is people-centered, dispassionate and sustainable; and

(vi) progressively change the current research approaches towards educating populations on development issues into more integrated and multidisciplinary approaches for both formal and non-formal education and training, and general public information and awareness.

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research, training and information programmes dealing with both local and global issues;

(v) mobilise at international, regional and national levels, a wide array of institutional, social and economic researchers and the media to promote programmes aimed at improving the quality of life and achieving development that is people-centered, dispassionate and sustainable; and

(vi) progressively change the current research approaches towards educating populations on development issues into more integrated and multidisciplinary approaches for both formal and non-formal education and training, and general public information and awareness.

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