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Research in Creative Functioning

A TREND REPORT

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Creativity is essentially a human phenomenon. It is a process in man which helps him achieve dignity and meaning in life. Creativity is considered to be identical with the expansion of the universe and the main task of man on this planet. 'Man's effort, at its best, has revealed itself in his creative work and in his search for a type of cosmology which defined his destiny.' Whether it is considered from the viewpoint of its effects on society, or as one of the expressions of the human spirit, creativity stands out as an activity to be studied, cherished and cultivated (Arieti, 1976). In one form or another, there is a world-wide trend which shows great concern about creativity. Advanced countries are definitely interested in the study and development of creativity, as are Third World countries, whose survival depends upon the creative vision and creative striving of the masses (Raina, 1980).

Beyond local interests, whether individual or national, is the increasing recognition, in all parts of the globe, that our capacity for creative thought and action may literally make all the difference in the world.... Human Creativity may prove to be the key to success or failure in mankind's quest for knowledge, in his journey beyond the bounds of the certain and the seen, in his exploration of the unknown (Barron, 1968). In a foreword to a book, J.P. Guilford (in Raina, 1980) maintains:

> This volume provides substantial evidence that there is indeed a 'creativity movement' and that it now has nearly worldwide proportions. It is a hopeful situation, for a world population of creative problem-solvers should be more productive and happy as well as more self-confident and more tolerant and, therefore, more peaceful. It can more readily solve its increasingly complex problems.

Enhancing creativity is the most certain way of uniting mankind. Unesco (1974) is positive in its stand that, while both knowledge and creativity are useful in itself, they are also indirect contributors to international understanding and peace.

It is universally acknowledged that Indian philosophers, over the centuries, have given deep and abiding thought to the theoretical and philosophical aspects of the process of creativity. Expressed in their writings is the view that, from moment to moment, man is creative in his ability to innovate new forms (*navanavomeshshalini pragya*). These philosophers seemed, in point of fact, well aware of the spiritual basis that gives access to the ancient Indian system of achieving concentration and relaxation that, in turn, may bring a flash of insight—a system discovered by the west only in recent years. What the Indian system espouses is not a scientific, mechanical, providential or dialectical approach, but a liberating concept which stresses the inwardness of human beings, and spirit within man. However, Indian concept of creativeness is not based on any magical mysticism but on the needs of man and the realities of our nature. It is the spirit in man, asserts Radhakrishanan (1975), which is responsible for all mankind's achievements. When the fountains of the spirit, from which the creative life of the individual and

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society springs dry up, infirmities of every description, intellectual, moral and social, break out (Radhakrishnan, 1939).

This philosophical interpretation of the processes of creativity and current awareness about its importance should motivate some research. Currently, there is a strong awareness that scientific, technological and other types of creativity are as essential as the twin strains of musical and artistic creativity. Discussing the basis of a cultural policy for India, Dube (1975) stressed that 'A vital culture is a creative culture. One of the major objectives of the new cultural policy would be to promote creativity in the fields of literature, music and visual and graphic arts as well as science and technology'. Creativity is regarded as a crucial factor in promoting socio-cultural change and renewal.

CREATIVITY RESEARCH: INTERNATIONAL PERSPECTIVE

The spirit of the present, the emergence of new responsibilities, new social and cultural necessities, deep and tumultuous changes in social mores and objectives, have made creativity a rapidly expanding area of scientific interest. The current widespread ferment and concern with creativity is due to forces which have operated outside of psychology (Barron, 1975). Renewal in man and society will ultimately depend upon our understanding of the process of innovation and creativity and its application in different areas of human endeavour. The need for support for creativity research is obvious, since better understanding of the creative process will provide means for an early identification of individuals who are most likely to be creative in science and technology, as well as an insight into how one can best educate, train, stimulate and manage potentially creative persons as individuals or as members of groups (Golovin, 1963). Yet one more, humanitarian, reason has been advanced, that creativity will eventually serve as a focal point for all disciplines concerned with the improvement of man's health, happiness and social situations.

Scientific study of creativity is quite a recent phenomenon. Psychologists, as Guilford (1967) maintains, were more concerned with the simpler processes, and apparently lacked the courage to tackle the complex problems of studying creativity. Creativity research has in fact reopened some of the doors that were closed to psychology when it consciously separated itself from philosophy. Indeed, the immaturity of scientific psychology is reflected in its slowness to study the creativity phenomenon, despite the fact that man has been creative from the dawn of his awareness of himself (Arasteh and Arasteh, 1976).

Guilford, the first dean of creativity research, has been responsible for bringing about a paradigmatic shift in the study of human abilities. An outburst of work on creativity followed after his 1950 Presidential Address on the Structure of Intellect (SI) Model. Guilford has called attention to the fact that there had been less than 200 psychological studies of creativity in the preceding quarter of this century. Within a decade, almost that number were appearing in a single year. Indeed, it has been estimated that the number of studies for 18 months of 1965 and 1966 was equal to that of the preceding five years, which in turn equalled that of the preceding ten years, which in its turn equalled that of the preceding 100 years (Parnes and Brunelle, 1967).

A great variety of studies have been designed and carried out in the area of creativity prediction and also in education and training. It has now emerged as a field of study with a vengeance. One of the basic factors responsible for this establishment of creativity as a bona fide term in the literature of educational, psychological and sociological research has been broadly indicated by Freeman, Butcher and Christie (1971) as the 'growing international scope of creativity'. Earlier, Torrance (1971) had also attempted to provide evidence of the universality of creativity studies which he described as a 'reassuring as to the generalizations that seem to be emerging from research and development in the United States'.

The most impressive feature characterizing the area of creativity research is a confluence of interests and its diversity. Some investigators examine the personality make-up of individuals who are high in tested creativity, others delve into paintings and mathematical discoveries, aiming to pinpoint the ingredients which set a few of these objects apart as outstandingly creative. There are investigators who specialize in test construction or interview eminent men about childhood experiences. 'Some concentrate on creativity and intelligence, while others study the effectiveness of brainstorming on creative behaviour or propose other methods of training to elevate the level of creativity.'

This unmistakably points to the diversity of approaches and techniques adopted to study creativity and the increasing number of persons concerned with it. People are undoubtedly becoming aware of the impor-

tance of creativity in many aspects of national life and are investigating the subject from their varied points of view.

There has been an enormous increase in creativity research and it is difficult to catalogue the whole literature. Currently, also, as Treffinger (1986) indicated, through more than 30 years of research and development, creativity has continued to be a topic of considerable interest and concern to educators as well as to social and behavioural scientists.

Gowan (1972) organized the available literature into five sections for analysis in terms of rational–psychedelic continuum:

(a) *Cognitive, rational and semantic*; problem-solving views of the Buffalo school; the Guilford structure of intellect, and others.
(b) *Personality and environmental*; child rearing practices, personality correlates, especially originality, energy and high self-concept.
(c) *Mental health*; Rogerian, Maslovian self actualization, openness, etc.
(d) *Psychedelic*; existential, non-rational, cosmic consciousness, and psychedelic.

This classification provides a useful framework for understa ling creativity. Most of the research on creativity, nearly 60 per cent as estimated by Freeman, Butcher and Christie in 1972, comes from the US. Some noteworthy attempts have been made elsewhere also as has been amply shown in a volume edited by Raina (1980).

Research in the United States has been of various dimensions, of varying qualities, with varying orientations and varying results. Studies have been made by tough-minded and tender-minded psychologists, as well as those in between, 'each with his own tested concepts, intuitive assumptions, and sometimes, blind spots, guiding the manner in which he views creativity'. Each enters the continuum at a particular point, according to interest, need, obvious lacunae, compulsion, or for some other reason. Even though there has been proliferation of literature, critics observe that psychologists have only scratched the surface of a complicated and miasmic phenomenon and that no major breakthrough has occurred.

Maslow (1972) was critical when he observed that thinking and research in the field of creativeness tend to be too atomistic and too ad hoc and that it is not as holistic, organismic, or systematic as it could be and should be. Critics maintain that much of creativity research deals with pseudo-creativity and the element of genuine creativity has been absent. They point to the paucity of systematic ecological observations, lack of central focus among the investigators, inadequacy of the current methodologies used, limitations of the investigators, lack of integration in findings and othe- technical defects. We are just at the stage of indicating what in psychiatry is called manifest symptomatology and have not been, perhaps, able to penetrate the essence of creativity. Investigators in some cases have come up with rudimentary and tentative notions. This has all been summarized by Roweton (1973) after making an elaborate survey of the field. The present state of the art is a mixture of some models, limited applications, operational and non-operational definitions, random speculations, and hypothesis testing. Progress to date is promising, but manifestly incomplete.

It is widely accepted that the field is in a dynamic state, full of complexities and challenges, and a clear crystallization is somewhat of an impossibility. This complexity and the present uncertainty of concepts and conflicts of results should occasion more rigorous and varied investigations rather than foreclosing of inquiry through singleminded espousal of one's own view (Getzels, 1975). The more that is said and written about creativity, the more attention will have to be paid to it. Khatena's (1975) observation is useful: 'We are going to make mistakes in identifying it and in interpreting it, but our whole human existence is based on mistakes and their correction. The fact that so many people have so many ideas about creativity means we have a richer field to plough, and this is the cause for rejoicing'. In any field of activity, particularly with such areas as creativity where problems are immense and obstacles enormous, various issues and perspectives can be described as there are always segments of reality, to use the language of a linguistically oriented psychologist (Church, 1961) about which we are ignorant, possible because of lack of interest or lack of opportunity.

In most of the countries outside the United States, the proliferation of research in this field has been less luxuriant. In these countries, the research is in its early stages, but the surface has unquestionably been scratched. Different countries can think of issues and needs in creativity research, keeping in view their own demands and priorities, as there is a multiplicity of problems needing research everywhere. Various needs and priorities have been listed (Raina, 1975, 1976) but one has to be careful in adopting research areas. Research in developing countries should help in the mobi-

lization of talents, provide direction for means and ways people can cultivate, liberate and express their slumbering creativity. And, by the same token, developing countries have to be more vigorous in ensuring that creative positives and strengths in large masses are identified and nurtured. Research along these lines cannot be a luxury which can be avoided or postponed for future attention. Possibly, with new ways of studying creativity in such countries, creativity will soon be known rather than unknown. Creativity can be studied in many ways, all rewarding in various degrees. New dimensions are constantly being discovered and added to the ones already known (Arieti, 1976). Researchers in different countries can look at creativity from different vantage points and pursue some tangible leads at this relatively early period of scientific research in this field in their countries.

CREATIVITY RESEARCH IN INDIA

In spite of the fact that a great deal of philosophical and theoretical attention is being paid to art and creativity, as Mitra (1975) points out, research in the subject has been receiving serious attention only very recently. Research is relatively new, and much remains to be accomplished. What seems to be lacking in much of the work, with some notable exceptions, is preciseness, clarity and maturity of judgement (Raina, 1975). Further, a lot of it appears to be done by individuals, working on their own, and, of necessity, carrying on work of small proportions. A number of reasons have been advanced for this situation, but none appears conclusive. However, this trend report, based primarily on doctoral theses and projects, should provide further evidence about the present state of the art.

The principal objective of this analysis is to trace the nature and volume of research in creativity in doctoral studies and research projects completed in university departments of education and other related departments in Indian universities, as also research projects conducted by other teaching and research institutes. Research projects financed by various agencies like the ICSSR, UGC and NCERT are also included. The report covers works reported during the period 1968–87.

Earlier surveys (Buch, 1974; 1979; 1986) did not carry any trend report on creativity. However, there are some trend reports which make mention of studies in this area. The ICSSR *Survey of Research in Psychology* (1980) has three chapters in which very small sections on creativity are included. Studies from this publication have also been considered while developing the present trend report.

The first research study in the area of creativity submitted for a formal degree of the University of Calcutta was done by Manas Raychaudhuri (1963). This clinically-oriented investigation attempted to lay bare the differential psychologic, social-environmental and developmental variables that characterize creative talent in music. It is, therefore, not correct to say as Menon and Ojha (1987) have done in the *Third Survey of Research in Education* (1978–83), that 'the first evidences of research in creativity have been mainly in the form of test construction' (p. 308). Since Raychaudhuri's work, the volume of research in the area of creativity has shown a gradual upward trend. Gupta (1974) surveyed the field in India and found 76 studies at various stages: some finished and a part of the literature, some in progress, with the ongoing work reported in research journals. His analysis showed that the majority of research had been done in the area of personality as related to creativity, while other important areas remained to be investigated. A subsequent survey (Raina, 1975) reveals that, one year later, a total of 133 studies in this area were done by Indian researchers and by foreign authors using Indian subjects for their study. A recent analysis (Bhaskara, 1987) of the 24 studies abstracted in the two previous *Surveys of Research in Education* indicated that 'the 24 studies could be classified as (i) test construction and related researches—9, (ii) correlational studies and related researches—13, (iii) intervention studies of fostering creativity—2'. He used this analysis to build the argument for establishing that:

> The last decade has seen a sharp increase in the volume of research on creativity and creative thinking with a major emphasis on constructing the tests of creativity and correlational studies of creativity with self concept, personality, etc. Unfortunately there has been little research on the general problem of nurturing and promoting creative thinking, especially in the classroom setting.

However, it seems that researchers have not been prolific and much has not yet been accomplished in terms of quality and quantity when compared to international contributions.

Table 8.3 shows the year, nature and financing agency of studies in the area of creativity.

The number of Ph.D. studies rose from five in the years 1965–72 to 67 in 1975–82. This is indicative of

Table 8.1

YEAR, NATURE AND FINANCING AGENCIES OF STUDIES ON CREATIVITY

Year	*Nature and Financing Agency (FA)*					
	Ph.D. Theses	*FA*	*Research Reports*		*FA*	*Total*
1968-72	5	-	1		UGC	6
1973-77	25	-	2		ICSSR	27
1978-82	67	-	6	ICSSR	1	
				IT College	1	
				Jnan Prabodhini	1	
				CIIL	2	
				SCERT	1	73
1983-87	39	-	1		NCERT	40
Total	136	-	10			146

the growth of interest in the subject and of the field. However, the number of Ph.D. studies came down in the years 1983–87 to 39, which is somewhat surprising. At this stage it can be asserted that, in India, creativity research has gained popularity and is no longer elementary and fragmentary as was observed in 1971 (Raina, 1975). However, the gains in research do not seem to be as remarkable as Parnes and Brunelle (1967) and Guilford (1967) noticed in the United States where there was a bibliographic explosion in the field. The fall in the number of doctoral dissertations in the years 1983–87 possibly indicates that research scholars have moved to 'greener fields' but creativity research in India is very much alive. Whether the fall in the amount of research activity is a healthy and positive phenomenon, future vigorous evaluative studies along can establish. Often, when the dust settles down, is the best the time to do fresh, sincere and serious research.

Table 8.2 shows the number of theses completed in different university departments.

Table 8.2

NUMBER OF THESES COMPLETED IN DIFFERENT UNIVERSITY DEPARTMENTS

Department	*Number of Studies*
Education	90
Psychology	46
Total	136

Of the 136 Ph.D. theses, 90 have been completed in Departments of Education and 46 in Departments of Psychology. One plausible reason for this phenomenon is that education has been considered a potent instrument for development of creativity and, therefore, has received greater attention from the Departments of Education. Another is that the development of instruments to measure various psychological aspects has, by and large, been the interest of Departments of Education and measurement of creativity is no exception.* It is difficult to extend any other reason for this relative unpopularity in Departments of Psychology.

Table 8.3 lists the universities which have awarded more than five Ph.D.s. in the area of creativity.

Table 8.3

UNIVERSITIES WHICH AWARDED MORE THAN FIVE PH.D.s IN THE AREA OF CREATIVITY

University	*Number of Ph.Ds.*
Agra University	19
Avadh University	7
Meerut University	8
M.S. University of Baroda	9
Panjab University	7
Kerala University	9
Kurukshetra University	8
Delhi University	7
Total	74

It is interesting to notice that 54.4. per cent of the Ph.D.s. in this area have been awarded by the eight universities listed. Agra University dominates the list. The upsurge of interest in the area of creativity in the Agra University is reflected mostly in the abstracts included in the *Fourth Survey,* and there are historical reasons for this phenomenon. Creativity, interestingly, became a popular topic in this university when Chauhan and Tewari's Test of Creativity became commercially available. Ph.D. scholars in other universities took an interest in creativity partly because there was someone to supervise them who had his/her major interest in this area or tests measuring creativity were readily available.

* For this idea I am thankful to Professor D. Sinha.

A breakdown of doctoral research on creativity in India is given in Table 8.4. One hundred and thirty-six studies are classified into six major areas. It is apparent that the majority of research has been done in the area of personality as related to creativity, while other areas have remained relatively neglected.

Table 8.4

CLASSIFICATION OF DOCTORAL RESEARCHES ON CREATIVITY IN MAJOR FIELDS

Major fields	*Number of Studies*	*Per cent*
Theoretical/Philosophical	1	.73
Identification and Measurement of Creativity	15	11.02
Intelligence, Achievement and Creativity	13	9.55
Personality Correlates of Creativity	68	50.00
Sociocultural Factors and Creativity	23	16.91
Nurturance of Creativity	16	11.76

The distribution of studies indicates that the trend established earlier in surveys by Raina (1975) still persists. Fifty per cent of the studies are devoted to just one area while there are many areas which have not attracted much attention. The types of groups which have been studied are indicated in the Table 8.5.

Table 8.5

GROUPS STUDIED BY CREATIVITY RESEARCHERS

Groups	*Number of Studies*
Middle School Children	17
Secondary and Higher Secondary Students	90
Polytechnic Students	1
Graduate Students	17
Postgraduate Students	2
Professional Groups	12

Interestingly, most of the studies have used secondary and higher secondary students as their subjects. However, various aspects of doctoral and other researches on creativity warrant a close look. Below follows a brief outline of some of these aspects.

THEORETICAL/PHILOSOPHICAL RESEARCH ON CREATIVITY

In most countries, contemporary creativity research is largely atheoretical. Time and again it has been observed that fundamental and most critical issues, throughout the course of enquiry into creative thinking, have been the problems of theoretical and procedural strategy. Researchers in different countries could seek insight through logical and philosophical analysis, and in the process formulate creative and powerful theories and then check such theories in practice. The practice would inform and strengthen theory or theories. 'The day on which we are certain about how to construct a theory of creativity will also be the day on which we are certain about how to construct a poem' (Jackson & Messick, 1965).

Most of the creativity research, as at present, with a few exceptions, is characterized by common sense and is of utilitarian nature. If this continues, it may soon lose its deeper scientific, theoretical foundations.

Indian research workers have to realize that the significance of a research result in creativity is found not in the statistics which spawn it but in the ideas and expectations which vitalize it. Truth, in fact, is more than measurement. The present tendency of being 'fact-crazy and theory-shy' is not useful.

We in India, as far as creativity research is concerned, are stuck with the unproductive dust bowl empiricism which characterized much of earlier American research in this field. There is no dearth of studies which are based on empirically derived questionnaires/tests, in which the typical hypothesis stated is that one group rated higher than another on a creativity criterion (which itself may be of a doubtful value) and will be significantly different from another group on a specific set of psychological variables. We have yet to come across an authentic, perceptive and scholarly theoretical analysis of creativity from an Indian standpoint. It is surprising that, with such a rich philosophical tradition, we have only one doctoral thesis which has studied creativity with special reference to Bergson, Whitehead and Sri Aurobindo. It must be appreciated that dust-bowl empiricism need not necessarily smother good theory. Just as the Institute of Personality Assessment and Research reaped good results with empirically derived tests, so it has also been the home of a valuable paper on creativity which is derived from theory. MacKinnon (1976) used Rankian theory for a superb integration of the IPAR data on architects and we would do well to emulate it in

future work (Stein, 1985). This feature does not characterize our research in this area.

From a world as well as an Indian perspective, we need to continue and intensify research efforts which will enhance our understanding of the nature of creativity and creative thinking as a significant component of giftedness and human extraordinariness, of ways by which such creative potential is identified so that opportunities for its development can be maximized, and ways to facilitate talent potential becoming realized talent. We need such research to build a sound theoretical and conceptual base. We need to subject research and development efforts to the kinds of synthesis, analysis and critique that may enable us to build better paradigms and structures. We need to explore further the differences in Eastern and Western approaches to the study of creativity so that we can acquire better insights into its nature and test alternative approaches to its nature (Passow, 1987). The significance of such an understanding has been highlighted by Raina (1980):

> The Western approach to creativity has been mostly objective, reality-oriented and intellectualistic. In order to arrive at a complete understanding of the creative process, the Eastern approach may also provide an insight and many worthwhile clues. Perhaps, the Eastern thinkers have more of intuitive insight, familiarity and association with creative processes, inner processes of imagination, contemplation and intuition. In the construction of a theory of creativity which can make deeper inroads into understanding of the creative process, the East-West approach to creativity will be illuminating. This has been very clear to such perceptive and astute observers as Haas (1956), Kelman (1963), Rugg (1963) and Arasteh and Arasteh (1976). Such an approach, such a symbiosis and such a model may provide what Gowan (1972) calls an enormous boon to this ongoing evolutionary thrust.

IDENTIFICATION AND MEASUREMENT OF CREATIVITY

Identification and measurement of creativity has attracted the attention of Indian investigators, although in most cases the measuring tools used were those developed in the United States, particularly those devised by Torrance at the University of Georgia. Several reviews of creativity research (Raina 1969, 1971) consistently show that Torrance's instruments were indeed the most popular and were translated into various Indian languages. Table 8.6 lists the types of creativity tests which have been used in Indian studies.

Table 8.6

CREATIVITY TESTS USED IN THE STUDIES
(Ph.D. and Projects)

Test	*Verbal*	*Non-Verbal*	*Verbal & Non-verbal*	*Total*
Torrance Tests of Creative Thinking	5	2	19	26
B. Mehdi's Tests of Creativity	9	2	16	27
Passi's Tests of Creativity	2	-	4	6
Wallach & Kogan Tests of Creativity	1	-	8	9
Tiwari & Chauhan's Tests of Creativity	-	-	10	10
Development of New Tests	1	-	27	28
Authors not mentioned	1	-	17	18
Creativity Rating	5	-	-	5
Something About Myself	2	-	-	2

Attempts were made (Passi, 1972; Mehdi, 1973 Kaul, 1974; Ramchandrachar, 1974) to develop similar creativity measuring devices adapted to specific Indian conditions. Paramesh (1972) adapted Wallach-Kogan Tests and together with his associates attempted to develop a 'Biographical Inventory' for identification of creativity. The adaptation of personality tests was done mainly into Hindi; among those currently in use are Khatena's Something About Myself (U. Raina, 1983) and Torrance's What Kind of Person Are You? In 1973, Mehdi developed a quick-scoring personality inventory that promised to become a useful, handy and efficacious instrument in the field. However, much information is not available on it. Some investigators have also been interested in developing tests of literary creativity (Rao, 1982; Kundley, 1977), scientific creativity (Singh, 1978; Shukla, 1980), mathematical creativity (Parasnis, 1985; Tuli, 1979) and creativity in physical sciences (Gupta, 1980).

As has been pointed out, most of these tests have been developed along the lines of Torrance or Guilford. However, Torrance's model of measure-

ment has been more popular as Indian workers have mostly modelled their tests after his instruments. They have mostly borrowed the items or patterned the items after the Torrance tests without realizing that there has been great improvement and advance in the scoring procedures now followed to score TTCT. The tests developed here lack a conceptual framework and carry no theoretical support, except for the fact that they are poor imitations of American tests.

Since no sound tests are available it is no surprise that existing tests have suddenly become popular. Research workers consider it quite convenient to introduce a variable like 'creativity' in their researches, since a tool is readily available somewhere, without judging the worthwhileness of the measure. One can only imagine where such research findings can lead us. There has been no sustained research in India like that of Torrance of Guilford who have devoted almost three decades to the development and improvement of creativity testing.

Torrance developed his test versions after 15 years of sustained research and development. This research has been continued and much of its results are reflected in the Manual and scoring schemes. 'This was accomplished primarily by (1) analysing the behaviour of eminent creative people as recorded in autobiographies and biographies as well as studies of the creative problem-solving process and trying to identify the most important composite skills, and (2) subjecting scores derived from a wide variety of test tasks of factor analyses and selecting tasks that are factorially different'. It is doubtful whether Indian test constructors have at all made such attempts.

In the case of certain tests, Indian workers have included in their tests, items based on the tests of Torrance and Guilford, and that of Wallach and Kogan. This seems to be quite inappropriate as the three tests are based on different theoretical assumptions. There need be no hesitation in asserting that some of these creativity tests can easily be characterized as tests of achievement.

The lack of sustained research and development is also reflected in the fact that the test constructors have not cared to review and revise their tests in the light of the data available. The confusion caused by the variety of measurement approaches notwithstanding, the question of predictive validity needs to be addressed. Do scores on creativity measures predict the occurrence of socially relevant creative behaviour? Although there has been some limited but promising research supporting the predictive validity of tests of creative thinking (Torrance, 1974; 1981; and 1986; Torrance & Ball, 1984; Torrance & Wu, 1981), much more needs to be done on predicting the long-range outcomes and behaviours which can be readily identified as fitting the nomological network of creative ability (See Ausubel, Novak & Hanesian, 1978; Nicholls, 1972).

It is a pity that our research workers use tests which have very limited potential. The case may be mentioned of a 'performance test of creativity' devised by a 'test constructor' with no background in the field which was even made commercially available at a high price. It was neither a 'performance' nor a 'creativity' test. The 'constructor' was compelled to withdraw the test in the face of academic criticism. Care has not been taken to analyse how weak or strong the psychometric findings are after using these tests. The following criteria for selecting specific tests and test materials which are crucial (Torrance, 1975) may be useful as a guideline:

1. They must have relevance to creativity theory.
2. They must have relevance to adult creative behaviour.
3. They must sample different aspects of creative thinking.
4. They must be attractive alike to children, adults and adolescents.
5. They must be open-ended so that a person can respond in terms of his experiences whatever these may have been.
6. The instructions and response demands must be adaptable to the educational range from kindergarten through graduate school and professional education.
7. They must yield data that can be scored reliably for such qualities as fluency, flexibility, originality and elaboration.
8. The testing materials, instructions to administration, time limits, scoring procedures must be such that the use of standard batteries in schools is feasible.

Creativity measures in India, as elsewhere, have thus far been limited to the rational thinking view of creativity. It can be safely asserted that no attention has been paid to the assessment of the further reaches of creative potential. 'We believe that such further developmental work is necessary in aiding mankind to make the best use of its creative potential' (Torrance, 1980). Torrance has discussed these concepts in his book *Satori and Cre-*

ativity (1978) and he and his associates have developed scoring guides, norms, a technical manual and a laboratory manual for training scorers.

It would be realistic for research workers to recognize that there is no single, easily administered, simply scored test booklet that educators can use to decide who is at least one standard deviation above other students in creativity. Torrance (1984) has argued strongly for the use of a wide variety of indicators within the area of creativity itself. This should put some check on the continued unabated use of divergent thinking tests in this country. 'Are we possibly doing as much injustice to those we test with so-called tests of creativity as we have done to those we tested in the past with tests of intelligence' (Stein, 1985). However, some promising research directions for identification of creativity (Treffinger, 1986) are as follows:

— research to provide a *synthesis* of many practical and technical issues, including test administration and test scoring;
— studies of creative development across the life span;
— basic research on the neurology and biochemisty of cognitive processes (beyond simplistic and speculative commentaries about 'right/left brain' functions);
— expanded attention to individual assessment and the diagnostic implications of test data;
— studies of creative products across various domains or fields of productivity;
— tools for assessing critical and creative thinking in the context of real problem solving;
— multivariate analyses of various components of creativity, and ways in which combinations of data might significantly enhance long-term prediction of creative accomplishments;
— increased investigation of various dimensions of *styles* or *psychological* types in relation to creativity profiles.

INTELLIGENCE, ACHIEVEMENT AND CREATIVITY

Substantial evidence has been furnished in the development of the argument that creativity research does indeed reflect culturally determined values. It is doubtful if this is the case with Indian researches in this area of giftedness. This, however, seems to apply to American researches. 'Some day, historians will consider the intelligence–creativity controversy and the divergent–convergent matter and hopefully they will put it in a perspective from which we will learn for the future. In such a perspective, an important role will have to be assigned to the *zeitgeist* of the 60's and the extent to which some of our values may have distorted our perception of the results' (Stein, 1985).

Why have psychologists developed an interest over the last two decades or so in the possibility of distinguishing between creativity and intelligence, asked Wallach (1970). He indicated that an answer lies in the nature of American society, its values and goals. By examining what these values and goals fail to emphasize, Wallach and many other investigators have concluded that a relationship holds between creativity and intelligence at the lower intellective levels, but not at the higher levels. The Indian doctoral dissertations and research reports, by employing such intelligence tests as Raven's Standard Progressive Matrices, Tandon's Group Test of General Mental Ability, Nafde's Non-verbal Test of Intelligence, Joshi's Test of Mental Ability and Cattell's Culture-fair Intelligence Test, have studied the relationship between creativity (in certain cases different types of creativity) and intelligence, in different socio-economic groups and at different education levels. Some studies, as usual, suggest very little overlap, others indicate that the two are virtually indistinguishable. As regards the relationship of creativity with achievement, findings are of conclusive. However, the majority of studies indicate high scholastic achievement being associated with high levels of divergent thinking. As has been reflected in such studies, the main means of deciding this question empirically is by the techniques of correlation and factor analysis. Although these have been widely employed in the study of creativity and intelligence, results have been conflicting, owing partly to the presuppositions of the investigators and partly to misunderstandings about the strengths and limitations of the techniques. In this context it may be useful to quote Stein (1985):

> Factor analysis is a very potent statistical technique but it, and especially the findings that stem from it, should not be abused. The assumptions underlying various factor analytic procedures need to be kept in mind. There are important disagreements in this field (Vernon *et al.*, 1977), and before we settle on any existing set of factors let us maintain an open mind as we wait for the contributions of Gardner (1983) and Sternberg (1977).

One of the ways to understand creativity is to understand the mental processes of the intellect that underlie it. Sternberg's triarchic theory of intelligence, through its componential sub-theory, specifies some, although almost certainly not all of these processes. Gardner's work may provide new perspectives to the understanding of the phenomenon. It may be useful to consider Sternberg's contention that creativity is as much a function of the direction of one's intelligence, as it is of the level of one's intelligence. Both must be taken into account.

PERSONALITY CORRELATES OF CREATIVITY

One of the frequent concerns of Indian researchers has been the study of personality factors and their relationship to creativity within the individual. This is true for research workers in other countries also where creativity research has been taken seriously. Reviewing American research Taylor (1975) observed: 'A great deal of research has focussed on identifying the characteristics of the creative personality, usually from a trait point of view'. There seem to be historical reasons for such an intense interest in the study of personality. Research workers have taken a stand which supports a personological approach: 'the roots of creativity do not seem to lie in convergent or divergent thinking, but rather, as Hudson (1966) suggested, in the personality and motivational aspects of character'. There is yet another practical reason: one of the great hopes of research on the creative person is the possibility that a finite number of personality characteristics is significant for creativity, as distinguished from those having significance for individual diagnosis, theory, or even academic performance. If some small number of parameters can be isolated, and defined in behavioural terms, great use of this might be mobilized for identifying creative potential.

By far, the most frequently cited research concerning the characteristics of the creative personality stems from the work of MacKinnon and his associates at the Institute of Personality Assessment and Research (Raina, 1980). After a review of more than two dozen studies in this area, Dellas and Gaier (1970) concluded that the 'evidence points up a common pattern of personality traits among creative persons and also that these personality factors may have some bearing on creativity in the abstract, regardless of field'. The authors reach similar conclusions after summarizing a series of studies with subjects of younger age:

> Generally, the data indicate that the personality characteristics of young creatives bear similarity to those of creative adults, and therefore, the conclusion seems tenable that these traits develop fairly early. Their manifestation at this level suggests that these characteristics may be determinants of creative performance rather than traits developed in response to recognition of creative behaviour.

According to the summary of these authors, a creative person is characterized by the following personality traits: independence in attitude and social behaviour, dominance, introversion, openness to stimuli, wide interests, self-acceptance, intuitiveness, flexibility, social presence and poise, an asocial attitude, and unconcern for social norms. Two additional traits seem to be more closely related to aesthetic than to scientific creativity: radicalism and rejection of external constraints. Most of the Indian research in this area will support such a summary statement.

Personality studies of the creative in India have, by and large, made use of adolescent boys and girls. Very few studies have dealt with professionals and highly eminent individuals; some have ventured to study creative writers and artists.

The most common procedure for studying personality has been to resort to the use of personality measures which investigators have preferred for various reasons, more often for reasons that are practical rather than theoretical or conceptual. Among popular measures are 16PF, HSPQ, EPI and MPI. Some have employed measures of anxiety, adjustment, attitudes and values. As a result of use of such personality measures many characteristics have been isolated. For example, factors such as self-concept, self-esteem, locus of control, attitudes, emotionality, achievement motivation, cognitive style, risk-taking, aspiration, anxiety, value orientation, temperament, introversion extraversion, curiosity, dogmatism, and a host of other variables have been studied.

The usual pattern has been to compare the high creative and low creative, identified on the basis of 'creativity tests', or some measures of personality. In addition, researchers have also perferred to use scores on creativity tests as criterion variables with personality and motivational variables as predictors. These are the typical procedures followed in studying creative personality. Research workers have frequently resorted to

so much use of statistical procedures that, at times, examiners evaluating Ph.D. theses have expressed doubts whether such indiscriminate and uninhibited use of statistics will at all explain the process of creative functioning. Instead of unlocking the mystery, it mystifies the phenomenon.

Even though researchers have studied numerous personality variables, mostly following the trait approach, the results, once again, are not conclusive. The composite picture of the creative person that emerges is not clear and congruent from these studies. Still, Paramesh (1970) observed, on the basis of his studies, that the composite picture of the creative individual showed that he or she is neither extraverted nor introverted and is neither high nor low in anxiety or nurosis-level. He found his group of creative subjects stable in personality organization and characterized by theoretical and aesthetic values. Such findings lead us nowhere—neither in terms of theory nor in terms of understanding creativity. One notices lack of ingenuity and insight in developing a theory of creative personality or putting findings in a proper theoretical framework. In this connection, this letter from a research worker studying the relationship between adjustment and creativity is interesting:

> In a research paper on the relation between 'Creativity and Adjustment', we got a correlation coefficient of 0.20. Using 't' test to test the significance of correlation, we got the value as 2.51 which is significant at .05 level and interpreted the result that creative people are not well adjusted whereas in some studies similar results are interpreted that creative people are properly adjusted. In a study by Sinha and Sharma a negative and significant correlation has been interpreted as better adjustment. Which one is correct, your seasoned guidance is required? Reviewing the literature contradictory results are most confusing. Kneller (1965) is of the opinion that the highly creative student is less adjusted wheras Gowan & Demos (1967) are of the opinion that the creative child is usually well adjusted.

Such theoretical interpretative crises are not uncommon in studies on creativity. Nandy (1980) writes from a different perspective:

> It is only recently that the psychological and sociological studies have begun to yield some insights into those personality assets and dynamic integration that are necessary for the creative functioning of a scientist. As time passes, one should be able to differentiate the characteristics specifically associated with scientific functioning and scientific creativity as distinct from those predicting intellectual functioning or creativity in general. Meanwhile, in the absence of specific theories, one is forced to work on the basis of ideographic formulations which are only indirectly and qualitatively applicable to other similar cases.

It is important to plan intensive studies of creative Indian students and adults which could form the basis for formulating sound impressions about possible individual and social sources of creativity and exploratory behaviour in India. And, in the process, trying to identify the cultural definitions of divergence and the social sanctions available to the divergent in the society. 'Indianness is defined, we feel, not merely by what the *modal* Indian feels, does and psychologically lives with but also by what the creative Indian's psychologically sense and actualise on behalf of their culture as well as by what the deviant Indian dramatises of his society's problems and crises' (Nandy and Kakar, 1980).

An insightful study along these lines which tried to analyse some aspects of the life-histories of two Indian pioneers in science was made by Nandy (1980). His study deals with the way they coped with the culture of modern science, the synthesis they attempted between their traditional selves and the demands of a new professional role, the personal and cultural resources that they brought to bear upon their creative tasks; and the meaning they ascribed to their work, by forging a new professional self-image and by offering alternative orientations to modern science which, though simple minded in many ways, anticipated some of the current concerns of the philosophy and sociology of sciences. It derives its theoretical scaffolding from psychoanalytic social psychology and personality theory, and conceptualizes scientific creativity as a cultural process which helps restructure a society's self-image and is, in turn, shaped by the society's historical and cultural experiences. Creativity researchers, by and large, are neither familiar with such studies nor are such studies familiar with them.

Two major approaches can be recognized in the study of the creative personality. One is holistic, that is, it is the study of the personality of the creative person in its totality, or at least its major divisions. The second approach is the study of the specific ingredients of such

a personality (Arieti, 1976). However, Perkins (1981) is critical of the present approaches:

> None of these approaches has turned out to be satisfying. No specifically creative ability wholly stands up, although Westoott's intuition comes close. The left brain, right brain approach falls down altogether. The personality approach goes in circle, a person with a creative personality turning out to mean about the same thing as a person who behaves creatively. May be it's time the combination-of-ingredients approach had a chance. In fact, it makes some sense to think of creativity as a trait made up of five sorts of ingredients, abilities, style, values, beliefs, and tactics. The results of the personality research can be recast in these terms, and a good deal more said besides.

Studies have hardly searched for the total system that stems from the creators cognitive and affective life. As Gruber sees it, the student of creativity must reconstruct the mental life of the creative individual at various points in the development of his work. Accordingly, the theorist of creativity has to identify certain enduring motifs—in the case of Darwin, themes such as origins, variations, survival, natural selection, heredity—and produce a series of 'cognitive maps' that capture the thinker's view of his project at various points in its own evolution. 'Rather than a single trait, creativity is a special combination of several traits—in a special family environment, in some social historical situations, occurring at a given time and place—that produces the synthesis we call creativity' (Arieti, 1976).

To study this special combination, it may be useful to combine Gruber's highly original approach with Erikson's powerful analyses. However, 'whether Erikson's approach can be reconciled with Gruber's is not known, but both men stand out in their spurning of glib generalization and in their total immersion in the facts and themes of each case that they examine' (Gardner, 1982).

SOCIOCULTURAL FACTORS AND CREATIVITY

In spite of the fact that India offers fascinating challenges to social scientists because of the interesting, complex, and multifaceted nature of its society, educationists and psychologists have not evinced much interest in cross-cultural studies and in analysing sociocultural factors which aid or impede ceativity in our culture. It is high time that we realize that "thought and creativity are conditioned by the sociocultural structure" (Deva, 1984). Sorokin, as many others, attributes artistic creation to the sociocultural dynamics of different historical eras. The significance of sociocultural influences is so pronounced that Toynbee warned that 'potential creative ability can be stifled, stunted, and stultified by the prevalence in the society of adverse attitudes of mind and habits of behaviour'.

Most of the research on creativity, including American research, has been characterized by an individualistic approach. 'The individualistic attitude reveals itself, above all, in a concentration of interest upon the psychological process of creativity and analysis of the so-called creative personality, whilst bypassing almost entirely (or at least clearly not noticing) the historical, social and philosophical co-determinants of creativity.' This is not altogether true. Remarkable work by Arieti and Simonton on sociocultural influence on creativity has opended new avenues and provided many insightful directions. However, Amabile (1983) is critical of the fact that a social psychology of creativity has failed to develop, in part bacause empirical creativity research has long been dominated by a trait approach (which is true in case of Indian research also) and the attempt to precisely identify the personality differences between creative and non-creative individuals (Nichollas, 1972):

> As a result, some potentially important areas of enquiry have been virtually ignored. There has been a concentration on the creative person to the neglect of 'creative situations', that is, circumstances conducive to creativity; there has been a narrow focus on interpersonal determinants of creativity to the neglect of external determinants; and, within studies of interpersonal determinants, there has been an implicit concern with 'genetic' factors to the neglect of contributions from learning and the social environment.... It can be argued, though, that social-psychological issues have been ignored in the study of creativity and that those must be integrated into a general framework that includes personality and cognition.

Amabile has developed a componential framework to creativity research, which can serve to broaden current conceptions of creativity.

It suggests that, rather than focusing solely on the characteristic personality traits of outstanding creative individuals, researchers might more profitably view creativity as a process (evidenced by products) that can be influenced by both internal and external factors—by cognitive skills, work habits, and social environmental variables as well as by personality dispositions. In so doing, this framework can facilitate both the development of an empirical social psychology of creativity and the integration of social psychological conceptualisation with the insights of cognitive and personality psychology.

Indian research on socio-cultural factors and creativity broadly relates to such issues as environment and creativity, creativity in the perspective of rural and urban background, creativity as reflected in different types of schools and creativity as related to different cultural factors.

Studies in the area of environment and creativity generally relate to home and organisational environment, dealing with different variables such as parental education, occupation, socio-economic status, number of siblings, birth order, parental perceptions, social-familial and personality correlates, disadvantaged versus advantaged homes, organizational environments. The following is typical of such findings: 'Cordial parental relationship, democratic attitude of parents, acceptance of the child by parents, relationship with younger siblings showed a direct, positive relationship with creativity'; 'Girls perceiving high stimulation in home environment and normal stimulation in school environment had higher scores on overall creativity and originality aspects of it'; 'Boys with scientific creativity perceived less social isolation in their homes'; 'Subjects whose parents are highly educated, highly placed are more creative than those whose parents had low education and low placement'; 'Age, space, school education environment, social class have significant main effects as well as interactive effects on creative thinking'. An interesting and amusing finding is: 'Father's books and education contributed to creativity among boys, but not among girls.'

Results of comparisons of effects of rural–urban backgrounds on creativity are not conclusive. There are studies which indicate that 'rural samples are more creative than urban', and also findings that indicate that 'urban students scored higher than rural counterparts'. Yet another finding suggests that 'rural disadvantaged are better than urban, tribal counterparts in verbal creativity scores'. Do such findings take us anywhere?

Studies on creativity and school climate have uniformly shown that schools with open climate are conducive to the development of creativity as compared to schools with closed environment. We have findings such as 'mean scores of subjects on verbal and non-verbal tests increased as the schools became characterised with respect to the status of being more advantaged'.

A few studies are available which have compared different cultural groups on different measures of creativity. Studies have compared Muslims and Hindus, high caste, low caste and tribals and non-tribals on different tests of creativity. We have such findings as 'culturally superior group scored higher on verbal fluency, verbal flexibility and non-verbal elaboration than culturally inferior group', 'Hindus belonging to three socio-economic strata are higher on creative production than Muslims belonging to three socio-economic strata'; 'Performance of high-caste subjects was superior to Harijan subjects on creativity variables', 'Disadvantaged Harijan subjects did not possess creative positives'; 'Cultural level index significantly correlated with creativity and differentiated between creatives and non-creatives'. Results about the comparative performance of tribals and non-tribals on tests of creativity are of course, not conclusive.

The types of studies reviewed above, though important, do not provide significant information about possible individual, social or cultural sources of creativity and exploratory behaviour in India. These studies do not provide significant sociological insight into how creative development is affected by socio-cultural conditions since it is evident that 'cultural factors strongly influence the course of creative development, the level of creative functioning and the type of creative functioning that flourishes most'.

Creativity, if conceptualized as a social phenomenon, has been perceived differently in different historical eras and in various socio-cultural structures in India. Societies are not completely stable and unchangeable in their notions about how people ought to think and behave. 'Socio-cultural time is thus a variable property of a socio-cultural system and not merely a matter of the system's intrinsic qualities. A given kind of creativity is associated with a particular historical era' (Deva, 1984). We have not tried to put time and creativity in a sociological perspective. We have no information on how in India creativity has fostered the cultural change processes and how creativity has been facilitated by such changes.

In a multi-cultural nation like ours, it will be interesting to explore whether the interface between two or more cultures has potential for promoting the emergence of creativity. It will also be interesting to study the development of the creative individual and thus suggest possible sources of creativity and innovation in Indian society. The type of work Simonton has pursued may provide useful direction.

Cultural psychology and psychological anthropology in India is yet to give attention to significant issues like relationship between culture and creativity. In any case, we have yet to see any promising developments in the area of the social psychology of creativity. The case for such research has been well argued by Amabile (1983):

> On a practical level, social variables represent one of the most promising avenues for influencing creative behaviour, there is not much that can be done about innate abilities and personality characteristics. Furthermore, although cognitive skills necessary for creative performance can be developed, this process normally occurs over relatively long periods of time. By contrast, social environments influencing creativity can be changed easily and can have immediately observable effects on performance.

RESEARCH ON NURTURING CREATIVITY

The art and science of nurturing creativity in the individual person is in its initial stages and much has not been accomplished. "I think we must be candid on this matter and admit that all of us, the concerned with this problem have so far only been able to come up with rudimentary and tentative notions. There is still a great discrepancy between what we know about creative process and our ability to use knowledge for the purpose of promoting creativity. Our modesty in admitting our results, however, should not eclipse our pride in participating in a pioneer work, with the hope that new advances soon will become apparent" (Arieti, 1976). One can cite numerous studies in the professional literature on the effects of various training programmes which have attempted to increase productive performance under different environmental conditions of children, adolescents and adults.

A comprehensive summary of the results of 142 studies that have used Torrance's Tests of Creative Thinking as a criterion measure was reported by Torrance (1972). The paper c[illegible]sified ways of teaching children to think creatively as:

> training programmes emphasizing the Osborn-Parnes Problem [illegible]lving Procedures or a modification of it;
>
> other disciplined approaches such as training in general semantics, creativity research and the like;
>
> complex programmes involving packages of materials such as the Purdue Creativity Programmes, the Covington, Crutchfield and Davis Productive Thinking Programmes and the Myers and Torrance Ideabooks;
>
> using creative arts as vehicles for teaching and practising creative thinking;
>
> curricular and administrative arrangements designed to create favourable conditions for learning and practising creative thinking;
>
> changes in teacher–classroom variables, indirect and direct control of classroom climate, and the like;
>
> providing testing conditions designed to facilitate higher levels of creative functioning or more valid and reliable test performance.

Torrance, on the basis of this comprenensive review, concluded that the most successful approaches seem to be those that involve both cognitive and emotional functioning, provide adequate structure and motivation, and give opportunities for involvement, practice and interaction with teachers and other students. Motivating and facilitating conditions certainly make a difference in creative functioning but differences seem greatest and most practicable when deliberate teaching is involved.

Analysis of the doctoral theses in this area indicates that relatively little research has been done in India on nurturing creativity through various procedures. Is this because promoting students' creative thinking and problem-solving abilities has not been considered a viable educational goal? To consider the problem of nurturing creativity in greater detail, however, and to illus-

trate new research opportunities in this field, a model of creative learning will be helpf We have practically none at present.

Researchers have studied the effect of teaching strategies, instructional materials, creativity training programmes, and stimulating environments on the development of creativity. Most of these studies have made use of samples of middle- and high-school children with one study using pre-schoolers. Most of the samples came from urban areas, but some made use of rural samples as well. The experimental designs used were of different types. In most of cases, the techniques employed have resulted in significant improvements in creativity as measured by creativity tests. This was bound to happen.

One notices an absence of an eclectic approach for nurturing creative behaviour by incorporating and synthesizing as much as possible from the growing, literature on creativity. There are many issues within this area which remain unexplored. The 16 studies classified in this area provide hardly any firm basis for determining the effectiveness of a procedure(s). The complexities involved in creativity development would indicate that there is no single direct approach and that one method or technique may profit one person but not another. Studies abstracted in this area have not made use of many procedures available for stimulating creativity (Van Gundy, 1982; Stein 1974, 1975). The goals of the studies in this area as pointed out by Stein (1985) should not be just such simplistic general statements as "those who have used the procedure were able to solve more problems than those who did not". While this information is desirable it does not go far enough. We need to know what *kinds* of people should use what *kinds* of procedures with what *kinds* of problems. It is important to go further and especially is it important to be able to recommend procedures for different kinds of people so that each type can become more effective. Stein (1985) has made some thoughtful recommendations:

> Previous work evaluating creativity stimulating procedures were faulted because the evaluation session utilised a procedure that was very much the same as one used in training. Thus, it was not unusual to find someone suggesting that a programme in which training to come up with as many ideas as possible and which contained a practice problem such as 'How many ideas can you think of for a coat hanger?' was tested for its effectiveness with the question, 'How many ideas can you think of for a brick?' Training and evaluation procedures should be different from each other. If training is to be at all meaningful then evaluation should involve a carry-over or a transfer of training to significant problems. Moreover, the expectation should also be that training should not only result in short-lived effects of one or two weeks duration but should yield effects that may be long lasting if not permanent.

Those who have used techniques to stimulate creativity have reinforced the use of the concepts of divergent thinking and convergent thinking and 'push them to forefront of visibility and popularity'. However, it needs to be realized that creative thinking does not depend only on divergent thinking or lateral thinking. Guilford, who identified the divergent thinking factor and pioneered the understanding of the distinction between convergent and divergent thinking, has pointed out that the divergent thinking factor was not the only factor involved in creative thinking; divergent thinking tests were not as valid as one might hope in studies of creative adults. This has to be taken seriously while testing the effectiveness of stimulating procedures.

While considering issues about nurturing creativity it is important to realize that there is a wide range of socio-psychological and educational variables that might influence creativity. The list of variables may include both global environmental features as well as more narrowly defined social factors. The whole field of education, including those agencies which deal with human resource development, should come under scrutiny to find out if the practices and procedures used really stimulate creativeness. Training procedures, though significant, form just a part of the whole nurturing strategy. We have remained indifferent to what is happening in the field of education. MacKinnon (1967) found a striking similarity between psychotherapy and education when he wrote:

> The field of education is strikingly like psychotherapy, not only in that both take as their goal the improvement of the objects of their efforts—students in one case, and patients in another—but that in the past both have not been especially concerned to test the effectiveness of their theories or practices. The reasons for such strange neglect have been mainly the same in both fields. In the context of Indian situation Gandhi (1985)

puts it as follows:

> How to locate dynamic, open-ended and flexible political structures and models and evolve new administrative and management tools which will facilitate the emergence of an evolutionary and transformational image of man and society? How to recast priorities in the educational system with a focus on vocationalisation and value-oriented education to ensure the goal of excellence, equity and productivity in the system? These and many other inter-related questions need to be examined in depth before evolving a coherent and comprehensive strategy of development for a major breakthrough into the future.
>
> When we attend to these issues, we shall, in all possibility, notice creative functioning flourishing in our students and other sections of our society.

CREATIVITY: PROSPECTS AND ISSUES

Creativity is a complex issue which deserves the most vigorous systematic enquiry. There is in India some amount of resurgence of research and interest in the area of creative functioning; it must also be recognized, however, as an unsystematic, atomistic and ad-hoc type of approach, at least so far. But for a few notable exceptions, the research has lacked the freshness and the very creativity that is being studied. Some colleagues in Indian universities like Walkup (1970) have attributed this deficiency to the level of competence of those doing research in this fascinating field. It is not uncommon to come across such a charge, of course, not altogether unfounded in the field of education and psychology. One is tempted to reproduce what Howard Gardner (1982) wrote in a similar context:

> One of my professors in graduate school, a brilliant but insidious fellow, once taunted me: 'Why study creativity? The psychologists who have done so are a notably dull lot.' He was right in a sense, because the list of individuals who have studied the creativity process is distressingly long in comparison with handful who have actually illuminated it. But my professor was just as certainly wrong. The greatest psychologists—from William James to Sigmund Freud, from B.F. Skinner to Jean Piaget—have all recognised the importance and the appeal of a study of the creative process. They have all sought to explain how human beings can fashion comprehensive theories in science or powerful works of art. And if they have not fully succeeded in providing a coherent and cogent account of this most puzzling of areas, it is not for want of trying.

This trend report does not clearly indicate where we are in the field of creativity research. The state of the art is indefinite and inconclusive. It can be safely argued that we have not addressed ourselves in a sustained and committed fashion to any major problems to this area. Our methodology has been rather narrow as has been our concept of creativity. A psychometric approach to the study of creativity is not the only useful approach. 'The necessary uniqueness of the creative person argues against psychometric approaches and other efforts to reduce psychological description to a fixed set of dimensions.' Creativity has to be studied along all the dimensions—constitutional or biological, cultural, anthropological and socio-psychological. We have to look for new and alternative methodological frameworks. 'In the study of creativity, as in the study of evolutionary novelty, as an alternative to the methodological battlecry of prediction and control,' a two-part approach has been proposed: careful, analytic description of each case and efforts to understand each case as a unique, functioning system. It may not be out of place to suggest that developmental approaches are possibly the most promising ones available for the foreseeable future to stimulate and guide work in the area of creativity, giftedness and human extraordinariness. These developmental approaches will utilize insights and findings from the developmental sciences: principally psychology, but also biology, brain research, epistemology and even literature. This was clear to the noted British scientist P.B. Medawar:

> The analysis of creativity in all its forms is beyond the competence of any one accepted discipline. It requires a consortium of the talents: psychologists, biologists, philosophers, computer scientists, artists, and poets will all expect to have their say. That 'creativity' is beyond analysis, is a romantic illusion we must now outgrow.

ABSTRACTS : 524—585

*524. AMIN, M.J., *To Study the Effectiveness of Creative Thinking Programmes on the Creativity Level of the School Children in relation to the Programme Correlates,* Ph.D. Edu., SPU, 1988

The objective of the study was to develop a creative thinking programme (CTP) for enhancing the level of creativity in children with special reference to time duration for implementing the programme, teacher variability, discussion pattern in a group and programme correlates. The hypotheses examined were: (1) A creative thinking programme increases the level of creativity of students. (2) A creative thinking programme increases the creativity components scores for fluency, flexibility and orginality of the students.

An experimental factorial design (2×2×2) with a single control group was employed. The independent variables were varied at two levels. In each of the eight cells, 20 subjects were randomly chosen. The control group comprised 40 subjects. Thus, in all, a sample of 200 subjects of class V was employed. The Creative Ability Test standardized by J.Z. Patel was used to measure creativity and its components. The experimental treatment, namely, the creative thinking programme developed by J.Z. Patel, was used to enhance creative ability. Analysis of variance and t-test were applied for data analysis.

Some of the major findings were: 1. The main effect of the treatment—the training of creativity by the creative thinking programme—was significant for creativity and its component measures: fluency and originality. 2. The main effects of the two factors, time duration and group discussion, were found significant on creativity and fluency thinking ability. Thus, when the programmes were utilized for as long a period as 12 weeks, enhancement of creativity seemed to be superior, irrespective of discussion and programme instructors. 3. After the completion of every creative thinking programme, group discussion seemed to be worthwhile in terms of ideas produced. 4. The main effect of programme instructor was not significant.

The educational implications are: (1) National education policy should put special stress on the development of creativity in primary school children. (2) The programme to enhance creative thinking can be implemented within school hours, during the regular timetable. (3) Creativity can be introduced through cocurricular activities, social sciences and general sciences. (4) Involvement of the students in creative thinking would provide highly motivating opportunities to achieve many good and appropriate responses to the stimulus.

525. BHOGAYATA, C.K., *A Study of the Relationship amongst Creativity, Self-concept and Locus of Control,* Ph.D. Edu., Sau. U., 1986

The main objectives of the study were, (i) to compare the creativity, self-concept and locus of control of boys and girls, (ii) to compare the creativity, self-concept and locus of control of urban and rural students, (iii) to find out the magnitudes and directions of the correlations of self-concept and locus of control with fluency, originality and creativity, (iv) to find out the magnitudes and directions of the multiple correlations of self-concept and locus of control with fluency, originality and creativity, (v) to study the predictability of fluency, originality and creativity, (v) to study the predictability of fluency, orginality and creativity of the students from their self-concept and locus of control, (vi) to compare the fluency, originality and creativity of the students with a high and low self-concept, (vii) to compare the fluency, originality and creativity of the students with internal and external locus of control, and (viii) to study the interactive effect of self-concept and locus of control on creativity. Thirty-one operational hypotheses were formulated for the study.

The sample comprised 1,014 students with 671 boys and 343 girls, and 685 urban and 329 rural students. It was selected by employing the stratified random cluster technique from population of about 10,000 students studying in Std. X of Gujarati-medium secondary schools in Bhavnagar district. The three tools used to collect data for the study were the Creative Expression Test (CET) constructed and standardized by Janakaray Dave, the Self-Concept Inventory (SCI) constructed and standardized by Jayantilal Shah, and a Gujarati adaptation of Rotter's Internal–External Locus of Control Scale (RIELCS) prepared by the investigator. The reliability and validity indices of the CET, SCI and RIELCS anged from 0.812 to 0.942 and from 0.470 to 0.883, respectively. The technique of a back translation was employed to examine the Gujarati adaptation of the RIELCS for any possible culture bias. The descriptive statistics such as mean, medium, standard deviation, zero-order correlation and multiple correlation and inferential statistics such as multiple-regression equation.

z-ratio, t-ratio and ANOVA were employed to analyse the data.

The major findings were: 1. Boys were more creative than girls, but they did not differ in their self-concept and locus of control. 2. Urban students had a higher self-concept than rural students, but urban and rural students did not differ in their creativity and locus of control. 3. The zero-order correlations of self-concept and locus of control with fluency, originality and creativity were 0.248, 0.219, 0.253, 0.239, 0.241 and 0.240 respectively. The correlation between self-concept and locus of control was 0.345. All the correlations were linear, positive and significant at 0.01 level. 4. The multiple correlations of self-concept and locus of control with fluency, orginality and creativity were 0.297, 0.282 and 0.301, respectively. These multiple correlations were positive and significant at 0.01 level. 5. The fluency, orginality and creativity of the students were predictable from their self-concept and locus of control. 6. The students with a higher self-concept were more fluent, original and creative than the students with a lower self-concept. 7. The students with internal locus of control were more fluent, original and creative than the students with external locus of control. 8. The main effects of self-concept and locus of control on creativity were significant, but their interactive effect on it was not significant.

526. BINDAL, V.R., *A Study of Creativity in relation to Experimental Attitude and Pupil's Perception of Parents' Attitude towards Creativity,* Ph.D. Edu., DAVV, 1984

The objectives of the study were, (i) to ascertain the relationship between creativity and experimental attitude, (ii) to detemine the relationship between creativity and pupil's perception of parents' attitude towards creativity, (iii) to study the relationship between experimental attitude and creativity, (iv) to find out the relationship between verbal creativity and nonverbal creativity, (v) to compare the performance of scheduled caste/scheduled tribe and non-scheduled caste non-scheduled tribe students on the measures of creativity, experimental attitude and pupil's perception of parents' attitude towards creativity, (vi) to compare the performance of males and females on the measures of creativity experimental attitude and pupil's perception of parents' attitude towards creativity, (vii) to compare the performance of science and arts students on the measures of creativity, experimental attitude and pupil's perception of parents' attitude towards creativity, and (viii) to compare the performance of IX and X grade subjects on the measures of creativity, experimental attitude and pupil's perception of parents' attitude towards creativity.

Four hundred students were randomly selected from 3952 students studying in ten higher secondary schools of Ratlam city. The sample comprised 200 boys and 200 girls of grades IX and X. In each group, 100 students of arts and 100 of science were present. The whole sample also had 100 SC/ST students. Mehdi's Test of Creative Thinking (verbal and nonverbal) in Hindi was used to measure creativity. Its test-retest reliability coefficeint was 0.98 and validity coefficient ranged from 0.32 to 0.40. Experimental attitude was measured with the help of the Pupil Situational Inventory developed by Cheong (1969). The test-retest reliability coefficient was 0.81. The empirical validity with creativity as a correlate was 0.82, with pupil's attitude towards school as a correlate, it was 0.30, and with sociometric status it was found to be 0.29. Pupil's perception of parents' attitude towards creativity (PPPATC) was measured with the help of the Pupil's Perception of Parents' Attitude Towards Creativity Inventory developed by the investigator. The test-retest reliability and split-half reliability coefficients were found to be 0.938 and 0.723 respectively. The concurrent validity was established by finding the correlation between PPPATC and creativity which was 0.564, and between PPPATC and experimental attitude which was 0.734. The data were analysed by using the t-test and product-moment correlation.

The findings were: 1. A significant relationship was found between various components of creativity (verbal fluency, verbal flexibility, verbal originality, total verbal creativity, non-verbal originality, non-verbal elaboration, total non-verbal creativity, and composite creativity) and experimental attitude (for males, females, science subjects, arts subjects, IX graders, X graders, and for the total sample). 2. A significant relationship was found between various components of creativity and pupil's perception of parents' attitude towards creativity (for males, females, science students, arts students, IX graders, X graders, and for the total sample). 3. A significant relationship was found between experimental attitude and pupil's perception of parents' attitude towards creativity (for males, females, science students, arts students, IX graders, X graders, and for total sample). 4. A significant relationship was found between verbal creativity and non-verbal creativ-

ity (for males, females, science students, arts students, IX graders, X graders, and for the total sample). 5. A significant difference was found between the performance of scheduled caste/scheduled tribe, and non-scheduled caste/non-scheduled tribe students on all the components of verbal and non-verbal creativity on experimental attitude, and on PPPATC. 6. No significant difference was found between the performance of males and females on nearly all the components of verbal and non-verbal creativity, experimental attitude, and PPPATC, except non-verbal originality, in which males were higher. 7. A significant difference between the performance of science and arts students was found on all the components of verbal and non-verbal creativity, experimental attitude and PPPATC. 8. No significant difference was found between the performance of IX and X graders on verbal originality, total verbal creativity, all the components of non-verbal creativity and PPPATC, whereas a significant and positive difference between the performance of IX and X graders was found on experimental attitude showing the superiority of X graders. A significant but negative difference was found on verbal fluency and verbal flexibility, showing the superority of IX graders.

The implications are: (1) Teachers can promote creativity by encouraging the experimental attitude in the pupils through hypothesizing and heurism. (2) Through curricular and cocurricular programmes, attempts should be made to provide heuristic and hypothesis-making experience to the arts, SC/ST and IX grade students to enhance their experimental attitude. This experience will make them more flexible and open-minded. 3. Through the adult education programmes, efforts should be made to make parents aware and appreciative of creativity, and its contribution to national development. This will make them receptive and responding to the creative ideas of their children.

527. BRAR, S.S., *A Comparative Study of the Performance in Bachelor of Education Examination of High Creative and Low Creative Boys and Girls at Different Levels of General Intelligence and Socio-economic Status,* Ph.D. Edu., Kur. U., 1986

The objectives of the study were (i) to find out if there was any difference in the performance as a whole in the B.Ed. examination of high creative and low creative students, (ii) to find out if there was any difference in the performance in theory papers in the B.Ed. examination of high creative and low creative students, (iii) to find out if there was any difference in the performance in teaching skills in the B.Ed. examination of high creative and low creative students, (iv) to find out if there was any difference in the performance in art and craft in the B.Ed. examination of high creative and low creative students, (v) to find out if there was any effect of the interaction between, (a) sex and creativity, (b) socio-economic status and creativity, (c) general intelligence and creativity on the performance in the B.Ed. examination, and (vi) to find out the combination of factors from amongst creativity, general intelligence, sex and socio-economic status for the purpose of optimum prediction of performance in the B.Ed. examination. Keeping these objectives in view null hypotheses were framed.

The sample of the study consisted of 506 B.Ed. students who were available at the time of data collection. These students belonged to different colleges of education affiliated to the Kurukshetra University. The sample comprised 309 females and 117 males. The sample students were administered the following tools: (i) The Torrance Test of Creative Thinking (1972), with both verbal and non-verbal forms; (ii) The Tandon (1971) Group Test of General Mental Ability; (iii) The Jalota *et al.* (1970) Socio-economic Scale Questionnaire: (iv) The marks of the B.Ed. examination of the students in the university examination. The data so collected were analysed with the help of analysis of variance, product–moment correlation and multiple regression.

The findings of the study were: 1. High creative subjects scored higher than low creative subjects in the area of total performance, the theory part and skill-in-teaching part of the B.Ed. examination. The differences were significant in these areas. There was no significant differences in performance in art and craft between high and low creative subjects. 2. The high creative girls scored comparatively higher than the high creative boys in the area of total performance, the theory part and the art and craft part of B.Ed. examination. But these differences were not significant in any case. High creative boys scored higher than the high creative girls in the skill-in-teaching part of the B.Ed. examination and the difference in performance was significant. 3. The low creative girls scored higher than the low creative boys in all areas, that is, in total performance, the theory part, skill-in-teaching and the art and craft part of the B.Ed. examination. The differences in performance were significant in all the cases. 4. The influence of creativity on performance in the B.Ed. examination for

the total sample was significant in the case of total performance and the theory part while it was not significant in the case of skill-in-teaching and the art and craft parts. 5. The influence of intelligence on performance in the B.Ed. examination for the total sample was significant in the case of total performance, the theory part, and the art and craft part, while it was not significant in the case of the skill-in-teaching. 6. The influence of socio-economic status on performance in the B.Ed. examination for the total sample was significant in the case of total performance, skill-in-teaching, and the art and craft part, while it was not significant in the case of the theory part. 7. The interaction effects of intelligence, socio-economic status and creativity, considering two at a time, on performance in the case of total performance, the theory part, the skill in teaching part and the art and craft part were not significant. 8. The simple correlations between the variables of total performance, intelligence, socio-economic status and creativity were significant for the total sample, for girls only and for the boys only except the one between total performance and socio-economic status in the case of girls only. 9. Among the variables of total performance, intelligence, socio-economic status and creativity, the value of the correlation coefficient between any two variables on partialling out any third variable decreased in all the combinations. 10. The values of multiple correlation coefficients between total performance and any two of the remaining variables taken two at a time was higher than the simple correlation of total performance with the other variables. The value of the multiple correlation coefficients was still higher when taking intelligence, socio-economic status and creativity together with total performance; when considered separately for boys and girls, the value of this multiple correlation was the highest in case of boys while in the case of girls it was the lowest among all the multiple correlation coefficients. 11. In the case of multiple predictions of total performance in the B.Ed. examination for the total sample, all the three variables, viz., intelligence, socio-economic status and creativity, when taken two at a time and when taken all three at a time, made significant contributions in predicting total performance, the hightest being by intelligence followed by creativity and socio-economic status. 12. In the multiple predictions of total performance in the B.Ed. examination with the help of intelligence, socio-economic status and creativity for boys and girls separately, in case of boys, the socio-economic status made no significant contribution in predicting total performance while intelligence and creativity made a significant contribution. The contribution of creativity was higher in case of boys as compared to that for the total sample. In the case of girls, socio-economic status and creativity made no significant contribution in predicting total performance in the B.Ed. examination while intelligence made a significant contribution.

The study has its implications for teacher educators, who should (i) apply a creativity approach to teaching, (ii) change the system of examination, (iii) pay special attention to students coming from lower socio-economic strata. Above all, admission to B.Ed. courses should be streamlined so that only creative and intelligent students are admitted.

***528.** BRAR, S.S., *Development of Creativity in relation to Intelligence among the School Children of 13 to 18 Years Age,* Ph.D. Psy., GNDU, 1987

The objectives of the study were, (1) to investigate the growth patterns of creativity among school children of thirteen to eighteen years of age, trifurcated into high intellegent group, average intelligent group and low intelligent group, formed on the basis of performances on tests of fluid intelligence and crystallized intelligence, (ii) to ascertain developmental patterns of fluid intelligence and crystallized intelligence among school children of thirteen to eighteen years of age, trifurcated into high creative group, average creative group and low creative group, on the basis of different components of figural and verbal creativity, (iii) to have some idea of the factorial structure of the measures of creativity and intelligence at different grade (age) levels, during the adolescent period of human development. The hypotheses examined were: (1) Different components of figural and verbal creativity would follow different growth patterns in the high intelligent group, average intelligent group and low intelligent group formed on the basis of differences in fluid intelligence among children of thirteen to eighteen years of age. (2) Different components of figural and verbal creativity would follow different growth patterns in the high intelligent group, average intelligent group and low intelligent group formed on the basis of differences in crystallized intelligence among children of thirteen to eighteen years of age. (3) Fluid intelligence and crystallized intelligence would follow different growth patterns in the high creative group, average creative group and low creative group formed on the basis of differences in various components of figural

and verbal creativity among children of thirteen to eighteen years of age. (4) The factorial structure of creativtiy and intelligence measures would differ at different age levels from thirteen to eighteen years.

The descriptive correlation method was used. A sample of 637 male students from 7–12 grades with ages varying from 13 to 18 years was drawn from rural areas of the district Faridkot in Punjab. The tools used for data collection were the Cattell Culture Fair Intelligence Test, Hundal's Verbal Test of General Mental Ability, and the Torrance Tests of Creative Thinking (figural and verbal). The data were processed with the help of analysis of variance, growth rates, means, relative means, and Spearman rank order correlation. For getting an idea of the factorial structure of psychological attributes, factor analysis was carried out.

Some of the major findings were: 1.There was a considerable increase in the growth of all the four components of figural creativity, viz., fluency, flexibility, originality and elaboration in the eighth grade, the fourteenth year of age, in the total group. 2. A different picture of growth patterns of creative abilities emerged in the high intelligent group, average intelligent group and low intelligent group formed on the basis of differences in fluid intelligence. 3. All the four components of figural creativity developed at quite a high rate of growth in the eighth grade. Slumps in the ninth grade were observed in the growth of figural fluency, figural flexibility and figural originality. The slumps were more severe in the low intelligent group than that in the average intelligent group and high intelligent group. 4. There was more recovery in figural creativity components after the ninth grade slump in the high intelligent group as compared to the average intelligent group and the low intelligent group formed on the basis of fluid intelligence test scores. 5. Verbal creativity components, viz., fluency, flexibility and originality developed continuously from the seventh grade through the twelfth grade in high intelligent group, formed on fluid intelligence test scores. There was only a minor slump in the growth of verbal fluency and verbal flexibility in the high intelligent group. But in the average intelligent group and low intelligent group, formed on the basis of the fluid intelligence test scores, the verbal creativity components, namely, fluency, flexibility and originality, declined in the twelfth grade. The rate of decline, was more in the low intelligent group than that in the average intelligent group. 6. Figural creativity components, viz., fluency, flexibility, originality and elaboration developed at a high rate of growth in the eighth grade in three groups, viz., the high intelligent group, average intelligent group and low intelligent group, formed on the basis of differences in crystallized intelligence. 7. Verbal fluency, flexibility as well as originality, increased continuously from the seventh through the twelfth grade in the average intelligent group. 8. Fluid intelligence developed continuously from the seventh grade through the twelfth grade in the total group. 9. Crystallized intelligence increased continuously from the seventh grade through the twelfth grade, implying that performance of students on the crystallized intelligence test increased with age. 10. Crystallized intelligence increased from the seventh grade through the eleventh grade, but declined in the twelfth grade in low creative groups and average creative group formed on the basis of performances in various components of figural creativity. 11. With the help of factor analysis, creativity was found to be multi-dimensional in nature, as its measures generated two independent factors, namely, figural creativity and verbal creativity, almost in all the six grades included in the sample of this study, that is, from the seventh grade through the twelfth grade. 12. Almost in all the grades, creativity and intelligence measures emerged as distinct factors, relatively independent of each other.

529. CHAUDHARY, G.G., *An Investigation into the Trends of Creative Thinking Ability of Pupils of Age Group 11+ to 13+ in relation to Some Psycho-socio Correlates*, Ph.D. Edu., SPU, 1983

The objectives of the study were, (i) to prepare a reliable and valid creative thinking ability test, (ii) to study the trend of creative thinking ability of pupils of different areas, (iii) to study the trend of creative thinking ability of pupils of different sexes, (iv) to study the trend of creative thinking ability of pupils of age group 11 to 13, and (v) to study the trend of creative thinking ability of pupils in relation to their socio-economic status (SES), need achievement (n-Ach), IQ parental behaviour, anxiety, security–insecurity feelings, radicalism *vs.* conservatism, flexibility *vs.* rigidity, suggestibility and emotional stability.

The Creative Thinking Ability Test was standardized on a sample of 1000 pupils of which 394 were from urban area and 606 were from rural area. The reliability and validity of the test were established. The percentiles and percentile rank norms were established for different age groups. For measuring socio-economic status (SES), n-Ach, IQ, anxiety, security–insecurity, and per-

sonality traits, inventories were used. All these tools were standardized by different persons. Factorial design was used to study creative thinking ability in relation to various psycho-socio variables.

The major findings were: 1. There was no significant difference between the mean creative thinking scores of male and female children of rural and urban areas. 2. There was a marked difference between the mean scores on the test of children of three age groups. 3. The higher the socio-economic status, the higher was the creative thinking ability of the student. 4. The higher the n-Ach, the higher was the creative thinking ability of the students. 5. The students with high IQ did not have more creative thinking ability than the students with low IQ. 6. The students belonging to the high parental behaviour group did not have more creative thinking ability than the students belonging to the low parental behaviour groups. 7. The students with low anxiety had more creative thinking ability than students with high anxiety. 8. The higher the security, the higher was the creative thinking ability. 9. The higher the radicalism trait, the higher was the creative thinking ability of the students. 10. Students with the flexibility trait had more creative thinking ability than students with the rigidity trait. 11. The students with low suggestibility had more creative thinking ability than the students with high suggestibility. 12. The students with high emotional stability had more creative thinking ability than the students with low emotional stability.

530. CHAUHAN, N.S., *Creativity Components as Functions of Personality Factors, Sex and Adolescence among University-going Students,* D. Litt. Psy., Agra U., 1978

The objectives were, (i) to explore the nature of creativity, (ii) to enhance the concept through specific probes of its components, (iii) to determine adolescent growth of the five components of creativity, and (iv) to determine personality correlates of creativity components.

The sample comprised 240 university-going students. It was selected by employing the multistage random sampling method. The Creativity Test developed by Chauhan and Tiwari was used to measure creativity. Personality was measured with the help of the 16 PF Questionnaire developed by Cattell. The data were analysed with the help of (2×2×3) factorial design analysis of variance of equal cell size.

The findings were: 1. At the age level 17 years, fulsome expression was positively correlated with creativity components. In late adolescence, it promoted creative production (CP), originality, masculine and feminine creative production (CP). At the age level of 21 years, affectothymia continued to promote CP, masculine CP, originality and masculine originality. Effectivity of affectothymia as a correlate of creativity components, with a depression at 19 years continued to grow. 2. Intelligence demoted fluency and flexibility and rise of CP and flexibility on the low level proved them to be negatively correlated with intelligence, but the decline of feminine, flexibility on the low level of intelligence put it as a positive correlate of intelligence. Intelligence was a correlate of creativity but a negative one of fluency, flexibility, CP and masculine flexibility. It was a positive correlate of feminine flexibility. 3. CP increased consistently and originality increased after the age of 19 years. Fluency at 17 and 21 years was masculine and was feminine at 19 years. Masculine fluency declined up to 19 years, whereas feminine fluency increased up to 19 years. As a reverse of fluency, flexibility of males increased up to 19 years but feminine flexibility declined up to 19 years. Thus the age level of 19 years remained a point of depression for masculine fluency and feminine flexibility. 4. Super-ego at its weaker end acted as a better correlate of adolescent components of creativity. 5. Harria was a positive correlate of feminine CP, feminine fluency and masculine flexibility up to 19 years and of originality after the age of 19 years. Harria was a negative correlate of feminine flexibility up to 19 years Both adequacy and guilt-proneness were correlates of adolescent components of creativity. Conservatism was a positive correlate of adolescent components of creativity up to 19 years. Group-dependence was a positive correlate of feminine CP, feminine fluency, masculine flexibility and originality during late adolescence. It appeared as a negative correlate of masculine fluency and feminine flexibility. Low self-sentiment remained a positive correlate of feminine CP, feminine fluency, originality and masculine flexibility during late adolescence. It appeared as a negative correlate of masculine fluency and feminine flexibility. Adjustment either low or high was a positive correlate of feminine fluency. Adjustment, independent of its level variations, was a positive correlate of originality. Adjustment or less of it was a positive correlate of ISP. Adjustment was a negative correlate of feminine flexibility. Subduedness was a positive correlate of feminine CP, fluency, feminine fluency, originality, flexibility, masculine flexibility and ISP. It remained a negative corre-

late of fluency up to 19 years and of feminine flexibility as well. 6. Both CP and flexibility were feminine but ISP was masculine, originality and fluency were sex-bilateral. Fluency was feminine at 19 years with weak ego, desurgency, conservatism, group dependence, introversion, and with less of adjustment; at 21 years, with low intelligence, weak super ego and with guilt-proneness. Creativity components were sex sensitive. 7. Feminine fluency and masculine flexibility increased up to 19 years but masculine fluency and feminine flexibility declined after 19 years.

531. CHAUHAN, Y., *Value Orientation, Cultural Determinism and Frustration as Correlates of Components of Creativity in Adolescent Boys and Girls,* Ph.D. Psy., Agra U., 1984

The investigation aimed at (i) studying the four components of creativity in terms of their contents, processes and products, and (ii) analysing them in a psycho-cultural framework of factors like culture conformity, value orientation, sex and frustration.

The research had a randomized block design. The paradigm of research had 15 basic hypotheses for twelve 2×2×2×2 factorial experiments. The final sample had a size of 480. The elements of the universe were adolescent boys and girls of high school classes selected at random from different religious groups, castes and economic status strata. The data were collected through four standardized tests and analysis was done by using the F-test.

The following were the conclusions: 1. Mutual sensitivity and roleship of both independent and dependent variables amply justified their selection in the variate framework of the problem. 2. Even the sensitive and useful correlates of the four components of creativity required assistance of each other before they became 'vocal' in the context. 3. Cultural conformity and value orientation on the socio-cultural plane, sex, and frustration on the psycho-social plane appeared highly contributing to promotion and demotion of components of adolescent creativity. 4. Components of adolescent creativity were clearly sex sensitive. Their sensitivity was actually 'Sex Bilateral' instead of 'Sex unilateral'.

532. CHAUHAN, Y.K.S., *Psycho-Cultural Factors (Frustration, Sex, VO and CD) as Correlates of Creativity Components in Adolescence,* Ph.D. Psy., Agra U., 1984

The objectives of the study were, (i) to observe the effect of culture-set variables on the four creativity components, (ii) to determine their creativity-oriented role in the context, (iii) to see the effect of psychological-set variables on the four components of creativity, and (iv) to determine their creativity-oriented role in the context.

The sample comprised 480 adolescents. It was selected through the use of the stratified randomization technique. Creativity was measured with the help of the Rachna Shakti Parikshan developed by N.S. Chauhan. Kunthaa Parikshan developed by N.S. Chauhan and G.P. Tiwari, was used to measure frustration. The Adolescent Value Test developed by the investigator was used to measure Value Orientation (VO). An Adolescence Cultural Influence Test was developed by the investigator. The split-half reliability was 0.80. The data were analysed with the help of 2×2×2×2 factorial design.

The findings were: 1. The choice and use of tetravariate factorial experiments in the study lent full support and facility for developing deep insight into the dynamics of adolescent creativity. 2. It was found that even the sensitive and useful correlates of these components of creativity required assistance from each other to become vocal in behaviour. 3. The CD and Value Orientation on the socio-cultural plane and sex with frustration on the psycho-social plane appeared to highly contribute to promotion or demotion of creativity components. 4. Creativity components in adolescent years were sensitive to sex and their sensitivity was of a sex bilateral type.

*533. DESAI, N.N., *An Investigation into the Creative Thinking Ability of Students of Higher Secondary of Gujarat State in the Context of some Psycho-socio Factors,* Ph.D. Edu., SPU, 1987

The objectives of the study were, (i) to prepare a reliable and valid creative thinking ability test, (ii) to study the trend of creative thinking ability of pupils of higher secondary schools, (iii) to study the trends of creative thinking ability of pupils of different sexes, (iv) to study the trends of creative thinking ability of pupils of science and common streams, (v) to study the creative thinking ability of pupils of different socio-economic levels, and (vi) to study creative thinking ability in relation to scholastic achievement, anxiety and reasoning ability.

A verbal and non-verbal creative thinking ability test was constructed to measure fluency, flexibility and originality (by verbal test) and fluency, flexibility and elaboration by a non-verbal test. The test was standardized over a sample of 608 students which included students from rural and urban area, both girls and boys. The reliability of the test was established by test-retest, split-half, Rulon Formula and Flanagan Formula. It ranged from 0.82 to 0.90. The concurrent and congruent validity were established. The SES scale by B.V. Patel and I.A. Vora, the Anxiety Scale by Nijhawan, the Non-verbal Reasoning Test by the investigator, the percentage marks obtained by the students at the SSC Examination were used for the study. For studying neuroticism and other personality variables the investigator used a self-prepared questionnaire. The 2×2 factorial design was adopted and analysis of variance technique was used for testing the hypotheses.

The major findings were: 1. There was no difference in creative thinking ability of urban and rural higher secondary students. 2. There were no sex differences with regard to creative thinking ability of higher secondary students. 3. There was no difference between the means of science and common stream students. 4. There was no significant difference between the means of high SES and low SES students. 5. The mean difference between two groups, namely, the high anxiety and low anxiety group, was highly significant and was in favour of the low anxiety group. 6. The students with the radical personality trait were more creative. 7. The students with a low neuroticism level were more creative. 8. The students with high emotional stability were better in creative thinking than students with a low emotional stability. 9. The students with good reasoning ability were better in creative thinking than students with poor reasoning ability. 10. The students with higher scholastic achievement were found better in creative thinking than students with low scholastic achievement.

534. DEY, B., *The Relationship of Creativity to Intelligence and Academic Achievement of National Rural Talent Scholarship Awardees,* Ph.D. Edu., Utkal U., 1984

The main objectives of the study were,(i) to study the relationship among measures of creativity, intelligence, State Level Award Selection Tests (AST) scales and subsequent achievement of the National Rural Talent Scholarship (NRTS) awardees, (ii) to study the relationship between each of the measures of creativity and intelligence with the AST scores for languages and social studies and AST scores for mathematics and general science and subsequent achievement in English and Oriya and social studies, and mathematics and general science of the NRTS awardees of grades, (iii) to compare the performance of the NRTS awardees of different years at the two state level award selection tests with their corresponding achievement in school subjects, (iv) to study the differences in creativity, intelligence, scores in award selection tests, and total schools achievement among the high creative and high intelligence groups of NRTS awardees, and (v) to study the different problems in the implementation of the NRTS scheme as perceived by teachers and heads of the schools.

The tools used for data collection were the Basantic Remote Associates Test (BRAT) developed by the investigator for studying creativity of students, Raven's Standard Progressive Matrices (SPM), and NRTS Awardees Information Sheet. Teacher's Nomination of Pupil's Creativity Sheet, NRTS School Information Sheet and examination scores of students in different school subjects. The sample of the study consisted of 431 NRTS awardees of 17 high schools of three districts of Orissa state. Data were collected through administration of tests to the sample respondents and record surveys.

The findings of the study were: 1. There was a positive and statistically significant correlation between the creativity and intelligence of the NRTS holders. 2. Creativity was found to relate itself to the subsequent total school achievements of the NRTS awardees. 3. Intelligence of the NRTS awardees was correlated with their award selection test performance and total school achievement of the highly intelligent awardees was better than that of the highly creative scholars. 5. There was a statistically significant disordinal creativity–intelligence interaction as it affected the performance of the NRTS awardees at the state level award selection tests. 6. The award selection test performance and the total school achievement of the NRTS awardees belonging to the general category of castes was better than that of other backward classes and scheduled caste/tribe awardees. 7. There was a tendency for the first-born national rural talent scholarship holders to score higher than the later-born in the state level award selection tests.

535. DUBEY, SUSHMA, *An Ecological Study of Educational Influences on Development of Creative Thinking in Children,* D.Phil. Edu., All. U., 1986

The study attempted to provide empirical support to ecological conceptualization of creative thinking/creativity. It was assumed that (a) there is a symbiotic relationship between man, society and nature, and (b) there is a symbiotic relationship between natural/social environment and creative thinking/creativity. In the study, ecology was defined as a scientific study of conditions of existence of living organisms and the natural relations between organisms and the medium they inhabit. Further, creative thinking and creativity were used interchangeably to refer to a higher complex psychological process resulting from the synthesis of lower cognitive, motivational and effective processes. The hypotheses of the study were: (1) There will be positive association between age and creative thinking. (2) There will be positive association between enriched school education environment and creative thinking. (3) There will be positive association between enriched family education environment and creative thinking. (4) There will be significant spatial variation in creative thinking. (5) There will be positive association between social class and creative thinking. (6) Some of the interactions between and among age, space, family education environment and school education environment will have significant positive effects on creative thinking.

The study was patterned on a mixed factorial design. The total sample of the study consisted of 255 male students of classes V and VI of Allahabad and Kanpur. Of these 255 students, 130 were from an enriched school education environment and 125 from an impoverished school education environment. The school education environment was measured through a School Education Information Schedule plus the investigator's own judgement based on spot verification. The family education environment was measured by a specially devised Family Education Inventory. Kuppuswamy's Socio-economic Status Scale (Hindi) was used for ascertaining the social class of children. Baqer Mehdi's Nonverbal Test of Creative Thinking, Passi's Block Design and Passi's Puzzle Test were used for measuring creative thinking in children. In addition, two other nonverbal tasks developed by the investigatory—Toy Making Task and Clay Modelling Task—were used for measurement of creative thinking. The data obtained were subjected to multifactor analysis of variance, correlation analysis and factor analysis.

1. The results of the study supported all the hypotheses. Age, space, school education environment, family education environment and social class were found to have significant positive main effects on creative thinking in children. 2. The interaction between age and space, space and school education environment, and school education environment and family education environment had significant effect on creative thinking. However, most of the interaction effects for age × space × school education environment were not found significant.

536. GANESAN, V., *Knowledge Workers: Organizational Climate for Creativity,* Ph.D. Psy., Madras U., 1987

The major objective of the study was to evaluate the influence of the creative potential of knowledge workers and the organizational climate over their innovative performance.

Creativity (ideational fluency) was measured using an individual brainstorming technique, organizational climate by the OCCQ (Organisational Climate for Creativity Questionnaire) developed by the investigator and innovative performance by a Performance Evaluation pro-forma and an interview on variables considered in the study, viz., satisfaction of organisational climate for creativity, need fulfilment, need satisfaction, job involvement, importance in life, satisfaction in life and motivated behaviour. Data were collected from 100 knowledge workers, scientists, university teachers, engineers and medical doctors from 16 organisations adopting a purposive sampling technique.

The main findings were: 1. Creativity of knowledge workers and their innovative performance had a positive but insignificant relationship. 2. Organizational climate by itself was related to innovative performance when creativity was controlled. 3. High and low creatives did not differ in their work attitudes. 4. Organizational climate facilitated the fulfilment of self-actualization needs. 5. High creative people expressed creativity outside the organization when organizational climate for creativity was low. 6. Low organizational climate for creativity and satisfaction of achievement, affiliation and autonomy needs did not go together. 7. High creative people were not more willing to use their creativity than low creative people where reinforcement was lacking.

The implication of the findings is that promotion of

favourable organizational climate for creativity helps increase productivity, job satisfaction and mental health of knowledge workers.

*537. GOLWALKAR, S., *A Study of Scientific Attitude, Creativity and Achievement of Tribal Students of Rajasthan,* Ph.D. Edu., M. Sukh. U., 1986

The main objectives of the research were (i) to study the scientific attitude of tribal students studying science in secondary schools located in tribal area, (ii) to compare this with the scientific attitude of non-tribal students of the same schools, studying science in secondary classes, (iii) to compare the creativity of tribal and non-tribal students, and (iv) to compare the achievement of tribal and non-tribal students in science subjects.

The sample of the study consisted of 270 tribal and 270 non-tribal students of classes IX and X offering science as an optional subject, and living in a tribal area. The tools and techniques used were the Scientific attitude Scale, Thinking Creativity with Words, and Thinking Creativity with Figures.

The main findings were: 1. When comparison of tribals and non-tribals on ten components of scientific attitude was made, non-tribals were found to be superior to tribals on three components of scientific attitude. 2. There was no significant difference between the mean scores of tribals and non-tribals in seven components. On no factor did the tribals fare better than the non-tribals. The overall mean score on the scientific attitude scale for non-tribals was higher than for tribals. 3. There was a significant difference between the mean creativity scores of tribals and non-tribals. The non-tribals had a higher level of creativity than the tribals. Factor-wise comparison of the two groups on the basis of a verbal test of creativity showed that for the fluency component, the mean fluency score of non-tribals was higher than that of tribals. Non-tribals had more fluency than the tribals. The two groups did not differ significantly on the flexibility component. The mean originality score of non-tribals was higher than that of tribals. 4. The non-tribal students had a higher scholastic achievement in science subjects than the tribal students.

538. GUPTA, A.K., *A Study of Institutional Climate, and Classroom Teaching Behaviour in relation to Creativity,* MIER, Jammu, 1977 (ICSSR financed)

The main objectives of the study were (i) to explore the relationship between institutional climate and the creativity of pupils, (ii) to explore the relationship between teachers' classroom verbal behaviour and creativity of pupils, (iii) to study the significant patterns of the needs of pupils and that of the 'press' in their institutions, (iv) to analyse significant patterns of ninth class science teachers' classroom behaviour, (v) to study the effect of intelligence and socio-economic status on creativity, and (vi) to study the interaction between school climate, teachers' classroom verbal behaviour and creativity of pupils.

A sample of 2000 boys and girls studying in grades 7th to 11th in Jammu City high and higher secondary schools, was drawn for investigating the climates of these schools. Further, a sample of 20 science teachers (who were teaching science to ninth class pupils in the schools) was selected to study their classroom teaching verbal behaviour. The sample of 310 students reading in class nine was drawn from the schools which had earlier been categorized as having different institutional climates to enable study of the creativity patterns and interactions between the selected variables. The research tools employed to collect data were: (i) the Verbal Battery of MIER's Tests of Creativity (Gupta, 1975), (ii) the Non-verbal Battery of MIER Tests of Creativity (Gupta, 1975), (iii) the Hindi adaptation of Joshi's Institutional Climate Inventory, (iv) MIER Interaction Analysis Technique (modified form of Flanders' Interaction Analysis Technique) to measure a teacher's classroom behaviour, (v) Jalota's Mental Ability Test in Hindi for measuring a pupil's intelligence, (vi) the Socio-economic Status Scale Form B (urban) (Kuppuswamy). The data were analysed using 2× 2, 3×3 and 2×3×3, factorial design, product–moment coefficient of correlation, the Wilcoxon Signed Rank Test and chi-square test of independence and contingency coefficient.

The major findings were: 1. The mean level of verbal creativity was found to be significantly higher in the need-unfulfilling type of institutional climates as compared to that in need-fulfilling and *laissez faire* institutions. 2. Pupils studying in the *laissez faire* institutions had significantly higher mean non-verbal creativity level than their counterparts in the need-fulfilling type of institutions. 3. There were no significant differences between the pupils studying in institutions with different types of institutional climates with respect to their scores on composite creativity. 4. Institutional climate and verbal creativity were found to be significantly

related. 5. There was a significant relationship between verbal creativity and teaching verbal behaviour, even though the extent of relationship was low. 6. Both verbal and non-verbal creativity, as measured by MIER tests, was found to be independent of intelligence and socio-economic status. 7. Pupils with average and low levels of verbal creativity were likely to improve upon their creative levels in schools with a *laissez faire* type of institutional climate under teachers with democratic classroom verbal behaviour, whereas pupils with high verbal creativity were found to improve in *laissez faire* schools under authoritarian teachers. 8. In the case of non-verbal creativity on the other hand, pupils belonging to all levels of creativity were found to have significantly higher creativity levels in the schools with a need-unfulfilling type of institutional climate under teachers whose classroom verbal behaviour was democratic in nature. 9. Verbal and non-verbal creativity required different sets of conditions for their development in terms of teaching styles of teachers and institutional climates. 10. The perceived need patterns and perceived press patterns of the need-fulfilling and need-unfulfilling types of institutions were found to differ significantly. 11. The needs of the pupils of need-fulfilling types of institutions could be mainly described in terms of needs related to self-expression and satisfaction through intellectual, artistic, manipulative and co-curricular avenues, whereas the needs of the pupils in need-unfulfilling types of institutions could be described as being directed towards higher need-achievement and a higher level of aspiration. The needs of the pupils were mostly related to the intellectual field only. Artistic, creative and manipulative areas were generally not perceived as possible channels of need satisfaction by pupils studying in schools with a need-unfulfilling institutional climate. 12. Science teachers showed a marked preference for narrow, factual types of questioning as against elaborative questioning. Classroom interaction was limited to the question response pattern, pupil initiation was almost absent and pupils' ideas were not appreciated. 13. The teacher-talk of democratic teachers was found to be more indirect as compared to that of the authoritarian teachers. Teacher-talk was higher in the case of trained teachers, pupil-talk was maximum in the classrooms of untrained teachers. 14. Pupil-talk was significantly higher in the classes of authoritarian teachers than in the classes of their counterparts with democratic teaching.

539. GUPTA, G.S., *Fundamental Dimensions of Creativity,* Ph.D. Edu., Avadh U., 1984

The main objectives of the study were, (i) to find out whether the dimensions of fluency (*Flu*), flexibility (*Flex*), originality (*Ori*), elaboration (*Ela*), seeing problem (*SP*), inquisitiveness (*Inq*), and persistency (*Per*) were fundamental dimensions of creativity and ran in common through the tests in which they were utilized as measuring scales, and (ii) in case the first did not hold true, then to explore the domain and see the factors that were common and how they were clustered and the meaning that could be given to them.

The sample of the study consisted of 200 students of the first year graduates class drawn randomly from ten affiliated colleges of Avadh University situated in the six districts of Faizabad Division. Five creativity tests prepared by Torrance, Wallach and Kogan, B. Mehdi, B.K. Passi, and K.R. Char were used to obtain test scores in the different dimensions of creativity. The raw scores were normalized on the T-Scale. Karl Pearson's product–moment inter-correlations were the main statistical techniques used.

The findings of the study were: 1. There was a general factor of creativity as in intelligence. 2. Instead of *Flu, Flex, Ori* and *Ela* coming out as different common factors, and each of them running through the different tests which were scored for them, it was found that the tests were separate identities almost as wholes and their *Flu, Flex* etc. had a different and separate factorial nature depending on their nature and product. 3. The nature of the common creative ability factors of the study were: (1) Factor A—This had loadings of 0.25 or more only in Torrance's dimensions of *Flex, Flu* and *Ela*; and Char's dimensions of *Flex, Ori* and *Ela*. The ability involved may be called as 'diversifying responses to figural stimuli'. (ii) Factor B—Substantial loadings in *Flu* and *Flex* of Torrance's test items only. This ability may be called 'situational evolvement'. (iii) Factor C—0.25 or more loading in Mehdi's and Pasi's *Flu* and *Flex*, and in all the dimensions scored in Char's test. This factor may be called 'ideational fluency'. (iv) Factor D—loading of about 0.25 only in Wallach and Kogan's test scores of *Flu* and *Ori*, and Mehdi's dimension of *Ela* in non-verbal items. This factor was termed the 'capacity for production of associative content'. (v) Factor E—substantial loadings in Wallach and Kogan's *Ori* and in all the dimensions of Char's test. This factor may be called the 'capacity for highly original innovation'.

540. GUPTA, I.D., *A Study of Some Factors of Environmental 'Press' Facilitating Creativity in Language Arts,* Ph.D. Edu., Bhopal U., 1984

The study attempted to investigate two comparatively neglected aspects in creativity research, viz., (i) creative product, and (ii) creative 'press', both related to school education. Specifically, it explored the structure of creativity in language arts and studied its facilitation through the 'press' of environment.

The study was conducted on a sample of 550 eighth grade children, comprising 247 boys and 303 girls from 22 school classrooms selected at random from the schools of Bhopal city. The data were collected with the help of a Creativity Test, Hindi Achievement Test and Environmental Press Scale constructed for the study and Jalota's Mental Ability Test.

The findings of the study were: 1. In the first instance, the structure of creativity in language arts was derived through factor analysis. Basically, it was found to be composed of imagery and composition. Later, composition was found to split into poetry and story dimensions. With this split, humour emerged as an independent cluster spreading equally over imagery, poetry and story. Studied along with intelligence and language ability, the chain of variables suggested a split of creativity into primary and secondary processes. The first part comprised imagery, humour and intelligence followed in sequence by the second half which included language, story and poetry. 2. Investigations into facilitation of creativity in language arts was made on the basis of environmental 'press' to include, (a) global factors, (b) 'press' factors in the domains of home, school and peers, and (c) the treatment factor. The analysis from global factors revealed that boys excelled girls on imagery, humour and intelligence. However, male superiority was found in families, average on all accounts. This support vanished in disadvantaged environments whereas in more advantaged environments the situation even reversed in favour of girls. Another interesting finding was that father's education and books at home supported creativity among boys but remained insignificant for girls. 3. The process factors were analysed in each domain separately and, in all, eight factors were derived to cover cognitive home, aesthetic home, home independence, school instruction, school enrichment, school openness, peer activity and peer openness. Canonical correlation analysis revealed a very significant contribution to creativity of both boys and girls. Peer activity, cognitive home and school instruction emerged as the main potent facilitators. 4. Lastly, facilitation by treatment 'press' was explored in three classrooms by pre-test post-test design. Covariance analysis demonstrated that experimental treatment facilitated creativity without having any adverse side effect on regular classroom achievement.

The study raises hope for schools of the possibility of achieving creativity goals without hampering routine instruction. Emergence of 'school instruction' as a significant process factor also supports this hope. The implications of the factors of 'peer activity' and 'cognitive home' are clear. The school has to provide a bridge between the home and itself, and to channelize student activity into their peer group.

541. GUPTA, P.K., *Development and Evaluation of Creativity Training Programme for Sixth Grade Children,* Ph.D. Edu., Mee. U., 1985

The objectives were (i) to develop a creativity training programme (CTP) for VI grade children, (ii) to study the effect of the creativity training programme upon the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity of VI grade children, separately, (iii) to study the interaction effect of CTP and level of intelligence on the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity of VI grade children separately, (iv) to study the effect of CTP and sex on the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity of VI grade children, separately, (v) to study the interaction effect of level of intelligence and sex with CTP on verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity of VI grade children separately, and (vi) to find out the reactions of the students towards the creativity training programme. The hypotheses were: (1) There is no significant difference in the mean gain scores of the verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity, separately between the students of the treatment group who are given training through CTP and the students of the non-treatment group who did

not get such training. (2) There is no significant interaction of the level of intelligence with CTP on the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and non-verbal composite creativity. (3) There is no significant interaction of sex with CTP on the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration, and composite non-verbal creativity. (4) There is no significant interaction of the level of intelligence and sex with CTP on the development of verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non-verbal originality, non-verbal elaboration and composite non-verbal creativity.

The sample comprised 357 students (188 girls and 169 boys) from government schools. The 2 × 3 × 2 factorial design was employed. The independent variables were: treatment conditions (training through CTP, and no training), intelligence (high, average and low), and sex (male and female). Jalota's Group Test of General Mental Ability was used to measure intelligence. Baqer Mehdi's Verbal and Non-verbal Tests of Creative Thinking were used to measure verbal and non-verbal creativity. A Creative Training Programme (CTP) was developed by the investigator. A CTP questionnaire was used to find out the opinion of the students concerning the creativity training programme. The data were processed with the help of analysis of variance, Hartley's Test and t-test.

The findings were: 1. The creativity training programme was successful in developing creative thinking abilities, both verbal and non-verbal among students. 2. As far as the interaction of the level of intelligence with CTP on the development of various components of verbal and non-verbal creativity and composite verbal and non-verbal creativity was concerned, the findings of the study did not indicate any significant interaction between intelligence level and CTP except for verbal originality. 3. The CTP was equally effective for both male and female students. 4. No significant interaction was found among the level of intelligence, sex and CTP for any of the components of creativity. 5. The majority of students felt that they had improved their creative thinking skills.

542. HALEEM, N., *Attitude of Teachers towards Non-creative Students of High Intelligence versus High Creative Students of Average Intelligence,* Ph.D. Edu., AMU, 1984

The objective of the study was to investigate teachers' attitudes towards high IQ, less creative versus high creative average intelligence students of secondary schools of Lucknow city.

Two groups of students, one of high IQ and low/non creative students and the other of average intelligence and high creativity were identified by the help of Mehrotra's Test of Intelligence and Zaidi's Trends of Imagination Scale. Students numbering 353 (201 boys and 152 girls) studying in class IX comprised the sample. An attitude scale constructed by the investigator and which yielded satisfactory validity and reliability indices was administered to the teachers of these students to study their attitudes towards these groups of students. t-test was employed to test the significance of differences between the scores obtained by different groups.

The major findings of the study were: 1. Thirty-five teachers had a favourable attitudes towards high IQ students while only 18 teachers favoured high creativity students. 2. Teachers favouring high IQ students ranked highly intelligent students much higher on intelligence-oriented personality characteristics than the teachers favouring creativity who ranked their highly creative students on creativity-oriented personality characteristics. 3. Intelligence-oriented teachers rated intelligent students much higher than high creativity students. 4. Teachers in general also rated high IQ students significantly higher than high creativity students. 5. Teachers in general showed a high regard for such characteristics as discipline, good grades, hard work, spirit of cooperation, than they showed for self-expression, imaginativeness, flexibility of ideas and non-conformity.

543. KUMARI, K., *A Study of Relationship among Creativity, Intelligence, Adjustment and Value Patterns in Adolescence,* Ph.D. Psy., Agra U., 1975.

The hypotheses were: (1) There is a positive and significant relationship between creativity and intelligence, creativity and adjustment, and creativity and value patterns. (2) There are no sex, facultywise, classwise and age differences in creativity. (3) Value patterns are not related to level of adjustment and level of intelligence. (4) Level of adjustment is not dependent on the amount of intelligence. (5) The amount of creativity increases during adolescence. (6) The level of adjustment increases during adolescence. (7) The level of intelligence increases during adolescence. (8) Value patterns change during adolescence.

The sample comprised 1000 subjects (500 girls and 500 boys). Their age ranged from 13 to 19 years. They belonged to classes IX and XII. Intelligence was measured with the help of Samoohik Mansik Yogyata Pariksha (2170) developed by R.K. Tandon. Adjustment was measured with the help of Vyaktitva Parakh Prashnavali developed by M.S.L. Saxena. Its test-retest, split-half and KR-20 reliability coefficients were 0.87, 0.89 and 0.90 respectively. An Indian adaptation of the Allport-Vernon Study of Values by R.P. Bhatnagar and R.K. Tandon was used to measure values. The data were analysed with the help of correlation and t-test.

The findings were: 1. There was no significant relationship between intelligence and creativity, creativity and adjustment, and creativity and value patterns. 2. Sex differences existed in the field of creativity. 3. One year of education did not put a significant mark on the development of creativity, while the difference of two years and above made same significant difference in creativity. 4. There existed age differences in the field of creativity and it was significant when there was a difference of at least two years. 5. Economic and religious values were highly related to level of adjustment, whereas social and aesthetic values were only slightly related to level of adjustment. 6. Intelligence had no place in patterning the value system among adolescents and so no specific value was related to intelligence. 7. Level of adjustment was significantly related to the amount of intelligence. 8. The amount of creativity increased during adolescence, i.e. from 13 to 18 years. 9. Level of adjustment was found to increase during adolescence. 10. Age was found to influence the growth of intelligence and it reached the point of its maturity near 18 years. 11. Growth in age during adolescence significantly influenced value patterns but its influence differed in respect of males and females.

544. KUNDU, D., *A Study of Creativity, Ego-Strength and Extraversion—An Empirical Investigation,* Ph.D. Edu., Del. U., 1984

The objectives of the study were (i) to find out the interrelationship among the three components (originality, flexibility and fluency) of creativity, (ii) to find out the nature of relationship between creativity with respect to sex and curricular streams, (iii) to find out the interrelationship among creativity and its components, ego-strength and personality factors (extraversion, neuroticism and psychoticism) with sex and curricular streams, (iv) to compare individuals having high and low ego-strength, high and low extraversion, high and low psychoticism with respect to their creative responses, (v) to compare incidence of creativity among hysterics and dysthemics, (vi) to verify the orthogonality of relationship among the three dimensions of personality (extraversion, neuroticism and psychoticism), (vii) to find out the interaction, if any, among creativity and various correlates of the study, and (viii) to investigate the nature of distribution of components of creativity, ego-strength, extraversion, neuroticism and psychoticism.

A sample of 252 subjects was selected from the metropolitan city of Delhi. The subjects in the study comprised XI grade students of arts and natural sciences of age level 15 + years. In order to study the factors which were responsible for creativity, the independent variables were (a) ego-strength, (b) Extraversion, (c) Neuroticism, (d) Psychoticism and the dependent variables (a) originality, flexibility and fluency, (b) creativity as a composite ability. The tools used in the study were (i) the Torrance Test of Creativity, (ii) the Eyesenck Personality Inventory.

The findings of the study were: 1. Introverts were more creative than extraverts. 2. Creativity was positively and highly related with ego-strength. 3. Science students were more creative than arts students. 4. Creativity was negatively and highly related with psychoticism. 5. Individuals high on ego-strength were more creative than those low on ego-strength. 6. The relationship between creativity and extraversion was curvilinear. 7. Dysthemics were more creative than hysterics. 8. The high creatives were consistently high on originality. 9. Introverts showed greater originality than extraverts. 10. Subjects higher on ego-strength had higher scores on originality. 11. Science students had higher scores on originality than arts students. 12. Males had higher scores on originality than females. 13. Introverts had higher scores on flexibility than extraverts. 14. Subjects higher on ego-strength had higher scores on flexibility. 15. Science students had higher scores on flexibility than arts students. 16. Introverts were more fluent than extraverts. 17. Science students were more fluent than arts students. 18. Psychoticism was negatively and highly related with ego-strength. 19. Males evinced greater psychoticism than females. 20. Extraverts were higher on neuroticism than introverts. 21. Arts students were high on extraversion that science students. 22. Science students were higher on ego-strength than arts students.

545. MAAN, G.S., *Value Patterns of Creative and Non-creative Students (A Cross-cultural Study)*, Ph.D. Psy., Agra U., 1978

The hypotheses were: (1) There is no significant difference between Hindu and Muslim high creatives in relation to values. (2) There is no significant difference between Hindu and Muslim low creatives in relation to values. (3) There is no significant difference between high creative boys and girls in relation to values. (4) There is no significant difference between low creative boys and girls in relation to values.

The sample consisted of 500 male and female students of intermediate colleges of Hindu and Muslim cultures. It was drawn from the Agra commissionary. The sample was divided into four groups: 125 Hindu boys, 125 Hindu girls, 125 Muslim boys and 125 Muslim girls. Creativity was measured with the help of the Verbal Creative Thinking Test developed by Baqer Mehdi. The Value Test was developed by the investigator. Its test-retest reliability coefficients ranged from 0.21 to 0.40. The data were analysed with the help of critical ratio.

The findings were: 1. No significant difference was found between the high creative Hindu group and the high creative Muslim group except in theoretical and political values, on which they differed significantly. 2. The low creative Hindu and Muslim groups did not differ significantly on theoretical, economic and aesthetic values but differed significantly in regard to religious, social and political values. 3. High creative boys and high creative girls did not differ from each other in respect of values except aesthetic value. 4. Low creative boys and low creative girls did not differ significantly in relation to values, except on economic value.

***546.** MUKHERJEE, MANJUBALA, *A Study of Relation between Some Personality Traits and Choice of Occupations*, Ph.D. Psy., RSU, 1973

The objectives of the study were (i) to find out if personality traits had any measurable bearing upon the choice of occupations at the two definitely different stages of age and educational development, (ii) to find out if individuals differing in respect of their choices of occupations also differed in respect of their personality traits, and (iii) to find out if individuals differing in their age and sex also differed in their choice of occupations.

The sample of the study consisted of 800 students of grades III, IV, VIII and X selected from different schools of Raipur city, following the stratified random sampling method. The sample was divided into two broad age groups, viz. pre-adolescence (9 to 11 years of age) and late adolescence (14 to 16 years of age). The data were collected by employing the Early Personality Questionnaire and High School Personality Questionnaire. Apart from these, an Occupational Choice Inventory was constructed and validated by the investigator herself. Means, t-values, chi-square test, and coefficients of correlation were used for the analysis of data.

The findings of the study were: 1. Some personality traits, namely *B*, *C*, and *G*, were found to have a measurable bearing upon the choice of some of the occupations. 2. Individuals differing in respect of their choice of occupation were also found to differ in respect of their personality traits. In the case of males at the pre-adolescent levels, significant differences were observed among the occupational groups of doctor and lawyer on factor *C*. The male students of the late adolescence level who showed difference in their occupational preferences also differed significantly in their average scores on factors *A*, *B*, *F* and *I* of personality. In the case of female students at pre-adolescent age level, differences were noted in the average scores on personality factors of *C* and *D*. Here the occupational groups of doctors and school-teachers were taken up for discussion. At the late adolescence level, the female students showing preference for the occupations of doctor and school-teacher respectively showed significant differences, in their average scores on factors *A*, *B*, and *H* of personality. 3. The chi-square and t-values computed among the average preferences for the occupations were found to be significant for the choice of army officer, businessman, teacher, lawyer, leader, lecturer, engineer and actor in the male groups, whereas, in case of female students, significant difference in the average performance was noted in nine occupations out of 20. 4. The students at the late-adolescence level were found to shift their occupational choices in a more realistic direction than those of the pre-adolescence level, who seemed to be much more influenced by fanciful ideas. 5. Significant sex differences were observed in th choice of occupations which were found to increase with the advancement in age and educational grades.

***547.** NANDANPAWAR, B.S., *Development of Linguistic Creativity among the Students—An Experimental Study*, Ph.D. Edu., Nag. U., 1986

The hypothesis wh[illegible]n formed the basis of the study

were: (1) Teaching through a creative method improves Marathi language proficiency of students. (2) Teaching through a creative method develops linguistic creativity among students. (3) Teaching through a creative method develops such abilities as are involved in linguistic creativity as vocabulary, sentence construction, poem composition, story writing and imagination among the students.

The sample for the study consisted of ninth class students offering Marathi as mother-tongue. Two equivalent groups of students were formed on the basis of a test in Marathi. Experimental and control treatments were randomly assigned to these two groups. A suitable adaptation of a test of literary creativity in Marathi developed by M.B. Kundley was administered to the ten groups as a pre-test. The experimental group was taught Marathi through a creative method developed by the researcher and the control group was taught through a traditional method for a whole session. The two groups were post-tested on the different items of the same test. t-test was employed for comparison of the two groups on the gain scores.

It was found that the experimental group scored significantly higher than the control group in (i) language proficiency, (ii) overall creativity, and (iii) all the abilities involved in linguistic creativity.

548. PARASNIS, H.N., *To Construct and Standardize a Test for Measuring Creativity in Mathematics of X Standard (Marathi Medium) Students in Pune,* Ph.D. Edu., SNDT U., 1985

The major objectives of the study were (i) to construct the items to test the ability of divergent production, cognition of transformation, convergent production of transformation, and evaluation of transformation in a symbolic content area, (ii) to select items on the basis of a difficulty index, item–total correlation, item–item correlation and stimulus potential, (iii) to determine the reliability of the test in terms of the internal consistency and stability of the test, (iv) to determine the validity of the tests in terms of content validity, concurrent validity, and factorial validity, and (v) to establish norms with the help of T-scores and percentiles.

The researcher prepared eight tests for measuring creativity in mathematics. Item analysis was done by administering tests to a group of 400 students selected randomly from Pune city. The final version of the tests was administered to a sample consisting of one thousand students drawn on the basis of the stratified sampling method. The collected data were analysed using statistical techniques such as measures of central tendency, variability, correlation, and factor analysis.

The major characteristics of the test and the findings were: 1. All the tests comprised items having a difficulty index of approximately 0.50. 2. All the tests included items which showed significant correlations with the total score on each test. 3. Items in all the tests had positive intercorrelations. Therefore, every test was homogeneous within itself. 4. All the open-ended items possessed maximum stimulus potential. 5. All the tests were internally consistent and possessed satisfactory content validity, concurrent validity. Creativity in mathematics could be measured in terms of five factors, viz., visualizations, reorganization, judgement, number fluency, and divergent production.

The educational implications of the study are: (1) The eight sub-tests prepared can be used for evaluating the creative potential of the students in different factors of creativity in mathematics. (2) With the help of the battery of the eight tests a comparison of creative potential of students in mathematics can be made.

549. PATEL, J.Z., *An Investigation into the Effectiveness of the Purdue Creative Thinking Programme on the Creative Abilities of Elementary School Children,* Dept. of Education, SPU, 1987 (UGC financed)

The objectives of the study were (i) to provide standard creative thinking programmes in Gujarati for elementary school children, (ii) to study the effect of the programmes on the creative level of the children, (iii) to study the effect of the programmes on the creativity components, viz., fluency, flexibility, and originality, (iv) to verify whether the main effect of IQ was significant, (v) to investigate the main effect of sex, and (vi) to study whether there exists any interaction effect on the creativity and its component measures.

The eight classes of different schools selected from Kheda district were equated on the basis of the scores made by the students on creative ability tests prepared and standardized by J.Z. Patel. The creative thinking programme was translated into Gujarati. Out of 32 programmes, 18 were translated into Gujarati. Seven other similar programmes were prepared by the investigator.

The Intelligence Test prepared by J.Z. Patel was also administered to students of eight classes. Out of the eight classes, four were treated as experimental classes where the programmes were implemented. The remaining four classes were treated as control classes. The 2 × 2 × 2 factorial design was used. (Treatment × IQ × Sex) and the analysis of variance was used to analyse the performance of the students.

The major findings were: 1. The main effect of training given to the experimental group was significant for creativity and its two components measures, viz., fluency and originality. 2. The research confirmed the effectiveness of creative thinking training in the Indian setting. In spite of big classes, rigid classroom control, memorization and respect for teachers in comparison with American classes, the gain in creative thinking ability was noteworthy. 3. The main effect of IQ was significant but sex was not significant. The minimum IQ suggested by Torrance and Raina was 120. This statement was supported by the findings of this study that IQ played an important role in the development of creativity of a child. There was no significant interaction effect on creativity and its components. 4. The creativity training could be practically imparted to the children in a developing country like India.

*550. PATEL, R.P., *Development of Brainstorming Technique Programme and to Study Its Effects on Creativity of the Secondary School Children*, Ph.D. Edu., SPU, 1988

The objectives of the study were (i) to establish the procedure of brainstorming technique for secondary school children in the Indian environment, (ii) to provide brainstorming technique procedure (BSTP) for school children, (iii) to study the impact of BSTP on creativity levels of the pupils, and (iv) to investigate the impact of BSTP in relation to the intelligence levels of the secondary school children.

The investigator selected a set of 16 problems in final form of BSTP which consisted of two types of problems, namely, individual type and general type. Besides this, the investigator developed the format for a brainstorming. It involved training a leader, training note-takers, group formation, determining the type of session, fixing time and place. The tools used for collecting data were the Creativity Test developed by J.Z. Patel, the Group Test of Intelligence by K.G. Desai and the Brainstorming Technique Programme prepared by the investigator. The experimental-control group technique was used and 2×2 factorial design was adopted by taking two levels of IQ. The experiment was carried out on pupils of class IX. The ANCOVA technique was used for analysing the data.

The major findings were: 1. The students of the experimental group did better on a creativity test after the treatment than the students of the control group. The student of the experimental group having high IQ gained more by BSTP than those of the control group. There was significant interaction between treatment and high IQ. 2. The main effect of the treatment variable on verbal creativity was significant and it was in favour of the experimental group. The second main effect of high IQ level on the verbal creativity of pupils was significant and it was in favour of the experimental group. The interaction of effect of treatment and IQ on verbal creativity was significant. 3. The experimental group did better on figural creativity than the control group. The main effect of IQ on figural creativity was significant and it was in favour of the low IQ group. There was an interaction effect between treatment and IQ level. 4. The experimental group did better on the fluency component of creativity than the control group. The main effect of IQ on the fluency component of creativity was significant and it was in favour of the high IQ group children. The interaction effect of treatment and IQ level on the fluency component of creativity was significant. 5. The students of the experimental group did better on the flexibility component of creativity than the control group. The main effect of IQ on the flexibility component of creativity was significant and was in favour of the low IQ group children. The interaction effect of treatment and IQ level on the flexibility component of creativity was significant. 6. Thus, the brainstorming technique procedure proved powerful for developing verbal, figural creativity. It also proved powerful for developing fluency, and the flexible component of creativity.

*551. RAINA, K., *Psycho-social Correlates of Scientific Creativity among High School Students*, Ph.D. Edu., Kur. U, 1986

The objectives of the study were (i) to find out the relationship between scientific creativity and achievement in science for boys and girls, (ii) to find out the relationship between scientific creativity and achievement in

science for students of different types of schools (government, private and missionary), (iii) to find out the difference between correlation coefficients of intelligence with different dimensions of scientific creativity for boys and girls groups, (iv) to study the effect of sex and type of school on scientific creativity among high school students, (v) to study the effect of socio-economic status (SES), sex, problem-solving ability and achievement in science on scientific creativity of students of different schools, (vi) to study the effect of sex, birth order and type of family on scientific creativity of students of different schools, and (vii) to study the mean difference in scientific creativity among high school students with high, middle, and low problem solving ability.

The study was correlational, where three psychological variables (problem solving ability, achievement in science and intelligence) and five social variables (sex, type of school, SES, birth order and type of family) were taken as independent variables and scientific creativity (fluency, flexibility and originality) was taken as the dependent variable. A sample of 1000 students (459 boys and 541 girls) was drawn from two missionary, eight government and 14 private schools. They were administered the following tools: (i) the Gupta Scientific Creativity Test, (1980), (ii) the Manju Problem Solving Ability Test in Science (1984), (iii) the Joshi Group Test of Intelligence (1964), (iv) an Achievement Test in Science, and (v) a Socio-economic Status Scale. The data were analysed with the help of correlation, partial correlation, analysis of variance, and analysis of covariance.

The findings of the study were: 1. Achievement in science was significantly related with scientific creativity. 2. The problem-solving ability was significantly related to three components of scientific creativity, viz., fluency, flexibility and originality. 3. All the three components of scientific creativity were positively related with intelligence. 4. Boys and girls differed on the intelligence and fluency components of scientific creativity and girls had higher scores on these than the boys. 5. Missionary school students were more creative than those of private and government schools and students of private schools were more creative than their counterparts studying in the government schools. 6. Students who had high problem-solving ability in science were more creative in science than their peers with middle and low problem-solving ability. 7. The mean scientific creativity score of high achievers in science was more than that of middle and low achievers. Further, the middle achievers were more creative than the low achievers in science. 8. Socio-economic status of the students did not affect their scientific creativity. 9. First-born students were more creative in science than the second- and third-borns. Further, the second-born scored more on scientific creativity than the third-born in the family. 10. The type of family, single or joint, did not have any relationship with the scientific creativity of the students. 11. Sex as a single main variable did not show significant variations in scientific creativity of students. 12. The girls from missionary schools had the highest mean scientific creativity scores, whereas boys from government schools had the least creativity scores. 13. Students belonging to middle SES and having high achievement scores were highest in scientific creativity, and students belonging to low SES and having low achievement scores were lowest on scientific creativity. 14. Boys of low SES and possessing high problem-solving ability had highest creativity, whereas girls of middle SES and low problem-solving ability were least creative. 15. Girls of single families were most creative in science, whereas girls of joint families were least creative. 16. The students belonging to middle SES with middle problem-solving ability scored the highest, whereas students coming from the low SES group and having middle problem-solving ability scored the least on scientific creativity.

552. RAINA, M.K., *Research and Development in Talent Search: A Study in the Use of Creativity Tests,* NCERT, 1984

The major objectives of the investigation were (i) to study the relationship between creative thinking ability, creative perception and measures of talent, (ii) to find out whether the candidates selected for National Talent Search award differed from those called for interview but rejected in their performance on the Wallach-Kogan Tests of Creativity, (iii) to study the relationship between scores on tests of creativity and measures of talent, and (iv) to determine whether the two batteries of verbal and visual tests of creativity defined separate dimensions of intellect as compared to what was measured by measures of talent.

The sample consisted of 48 students selected for the National Talent Search Scholarship out of 276 students of class X interviewed at two centres in 1977 and a second batch of 50 students selected for National Talent Search Scholarship out of 205 students of classes XI and

XII interviewed at three centres in 1978. The tools used for data collection were the Wallach-Kogan Tests of Creativity—verbal and visual forms; the 'Something about Myself' test to measure creative perception; and the General Mental Ability Test used for the Talent Search Examination.

The major findings were: 1. There was significant difference between the two groups of students—selected and rejected—on the verbal dimensions of creativity but no significant difference in scores on visual creativity tests. 2. The selected and the rejected groups of students did not differ significantly on measures of creative perception. 3. There was no significant relationship between General Mental Ability Test scores and scores on verbal and visual tests of creativity. 4. There was a low negative correlation between Scholastic Aptitude Test scores and various dimensions of verbal and visual creativity. In some cases in the 1978 batch, the correlation was zero. 5. A modest correlation was found between measures of creative perception and the General Mental Ability Test. 6. There was a negative correlation between measures of creative perception and Scholastic Aptitude Test scores. 7. No association was noticed between the creative perception of the total group and that of selected or rejected group of candidates. 8. Scores on the various tasks of creativity were fairly cohesive. 9. Six verbal indices of creativity were not found to be highly correlated with four visual indices. 10. Factor analysis indicated task specificity as well as verbal specificity in tests of creativity. Some of the factors that emerged were number factor, factor meanings, uniqueness-line meanings, scholastic ability and uniqueness-similarities.

*553. RAJAGOPALAN, S., *A Study of Creativity of Secondary School Students in relation to Classroom Climate, Achievement Motivation and Mental Ability*, Ph.D., Edu., SPU, 1988

The objectives of the study were (i) to find out the level of creativity of secondary school students of class VIII and Class IX, (ii) to find out the level of achievement motivation of students, (iii) to find out the level of general mental ability of students, (iv) to study the effect of achievement motivation on creativity, (v) to study the effect of classroom climate on creativity, (vi) to study the effect of mental ability on creativity, (vii) to study the effect of different interactions between achievement motivation, mental ability and classroom climate.

The investigator used the classroom climate scale developed and standardized by CASE, the Achievement Motivation Inventory by Prayag Mehta, the Mixed Group Tests of Intelligence by P.N. Mehrotra and the Verbal Tests of Creative Thinking by Baqer Mehdi. The study was carried out over a sample of 1200 students of classes VIII and IX of English-medium schools of Madurai city. The $2\times2\times2$ factorial design was used for the study. The analysis of variance, correlation and t-test techniques were used for verifying the hypotheses.

The major findings were: 1. On the whole, the creative level of students of Madurai city was low. 2. There was a dearth of originality amongst students. Students studying in class IX had high originality as compared to students studying in class VIII. 3. The high classroom climate (high authenticity, legitimacy and productivity) was found effective on the creative level of students of classes VIII and IX. 4. The achievement motivation had no effect on the level of creativity for the students of both the classes. Similarly mental ability did not have any effect on the creative level of students studying in class VIII whereas it had a significant effect on the creative level of students of class IX. 5. The interactive effect between classroom climate and mental ability for class IX was significant while for class VIII it was not significant. 6. The interaction between classroom climate and achievement motivation was not significant for both the classes. Similarly the interaction between achievement motivation and mental ability was also not significant for both the classes. The interaction amongst classroom climate, achievement motivation and mental ability was also not significant. 7. The mean creativity score of students having high achievement motivation was more highly significant than the mean score of students having low achievement motivation for both the classes. 8. It was concluded that classroom climate and intelligence had a significant effect on creativity scores of students of both the classes. 9. There was a significant positive correlation between achievement motivation and creativity of students of class VIII, while correlation between achievement motivation and creativity for students of class IX was not significant. 10. There was a positive correlation between creativity and mental ability of students of class VIII and IX. 11. There was a positive correlation between classroom climate and creativity of students of class VIII and IX. Finally it was concluded that high mental ability and classroom climate were conducive to the growth of creative talent.

554. RAM KRISHNA, *A Study of Literary Creativity in Hindi and Its Correlates in School-going Children*, Ph.D. Edu., Gor. U., 1986

The objectives of the study were (i) to study the level of performance of high school students in the Hindi Literary Creativity Test and the selected variables (intelligence, general knowledge in Hindi, socio-economic status, and Hindi achievement), (ii) to compare scores of boys and girls in the literary creativity test and tests on the selected variables, (iii) to compare scores of boys and girls belonging to the arts and science streams in the above tests, (iv) to compare scores of creative and non-creative boys and girls in the selected variables, and (v) to determine the dominant factors of literary creativity.

The sample consisted of 600 high school students (300 boys and 300 girls) selected from institutions situated in five districts of Eastern UP. The Hindi Literary Creativity Test, the Hindi General Knowledge Test, an Intelligence Test and a Socio-economic Status Scale were administered. High school examination marks in Hindi (1983) of the selected students were measures of performance.

The major findings were: 1. The students showed unsatisfactory scores in Hindi literary creativity and socio-economic conditions. 2. Girls showed better average scores in most of the tests. 3. Service-group girls excelled in most of the tests. 4. Creative boys and girls secured better average scores in the above-mentioned variables than the non-creative boys and girls. 5. All the selected correlates showed a significant positive relationship with literary creativity. 6. Fluency and originality were found to be dominant factors among the four factors of creativity—fluency, flexibility, elaboration and originality.

555. RAMAJEE LAL, *A Study of Some Personality Characteristics of Creative Adolescents with the Help of Some Projective Tests*, Ph.D. Psy., Pat. U., 1984

The hypotheses examined in the study were: There are significant differences between high and low creative adolescent groups in respect of their psychological needs, n-Achievement, n-Deference, n-Abasement, n-Autonomy, n-Aggression, and n-Counteraction. 2. There is significant difference between high and low creative adolescent groups in respect of various environmental 'press'. 3. There are significant differences in the structural characteristics of personality (introversive–extratensive balance, inner control, level of aspiration, empathy) of high and low creative group of adolescents.

The study was conducted on sample of 150 male adolescents in the age range of 17 to 20 years belonging to the colleges of Deoria District (UP) and studying in 1st year. The total sample was divided into high and low creative groups on the basis of the subjects' scores on the Creativity Test, taking the median of the score distribution as the cut-off point. The tests utilized to collect the data were the Creativity Test by Wallach and Kogan, after adapting the verbal part of the test into Hindi, the Thematic Apperception Test, and the Rorschach Ink-blot Test to assess the personality characteristics of high and low creative adolescents. The obtained data were analysed by employing t-test, median test, chi-square and graphic methods. The phi-coefficient was used to determine the relation between creative and personality variables.

The major findings were: 1. High creative adolescents exhibited a greater introversive tendency as compared to their low creative counterparts. This was further shown by the negative correlation between creativity and the introversive–extratensive balance. 2. A significant phi-coefficient value showed a positive relationship between creativity and inner control. 3. High creative adolescents exhibited a higher level of aspiration than low creatives. 4. High creative adolescents possessed good empathetic feeling as compared to low creative adolescents. 5. The mean achievement score of the high creative group was significantly greater than that of low creative group. 6. The low creative groups possessed a significantly higher need for deference than the high creative group. 7. Low creative adolescents were higher on n-Abasement in comparison with the high creative. 8. High and low creative adolescents differed significantly in respect of n-Autonomy scores. 9. High and low creative adolescents differed significantly in respect of mean aggression scores. 10. A negative correlation and a significant t-ratio demonstrated that subjects of the low creativity group had greater need for nurturance than the high creative group. 11. The high creative group yielded significantly higher mean scores for n-Succorance.

556. RANI, R., *Intellectual and Non-intellectual Correlates of Creative Female School Students*, Ph.D. Psy., Mag. U., 1986

The main purpose of the study was to investigate some intellectual and non-intellectual factors in relation to creativity of the subjects. Several hypotheses were examined.

The sample consisted of 400 Standard X and XI female school students. Wallach-Kogan's Battery of Creative Instruments, the Non-Verbal Test of Intelligence, Sentence Completion Test, Comprehensive Test of Anxiety, Religiosity Scale, Intolerance of Ambiguity Scale and Differential Personality Scale were used. In addition scholastic achievement scores in science, humanities and literature together with overall achievement scores and some background factors were also examined in relation to creativity index. Two-way analysis of variance, product–moment correlation, partial correlation, chi-square technique, etc, were employed.

Some of the major findings were: 1. High and low creative subjects were significantly differentiated on scholastic achievement in humanities, literature, together with overall achievement score, intolerance of ambiguity, friendliness and curiosity. They were not significantly differentiated in scholastic achievement in science, need-achievement, anxiety, religiosity, ego-strength, emotional stability, dominance, decisiveness, heterosexuality, masculinity and responsibility. 2. Positive and significant correlations were obtained between creativity index and scholastic achievement in science, humanities, literature, together with overall scholastic achievement scores, intolerance of ambiguity, emotional stability, friendliness, and curiosity. Caste, mother's education and economic status were also significantly associated with creativity index. 3. Positive but insignificant correlations were obtained between creativity and n-Ach, ego strength, dominance, decisiveness, heterosexuality, masculinity and responsibility. 4. Insignificant negative correlations were obtained between creativity index and comprehensive anxiety and religiosity. 5. When the effect of intelligence was partialled out, in most of the cases the direction of relationship did not change but the value was affected. But the value and direction changed in correlation between creativity index and scholastic achievements in science together with overall scholastic achievement. 6. Father's profession and ordinal position were not significantly associated with creativity index. 7. High creatives considered creativity and imagination necessary for life. 8. The conflict between tradition and modernization failed to associate significantly with creativity index. The relationship between creativity and emotional stability as well as curiosity was dependent upon intelligence.

557. RAO, V.R., *Standardisation of a Test of Literary Creativity in Telugu for the Students of Secondary Schools*, Ph.D. Edu., Osm. U., 1982

The objectives of the study were (i) to find out the functional constituents of literary creativity, (ii) to find out factors of creativity which contributed to creative writing, (iii) to construct a comprehensive test in Telugu which would measure creative writing ability of secondary school students, and (iv) to study the relationship between literary creativity and demographic factors such as age, sex, community, parental occupation, parental education and background of students.

A sample of 930 students studying in class IX (N=366) and X (N=564) with age range of 12+ to 15+ years was taken. It included both boys (N=60) and girls (N=323) belonging to rural and urban areas. The subjects were administered the literary creativity test in Telugu. For constructing the test five major areas were identified—poetic diction, short story construction, dialogue writing, descriptive style and vocabulary. The characteristics of the test were: (i) It was scored on fluency, flexibility, originality and elaboration. (ii) On factor analysis of the five areas, the third area having descriptive style stood segregated from the rest of the areas. The remaining four areas were renamed as 'ability of using vocabulary, ability of plot building, ability of emotional expression and ability of subjective reflection'.

The findings of the study were: 1. The performance level of grade X students in creativity was superior to that of grade IX students. 2. The performance level of boys and girls on literary creativity was similar. 3. The performance level of urban students on literary creativity was superior to that of rural students. 4. The performance level of students of age group 13 to 14 years was superior to that of 12-year old students. 5. The performance level of students whose parents were college teachers, doctors or engineers was superior to that of all other groups of students. 6. The performance level of students whose parental income was more than Rs.1000/- was superior to that of all other parental income group students. 7. The performance level of the group of students whose parents were highly educated was superior to that of other group of students whose

parents were less qualified. 8. The increase in mother's educational qualification was associated with higher language creativity in the students.

558. RATHER, A.R., *Incidence of Dropout and Maladjustment among Students in relation to Creativity and Social Structure of the School*, Ph.D. Edu., Kashmir U., 1985

The objectives of the inquiry were (i) to study the relationship between incidence of dropout and sociometric status of pupils, (ii) to study the relationship between incidence of dropout and creativity, (iii) to study the relationship between adjustment and social acceptability, (iv) to study the relationship between adjustment of pupils and their creativity, and (v) to study the relationship between socio-economic status, incidence of dropout and adjustment.

The sample of the study comprised 887 students (of which 367 were girls) of classes VI, VII and VIII ranging in age from 11 to 14 years. It was an experimental study with socio-economic status (SES) sociometric status (SMS) and creativity as independent variables and dropout incidence and adjustment as dependent variables. The tools used were the Sociometric Test of Sharma, California Test of Personality to measure adjustment, Dropout Scale of George D. Demos (1965), Verbal Test of Creative Thinking of Mehdi, and SES Scale of Pareek and Trivedi. The statistical techniques used to draw conclusions were t-test, chi-square test and product–moment correlation.

The major findings were: 1. The incidence of dropout was positively related with the sociometric status of the child in the classrooom. 2. The dropout incidence was not significantly related to creativity in students as a group. However, in case of girls, the lower creativity was associated with lower dropout incidence. 3. Dropout incidence was significantly related to SES of children. 4. The percentage of dropouts was high in schools with poor social structure. 5. The relationship between adjustment and SMS was significant and positive. The same was the case between adjustment and SES. 6. Creativity and adjustment were not significantly related. 7. Boys and girls differed in many respects on incidence of dropout, SMS, adjustment and SES. Girls with low SMS had a higher incidence of dropout than boys. Girls were better socially adjusted than boys. Girls with low SES tended to dropout more than boys.

559. RATHI DEVI, K., *A Study of Certain Social Familial and Personality Correlates of Creativity among Secondary School Children*, Ph.D. Psy., Ker. U., 1984

The main objective of the study was to identify certain social-familial and personality variables which would correlate with creativity and hence would discriminate between subjects of three different levels of creativity—high creative, average creative and low creative. The major hypothesis was that each of the 18 independent variables included in the study, categorized as social, familial and personality, would show significant association with creativity, the dependent variable.

The study used a sample of 566 pupils of Std. IX drawn from different schools of Kerala, and selected on the basis of stratified sampling procedures with representation given to factors such as school efficiency, rural–urban residence and sex of subjects. The tools used were the Kerala Socio-Personal Adjustment Scale, Kerala Introversion–Extraversion Scale, Kerala General Anxiety Scale, Kerala Examination Anxiety Scale, Kerala Achievement Motivation Scale, Home Learning Facility Inventory, Family Acceptance of Education Rating Scale, Family Cultural Level Rating Scale, Family Environment Index Inventory, A Comprehensive Test of Creative Thinking, the Kerala University Test of Verbal Intelligence and General Data Sheet. The social-familial factors measured were father's educational level, father's professional level, father's income level, mother's educational level, socio-economic status of family, order of birth of the subject, family size of the subject, family cultural level index, family environment index, family acceptance of education and home learning facility. The personality variables measured were social adjustment, personal adjustment, general anxiety, examination anxiety, achievement motivation, masculinity–femininity, and introversion–extraversion. The reliability and validity of the scales were established in earlier studies. The statistical techniques used were product–moment coefficient of correlation, analysis of variance and appropriate tests of significance for differences between means both for large independent and dependent samples.

The main conclusions were: 1. Out of the 18 independent variables studied, 16 correlated significantly with creativity. The two variables which did not indicate association with creativity were 'family acceptance of education' and 'masculinity–femininity'. 2. All the

16 variables which correlated significantly with creativity, differentiated significantly among subjects at different creativity levels.

The correlates of creativity identified in this study can be used for identifying creative talents and possibly also for predicting creative talents. The possibility that creativity can be developed by improving the correlated variables, pointed to the possibility of development of new educational strategies for students of high creativity.

560. ROY, A., *Creativity, Age and Value Orientations as Correlates of Behavioural Deviance,* Ph.D. Psy., Agra U., 1982

The objectives were (i) to study adolescent deviance in a multivariate framework, (ii) to study interactions or mutual effect among creativity, value orientations and age, (iii) to collect relevant and factual information about adolescent deviants in schools that may be utilized in correctional and guidance programmes. The hypotheses were: (1) If creativity is allowed to operate in the situation, it will affect behavioural deviance. (2) If value-orientation is allowed to operate in the situation, it will affect behavioural deviance. (3) If age is allowed to operate in the situation, it will affect behavioural deviance. (4) If interaction between creativity and value orientation is allowed to operate, it will affect behavioural deviance. (5) If interaction between creativity and age is allowed to operate, it will affect the behavioural deviance. (6) If interaction between value-orientation and age is allowed to operate, it will affect the behavioural deviance. (7) If interaction among creativity, value-orientation and age is allowed to operate, it will affect the behavioural deviance.

The sample consisted of 240 subjects belonging to different levels of creativity, value orientation and age. It was selected with the help of the multi-stage random sampling method. The data were collected with the help of the Creativity Test by N.S. Chauhan and G.P. Tiwari, the Behavioural Deviance Scale by N.S. Chauhan, and Value Orientation Scale by N.S. Chauhan *et al.* The data were analysed with the help of factorial design analysis variance of equal cell size and Duncan's Range Test.

The findings were: 1. Creativity, value orientation and age had promoting and demoting functions in the trivariate set. Value orientations of fatalism and autocratism contributed the most to withdrawing deviance. Similarly, fatalism and traditionalism prominently operated behind evasion deviance and rebellion deviance. Age had both promotive and demotive effects on deviance at, after and up to 15, 17 and 19 years of age. 2. Creativity components were predominently equipped with divergent operation of various types of contents that might result in certain operations. Resonance between components of creativity and deviance-categories was based upon their being divergent. Thus, deviance had a creative motive behind its typified branding of personality-pathology and ego-sickness. 3. The value-deviance relationship in a 'Creativity–Age' framework indicated the prominance of fatalism, autocratism and traditionalism. Fatalism had faith against reason and belief against calculation. The element of divergence in deviance was faith based, possessing an aggressive-dominant temperament and happened to be resentful against conformity. The creative motive was finding divergent expresssion through non-realistic modes of adjustment and was certainly off the track to a good extent. 4. The age of 17 years appeared to be a good junction of stops and starts of age effects on deviance. 5. Creative education and productive value orientations could be of paramount importance in the proper utilization of the force of divergence behind deviance and could save thousands of students from proceeding towards the 'side end' of the deviance dimension.

***561.** SAMI, S., *A Study of Relationship between Creativity, Self-awareness and Self-adjustment,* Ph.D. Edu., AMU, 1986

The objectives of the investigation were (i) to study creativity, (ii) to study self-awareness, and (iii) to study self-adjustment of university students.

Zaidi's Ideational Tendency Scale, Zaidi's Multidimensional Inventory of Self-awareness and Zaidi's Self-Adjustment Scale were administered to a representative sample of 450 students studying in undergraduate and postgraduate classes of Aligarh Muslim University. Coefficients of correlation were employed to study the relationship between the different variables.

The major findings of the study were: 1. The coefficients of correlations obtained between creativity and the different dimensions of self-awareness and those between self-awareness and the different dimensions of creativity were positive and significant though not very

high. This indicated that creatives were self-aware and self-aware people were fluent, flexible and original. 2. The relationship between creativity, total self-adjustment and its different dimensions as also between self-adjustment and different dimensions of creativity were positive and significant, but not high. This showed that creatives were self-adjusted and the self-adjusted were fluent, flexible and original. 3. The relationship between high creativity and high self-awareness and that between low creativity and low self-awareness were positive and very significant. 4. The relationship between high creativity and high self-adjustment was positive and moderately significant, but that between low creativity and low self-adjustment was positive and very significant. This showed that while most of the high creatives were likely to be self-adjusted, some may lack in this regard, but almost all the low creatives were likely to be poor in self-adjustment.

562. SAXENA, V., *Creativity Components, Educational Interest as Correlates of Frustration Modes of Higher Secondary Girl Students,* Ph.D. Psy., Agra U., 1983

The objective was to know how far creativity components (creative production, fluency, flexibility, and originality), along with educational interests (science, medicine, agriculture, fine arts, home science, engineering, commerce and humanities and arts) determined the four modes of frustration (aggression, regression, resignation and fixation) during adolescence.

The sample consisted of 300 subjects, female adolescents drawn from the girl student population studying in the intermediate colleges of Mainpuri district of UP. The Creativity Test by N.S. Chauhan, the Educational Interest Record by D.N. Srivastava and V.P. Bansal, and the Frustration Scale by N.S. Chauhan and Govind Tewari were used for collecting data in respect of creativity, educational interest and frustration respectively. The data were analysed with the help of correlation and analysis of variance techniques.

The findings were: 1. Frustration was affected by creative production, originality, fluency and flexibility in descending order. 2. Frustration scores were affected by interests in commerce, science, medicine, engineering, home science and agriculture in descending order. 3. Aggression was affected by flexibility, creative production, originality and fluency. 4. Educational interests affected aggression. 5. Fixation was affected by creative production, fluency, originality and flexibility. 6. Fixation was also affected by educational interests. 7. Regression was affected by creative production, fluency, originality and flexibility. 8. Regression was affected by educational interests. 9. Resignation was affected by creativity as well as educational interests. 10. Creativity and frustration had the most positive relationship among them, next in order were educational interest and frustration; creativity and educational interest were least related. 11. In the high creative group, the modewise frustration score was greater in the following order: regression, resignation, aggression and fixation while in the low creative group the order was reversed. 12. In the high educational interest group, the modernize frustration scores were in the following order: fixation, aggression, resignation and regression while for the low educational interest group, the order was reversed.

563. SHARMA, H.L., *A Comparative Study of Engineers and Civil Services Personnel Belonging to Different Socio-economic Status in Relation to Their Interests and Creativity,* Ph.D. Edu., Kur. U., 1986

The objectives of the study were (i) to find out the difference in the interests of engineers and civil service personnel with respect to their experiene (freshers and in-service), area (urban and rural), parental education, parental occupation, parental income, birth order and school education, and (ii) to find out the difference in the creativity of engineers and civil service personnel. In order to achieve these objectives null-hypotheses were framed.

The study was descriptive and correlational. In view of the objectives of the study, a factorial design was followed based upon three independent variables, namely, type of occupation, experience of professionals and non-professionals, and socio-economic status. The first independent variable, viz., type of occupation varied in two ways—engineers and civil service personnel. The second variable, viz., experience of professionals and non-professionals also varied in two ways—freshers and experienced (in-service) personnel. The third independent variable, viz., socio-economic status had six different components—area, parental education parental occupation, parental income, birth order and school education. Keeping in view the design of the study a sample of 300 subjects was randomly selected. This included 150 engineers and 150 civil service personnel.

The sample of engineers consisted of 75 freshers and an equal number of in-service engineers. The freshers were M. Tech. students who had just finished their B. Tech course. The in-service engineers had been in their respective jobs for at least one year. The experience varied from one to six years. Similarly in the case of civil servants there were 75 civil service probationers and an equal number of in-service civil servants. The probationers had been undergoing training in their respective training institutions. The in-service civil servants had already been in their respective jobs for at least one year. Their experience also varied from one to six years. All these in-service civil servants were in the government secretariat at Delhi, whereas the in-service engineers were from different government undertakings. In order to collect the data the following tools were used: (i) The interest inventory (which was developed and standardized by the investigator, the test-retest reliability for different interest areas varied from 0.9 to 0.98, the inventory was validated against content validity), (ii) the Wallach-Kogan Test of Creativity (1969), and (iii) the Rao Socio-economic Status Rating Scale which was adapted for the sample. The test-retest reliability of the scale was 0.97, and the scale had face validity.

The findings of the study were: 1. In case of interests, civil service personnel were found to be more adventurous and artistic than the engineers. Further, civil service personnel also had more domestic interests, literary interests, musical interests, political interests, reading interests, recreational interests and social interests than their engineer counterparts. 2. Freshers, that is, subjects without experience, were found to be more adventurous, and had more mechanical interests, reading interests, and sports interests than their experienced counterparts. 3. Subjects whose parents were highly placed were more adventurous, literary and had more mechnical interests and political interests than the subjects whose parents were lowly placed. 4. Subjects whose parents had high income were more adventurous, artistic, and had greater literary interests. 5. Civil service personnel with experience had maximum artistic interest scores, literary interest scores, musical interest scores, recreational interest scores, and civil service personnel without experience had the least scores on these interest areas. 6. Freshers coming from public schools were more artistic than freshers coming from government schools. 7. Freshers coming from urban areas had the maximum domestic interest scores, and subjects with experience coming from urban areas had the lowest domestic interest scores. 8. Civil service personnel with experience coming from public schools had the maximum literary interest scores, and engineering personnel with experience coming from public schools had the lowest literary interest scores. 9. Engineers without experience had the maximum mechanical interest scores, and engineers with experience had the lowest mechanical interest scores. 10. Civil service personnel whose parents had less education had maximum mechanical interest scores, and civil service personnel whose parents had higher education had the lowest mechanical interest scores. 11. Engineers without experience coming from public schools had the highest mechanical interest scores, and civil service personnel without experience coming from private schools had the least mechanical interest scores. 12. Last born subjects had more reading interests than first born and middle born subjects. 13. Last born civil service personnel with experience had the highest sports interest scores, and first born civil service personnel with experience had the lowest sports interest scores. 14. Civil service personnel were more creative than engineers. 15. Subjects belonging to urban areas were more creative than subjects belonging to rural areas. 16. Civil service personnel without experience belonging to urban areas had the maximum creativity scores, and engineering personnel without experience belonging to rural areas had the lowest creativity scores. 17. Freshers were more creative than experienced personnel. 18. Subjects with high parental education were more creative than subjects with low parental education. Civil servants whose parents had higher education, had the maximum creativity scores, and engineers whose parents had lesser education had the lowest creativity scores. 19. Subjects whose parents were highly placed were more creative than subjects whose parents were lowly placed. 20. First born subjects were more creative than the middle born and last born. 21. Subjects who studied in public schools were more creative than subjects who studied in private and government schools. 22. Fresher engineers coming from public schools had the highest creativity scores, and experienced engineers coming from government schools had the least creativity scores.

The study has its implications for education and training institutions of engineers and civil service personnel, schools and general colleges. Engineers need to be oriented towards literary, artistic, adventurous, and musical activities by introducing core courses in the engineering studies. The civil servants need to be oriented in science and technology in their respective institutions.

564. SHARMA, K., *Factors Related to Creativity,* Ph.D. Soc. Sc., IIT, Delhi, 1982

The main objective of the study was to explore the relationship of creativity with certain background, psychological and organizational factors of students of higher secondary schools of Delhi. The main hypotheses formulated were: (1) There will be a significant relationship between the measures of creativity and sex/number of siblings in the family/birth order/type of family/SES of the students. (2) There will be a significant relationship between the measures of creativity and scholastic achievement/intelligence/academic motivation/teacher behaviour as perceived by students/attitude to school/ agreement response/social desirability/characteristic preferred by parents of the students. (3) There will be a significant relationship between the measures of creativity and management of school/type of school/ organizational climate of school. (4) Background, psychological and organizational variables will predict creativity of students.

The sample consisted of 481 students (230 boys and 251 girls) of class IX from 23 different government, private-aided, public and central schools of Delhi. One hundred and eighty-four teachers were administered a questionnaire to find out the climate of the schools in the second instance. The selection of two samples was done on the basis of two-stage stratified proportionate simple random sampling method. Data were collected using the following tools: (i) Raven's Standard Progressive Matrices (SPM), (ii) Non-verbal Test of Creative Thinking (Baqer Mehdi, 1973; r=0.946), (iii) Social Desirability Scale (Edwards, 1957), (iv) Characteristics preferred by Parents (Mishra, 1961), (v) The Agreement Response Scale (Couch & Kenisten, 1960), (vi) School Attitude Inventory (Rao, 1970; r=0.81), (vii) Hindi adaptation of Aberdeen Academic Motivation Inventory, (De and Singh; r=0.80 & validity = 0.59), (viii) Socio-economic Status Scale, (Jalota, Pandey, Kapoor & Singh, 1970; r=0.89), (ix) Teacher Behaviour as perceived by students (r=0.59), (x) Background Information Blank, (xi) Organizational Climate Description Questionnaire (Halpin and Croft, 1963). The data were analysed using various univariate, bivariate and multivariate statistical analyses.

The major findings were: 1. Boys were more creative as compared to girls. 2. Number of siblings was found to be negatively related to creativity. 3. Creativity was higher in nuclear families and families with higher SES. 4. Number of siblings and SES were significantly related in nuclear families but not in joint families. 5. Birth order did not have any effect on the creative performance of the students; however, intercorrelation patterns between background variables and creativity were significantly different amongst students at different birth orders. 6. Scholastic achievement was found to be positively related to the measures of creativity. 7. Creativity was significantly higher in the high I.Q. group in comparison to the middle and low I.Q. groups; further, the middle I.Q. was found to be significantly higher than the low I.Q. group. 8. Perception of teacher behaviour by students was found to be related to creativity in students. 9. Attitudes of the students towards school, were not significantly related to creativity. 10. Social desirability was found to be significantly positively related to creativity. 11. Parental preference for conforming behaviour in the children was negatively related to creative behaviour whereas parental preference for independent self-assertion was positively related to creativity. 12. Parental preference for extraverted and sociable orientation in their children was not found to be related to creativity. 13. Central school students were found to be most creative; next in order were public, private-aided and government schools respectively. 14. Organizational climate of the school was not found to be related to creativity in students.

565. SHARMA, K.P., *Socio-cultural Correlates of Creativity, Adjustment and Scholastic Achievement,* Ph.D. Psy., Agra U., 1984

The objectives were (i) to determine the impact of cultural determinism, religion and socio-economic status upon important aspects like creativity components, adjustment and scholastic achievement, and (ii) to determine interactions among all the three variables in the domain of all three studies.

The sample consisted of 300 subjects belonging to different levels of SES, caste and conformists/rebels. It was selected with the help of the stratified random sampling method. The Culture Determinism Scale by N.S. Chauhan and A.D. Sharma, Socio-economic status scale (Urban) by S.P. Kulshrestha, Creativity Test by N.S. Chauhan and G.P. Tewari, and Adjustment Inventory by A.K.P. Sinha and others were used in the study. The data were analysed with the help of analysis of variance using factorial design of equal cell size.

The findings were: 1. Cultural conformity promoted creative production and scholastic achievement in the Muslims. 2. Conformity of the low SES group promoted

adjustment in home, health and educational pursuits. 3. Rebels to their culture were more original in general, possessed better creative production, showed better adjustment in home, health, emotional and educational pursuits of life under different treatments. 4. Hindus possessed high creative production, originality and flexibility as compared to Muslims. Hindus of high SES possessed more creative production, originality and flexibility as compared to Muslims of middle SES. Hindus of middle SES possessed more originality and flexibility as compared to Muslims of the same status, and Hindus of low SES were more original as compared to Muslims. 5. Hindus of high SES possessed high creative production as compared to Muslims of the same status. 6. Adolescents of high SES possessed high creative production and scholastic achievement; they promoted creative production, originality and flexibility in both Hindus and Muslims as compared to Muslims of low SES; they were more original irrespective of religion as compared to those of low SES; they were nonconformists, possessed originality and showed better adjustment in home, health and emotional pursuits as compared to those of low SES. 7. Adolescents of middle SES promoted fluency and originality, demoted home adjustment after its middle level and showed better adjustment in emotional and educational pursuits up to the middle level. 8. Adolescents of low SES were better adjusted in the home as compared to those of high SES. They were imbued with conformity and showed better adjustment in home, health and emotional pursuits as compared to those of high SES. They were found to be better adjusted in emotional and educational pursuits as compared to those of middle SES.

566. SHARMA, M., *A Study of Some Factors in Relation to Creativity,* Ph.D. Psy., Mag. U., 1977

The main aim of the research was to study some background, cognitive, motivational and personality factors in relation to creativity. Nine hypotheses were examined.

A sample of 400 standard X and XI high school students (200 males and 200 females) was drawn from uniform types of schools. Wallach-Kogan's Battery of Creativity Instruments, the Bihar Test of General Intelligence, Scholastic Achievement Test, Bhatia's Achievement Motivation Test, Kogan-Wallach's Choice Dilemma Questionnaire, Eysenck's Personality Inventory, Taylor's Manifest Anxiety Scale, Maslow's Security-Insecurity Inventory, Mohsin-Shamshad's adopted form of Bell's Adjustment Inventory, Personal Data Blank and Kuppuswamy's SES Scale were used.

The major findings were: 1. Males were superior in creativity to females. 2. High and low creative males were significantly differentiated on intelligence, scholastic achievement, risk taking tendency, anxiety, home health, and emotional adjustment together with overall adjustment scores. 3. High creative males were high in intelligence and scholastic achievement but low in risk taking. They were also better in home, health, emotional and overall adjustment. 4. In case of females, background factors like parents' education, and socioeconomic status were significantly associated. 5. High creative females were significantly high in intelligence and scholastic achievement than low creative females.

567. SHARMA, R.D., *An Experimental Study of the Performance of High School Students of Low, Average and High Creativity as a Function of the Instructional Media and Learning Tasks in Physics,* Ph.D. Edu., Pan. U., 1986

The objectives of the study were (i) to prepare instructional material for high school students in physics in the four media, viz., print-pictures, print-picture work book, tape-slides and tape-slide work book, (ii) to study the effectiveness of the instructional media on performance gains of high school students in physics, (iii) to study the performance gains in physics of high school students with low, average and high creativity levels on (a) total verbal creativity, (b) verbal fluency, (c) verbal flexibility, (d) verbal originality, (e) nonverbal creativity total, (f) nonverbal originality and (g) nonverbal elaboration, (iv) to study the performance gains of high school students on concept learning, principle learning and problem solving tasks in physics, (v) to study the effectiveness of the instructional media on performance gains of high school students in physics with low, average and high creativity levels, (vi) to study the effectiveness of instructional media on performance gains of high school students for concept learning, principle learning and problem solving tasks in physics, and (vii) to study the effectiveness of instructional media for three learning tasks in physics in relation to different dimensions of verbal and nonverbal creativity.

The study was an experimental one with $4 \times 3 \times 3$ experimental design with repeated measures. The instructional media had four levels, viz., print-pictures, print-

picture work book, tape-slides and tape-slide work book. The variable of creativity varied in three ways—high, middle and low creativity. The third variable, learning tasks, varied in three ways—concept learning, principle learning and problem solving. The experiment was conducted in two schools. In school I there were 68 subjects and in school II there were 189 subjects. The total sample consisted of 257 subjects of classes VIII, IX and X. The Torrance Test of Creativity was administered to all the students followed by a pretest (achievement in physics). Then each group was randomly assigned to the instructional media in each school. Subjects who were divided into four groups were matched on intelligence. The instructional media were administered to different groups varying on creativity levels. All the three learning tasks were repeated on each group. During the conduct of the experiment a scheduled amount of five school periods was uniformly fixed for each instructional medium. The criterion variable of the study was attainment scores measured by the achievement test. The tools used in the study were: (i) the Raven's Standard Progressive Matrices, (ii) the Torrance Test of Creative Thinking (verbal form and nonverbal form), (iii) the Achievement Test in Physics.

The findings of the study were: 1. The average gains in performance through the print-picture work book as well as the tape-slide work book media were found higher than the print-picture medium followed by the tape-slide medium. 2. The students scoring low, average and high on verbal creativity (total), verbal fluency, and nonverbal originality did not differ from one another in respect of mean gain in performance. 3. The high group on verbal flexibility and nonverbal originality performed higher than the corresponding average and low groups. 4. The mean gains in performance on concept learning, principle learning and problem solving were found different from each other, the gain being highest on concept learning and lowest on problem solving. 5. For all dimensions of verbal and nonverbal creativity including totals, the effect of media was found independent of the levels of creativity. 6. The students of high nonverbal fluency were benefited most by the tape-slide work book medium. 7. On concept learning tasks the students performed highest with the print-picture and tape-slide media. 8. For principle learning, the print-picture work book and the tape-slide work book media were found equally effective and both were found more effective than the print-picture and tape-slide media. 9. Problem solving was facilitated most by the tape-slide work book medium followed by the print-picture work book, print-picture and tape-slide media. 10. The students with low, average and high creativity level on verbal creativity totals, verbal fluency, verbal flexibility, verbal originality and nonverbal fluency, did not differ in their performance gains on concept learning, principle learning and problem solving. 11. The four instructional media were found equally effective for concept learning, principle learning and problem solving, with low average and high creativity groups. 12. With the print-picture medium, the high and low creativity groups performed higher on concept learning and principle learning than on problem solving. 13. With the print-picture work book medium, the performance gains of the high creativity group on concept learning, principle learning and problem solving were similar. 14. With the tape-slide medium, the performance gains of the high creativity group were found comparable on concept learning, principle learning and problem solving. 15. With the tape-slide work book medium, the high group performed higher on problem solving than on principle learning.

568. SHARMA, RAM VILAS, *An Investigation into Achievement-Motivation, Anxiety and Value-Orientation of Creative Teachers,* Ph.D. Edu., Avadh U., 1985

The objectives of the study were (i) to assess and compare the achievement motive of high and low creative groups of student-teachers in terms of sex (male and female) and residence (urban and rural), (ii) to assess and compare the anxiety of high and low creative student-teachers in terms of sex and residence, and (iii) to compare high and low creative student-teachers on ten value dimensions of the PVQ (Personal Value Questionnaire) in terms of sex and residence.

The initial sample of the study consisted of 500 B.Ed. students selected from eight degree colleges of Avadh University, Faizabad, from which two extreme groups high creative and low creative of 101 subjects in each on creativity measures, were drawn. The data were collected with the help of Torrance Tests of Creative Thinking (Verbal and Figural) Achievement-Motive Inventory by Pritty Gandhi and S.S. Srivastava, Comprehensive Anxiety Scale by A.K.P. Sinha and L.N.K. Sinha and Personal Value Questionnaire by G.P. Sherry and R.P. Verma. The data were tabulated and analysed by employing statistical procedures such as product moment coefficient of correlation, mean, median, standard devi-

ation, standard error of mean and t-test.

The findings of the study were: 1. The total sample of high creatives scored significantly higher than the low creatives on achievement-motivation. 2. Significant differences on mean achievement-motivation scores were found between high and low creative groups in each case except rural males and urban females, in the favour of high creatives. 3. The total sample of high creatives was found to be significantly more anxiety-ridden than the total sample of low creatives. 4. Though higher mean anxiety scores were obtained by all high creative groups except one, the difference was significant in only five cases. 5. Out of ten value areas as measured by PVQ, only five, viz., religion, economic, power, aesthetic and knowledge, were found to be highly discriminating between high and low creative groups. On the first three of these five values low creative groups had a significant edge over the high creatives. 6. On democratic and family prestige values none of the 13 comparisons yielded any significant difference between high and low creative groups.

The educational implications of the study are: (1) Guidance workers and teacher educators should guide their subjects in the light of the findings for creativity. (2) The various areas of the teacher education programme specially the student-teaching should be improved in order to promote creativity among student-teachers. (3) Teacher educators, administrators, policy planners and guidance personnel connected with teacher education programmes should think of ways and means of reducing the level of anxiety among the teacher trainees so that they can perform still better in creativity and improve the same qualities among their students when they join the schools.

569. SHARMA, S.C., *Correlates of Creative Functioning*, Ph.D. Psy., Mee. U., 1979

The objectives were (i) to identify the cognitive and noncognitive correlates of verbal and figural creative functioning in high and low caste groups, (ii) to determine caste and sexwise comparison on creative ability as tested through Torrance Tests of Creative Thinking, (iii) to study biographical differences in high and low creative subjects, and (iv) to identify the creative positives of the low caste groups.

The sample comprised 360 students (180 males and 180 females). The age ranged from 15 to 17+ years. Out of 360, 180 were from high caste groups (90 males and 90 females) and 180 from low caste groups (90 males and 90 females). These students were from high school classes (IX and X) and intermediate classes (XI and XII). Torrance Tests of Creative Thinking (TTCT) Verbal Form B and Figural Form B were used for measuring creativity. The Standard Progressive Matrices Test prepared by J.C. Raven was used for measuring cognitive functioning of the subjects. Personality (noncognitive factors) was measured with the help of the Hindi Version Jr./Sr. High School Personality Questionnaire by Kapoor and Malhotra. Biographical inventory was developed by the investigator. The data were analysed by using product-moment correlation, factor analysis, multiple regression analysis, t-test and chi-square technique.

The findings were: 1. Nonverbal reasoning was not related to verbal creative functioning in any of the caste groups. In the high caste group intelligence was related with verbal originality and composite verbal creativity, and it was missing in the low caste group. 2. Intelligence was related with figural creativity (originality and composite) in the high caste group, but no correlation between these variables existed in the low caste group. 3. High and low caste groups did not differ on noncognitive correlates of verbal creative functioning. No caste difference on personality correlates of verbal creative functioning was found. Low caste subjects who scored high on verbal tasks of TTCT were conscientious, vigorous, and controlled, while high caste subjects having high performance on verbal creative functioning were tough-minded. 4. High and low caste groups differed significantly on noncognitive correlates of figural creative functioning. High caste subjects having high scores on figural tasks of TTCT were happy-go-lucky and outgoing, while low caste subjects who scored high in figural creativity were obedient. Taking into consideration low caste group originality scores, it was found that they were phlegmatic, controlled, and relaxed. High caste subjects having high scores on figural originality were self-sufficient. Two factors, viz., 'happy-go-lucky' and self-sufficiency predicted significantly the figural creative functioning in the high caste group while the factor 'obedient' contributed significantly to multiple correlation in case of the low caste group. 5. The performance of high and low caste subjects did not show a significant difference on either verbal originality or verbal composite creativity. 6. The performance of the high caste group was superior to the low caste group on figural flexibility, originality, and figural composite creativity. 7. Low caste males were superior to high caste males on verbal originality. On verbal composite

creativity, no significant difference in high and low caste males was found. 8. On figural originality and composite creativity, high caste males excelled the low caste males. 9. No significant difference was noted in the performance of high and low caste females on verbal originality or composite creativity. 10. High and low caste females did not differ significantly on figural originality and composite creativity. 11. Males had an edge over females on verbal originality and composite verbal creativity. 12. Males were found significantly superior to females on figural originality, and no significant difference was found in case of composite figural creativity. 13. High caste males and females did not differ significantly on either verbal originality or composite creativity. 14. High caste males excelled females both on figural originality and composite creativity. 15. Low caste males were found superior to females on verbal originality and composite creativity. 16. Low caste females performed better than males on composite figural creativity. No difference was found on originality. 17. No significant association was found between biographical variables, such as, ordinal position, family education, interest, illness, study habits, art, leadership, social service, literature, drama, debate and music, and verbal creative functioning. 18. Music was associated with figural creative functioning. 19. On most of the creativity variables the performance of high caste subjects was found superior to the performance of Harijans. Harijan males excelled high caste males on verbal originality. 20. Disadvantaged Harijan subjects did not possess creative positives for figural creative functioning as evidenced by their performance on figural creativity test tasks.

570. SIERT (Rajasthan), *A Study of the Impact of the Camps for Talented Pupils,* 1982

The objectives of the study were (i) to find out the impact of the camps for talented pupils on increasing the number of students being selected from Rajasthan in the National Talent Search Examination, (ii) to find out the awareness among students, parents and teachers created by these camps, (iii) to find out some improved method of selection of students for these camps, (iv) to study the activities of these camps, (v) to find out the views of resource persons and camp organizers about these camps, and (vi) to find out the views of pupils and their parents about the camps.

The sample consisted of 120 students, 125 parents, 230 resource persons and four camp organizers who were associated with the camps during the years 1977, 1978 and 1979. Survey method was employed for the study. The tools prepared for data collection were questionnaires and interview schedules for the pupils, parents, resource persons and camp organizers.

The study revealed: 1. About 35 per cent pupils got the information about the National Talent Search Examination from the Institute, 13.7 per cent from newspapers and 51.3 per cent from other sources. 2. About 11.0 per cent students suggested that the State Institute should provide information through schools, All India Radio, newspapers and the departmental monthly journal Shivira. 3. About 78.0 per cent felt that the teaching in these camps was really good and of a high standard but 21.7 per cent were of the opinion that it was of average quality. 4. Fifty-nine per cent resource persons had a feeling that the teaching and self-study in these camps helped the students a lot in their Secondary School Board Examination and 44.1 per cent were of the view that it was really helpful. 5. About 59 per cent students were satisfied with the library and reading room facilities, 35.4 per cent were partially satisfied and 5.6 per cent were not satisfied. 6. About 87.0 per cent resource persons thought that the supervised study method was very useful for the students and 12.7 per cent found it to be useful; About 41.6 per cent resource persons desired that they should be trained to acquire expertise in it. 8. The preparation for the interview greatly benefited 48.3 per cent. 9. About 71.0 per cent students were very much impressed by the extension lectures. 10. About 77.0 per cent students wanted the Institute to organize more camps. 11. About 57.0 per cent resource persons wanted a State Talent Search Examination to be conducted on the pattern of the National Talent Search Examination. 12. About 77 per cent parents were quite satisfied with the work done in these camps. 13. About 77.0 per cent students and 34.4 per cent resource persons agreed that there were more chances of selection in the National Talent Examination after attending these camps.

571. SINGH. B.D., *A Study of the Effect of a Specially Designed Teaching Strategy and Some Socio-psychological Factors on Creativity among Middle School Children,* Ph.D. Edu., Avadh U., 1985

The study was designed (i) to evolve a suitable teaching strategy which would be useful for teaching mathematics in a creative manner in Indian schools, and (ii) to use

a social-structure and personality approach to analyse the interaction between characteristics of a person and the characteristics of the social setting as they influenced creativity.

The sample consisted of 277 (165 urban and 112 rural) male students of classes VII and VIII selected from two intermediate colleges of Sultanpur district. Teachers were trained to teach mathematics through the use of a specially designed teaching strategy. Mathematical Creativity Test and General Creativity Test by Baqer Mehdi were used before and after the treatment. Hindi adaptation of Thorndike Dimensions of Temperament Test and Biographical Inventory by Baqer Mehdi were administered to collect personality and biographical data.

The main findings of the study were: 1. The specially designed teaching strategy had a significant effect on creativity. 2. The specially designed teaching strategy had a significant effect on different dimensions of creativity. 3. The same method of teaching could not be used effectively at all levels of mental development. 4. The high and low general creatives did not significantly differ with respect to ten personality factors measured by Thorndike's Dimensions of Temperament. 5. The high and low general creatives differed significantly with respect to socio-cultural and educational background, attitude and level of aspiration. 6. Urban high and low creatives differed significantly with respect to three personality factors, viz., cheerful, placid and impulsive.

572. SINGH, C., *Scientific Creativity Test for High School Students*, Ph.D. Edu., Ran. U., 1978

The main purpose of the study was to construct a test for measuring scientific creative potential among high school students.

Six abilities, viz.; flexibility, novelty, observing minutely, imagination, analysing and transformation were selected. The test was developed in Hindi through tryout, item-analysis. Difficulty and discriminative values of items were found out. The final form had 29 items. The standardization sample included 466 class IX and X students randomly selected from two government and two non-government schools of New Delhi. Reliability was estimated through test-retest, split-half and K-R 20 method. Content, practical validity and percentile and T-score norms for class IX (N=250) and X (N=216) were worked out.

The test had fairly high reliability and validity. Norms were fixed.

573. SINGH, G., *A Study of Creative Behaviour among Adolescents from Different Cultural Backgrounds*, Ph.D. Edu., Luc. U., 1985

The main purpose of the study was to examine the role of various environmental and cultural factors in the development of creative abilities among school going adolescents.

The sample for the study consisted of 497 adolescents studying in class XI of six intermediate colleges. Baqer Mehdi's Test of Creative Thinking was used for assessment of creativity. Sahu's Socio-cultural Deprivation Scale was used to have an idea about the cultural environment of the students. The Socio-Economic Status Scale by Jalota, Pandey, Kapoor and Singh was used for assessment of socio-economic status of the families of the students. For assessment of school climate the judgements of principals, teachers and the District Inspector of Schools were obtained.

The main findings of the study were: 1. The culturally superior group scored significantly higher on verbal fluency than the culturally inferior group. 2. The culturally superior group scored significantly higher on verbal flexibility than the culturally inferior group. 3. The differences between the two groups as regards verbal originality were significant in the case of four out of six comparisons. 4. There were no significant differences as regards verbal composite creativity. 5. The culturally superior group scored significantly higher on nonverbal elaboration. 6. There were no significant differences as regards nonverbal originality. 7. The mean scores of urban students were higher than those for the rural students on all the seven dimensions of creativity. 8. Students from the higher socio-economic group scored higher than the students from the lower socio-economic group on all the seven dimensions of creativity. 9. In general, students from the advantaged school climate scored higher than those from the disadvantaged school climate.

574. SINGH, RAM SWAROOP, *A Study of Achievement Motivation, Level of Aspiration and Anxiety as Correlates of Creativity in Denotified Tribal Children*, Ph.D. Edu., Avadh U., 1986

The objectives of the study were (i) to assess the level of

achievement motivation (AM), level of aspiration (LA) and anxiety (AX) of the denotified tribal (DT) boys and girls and also to ascertain the extent of difference between them and the boys and girls of the other 'civilized' families (CFs), (ii) to see the level of creativity in the DT sample and to compare it with the sample of CFs, and (iii) to determine the effect of AM, LA and AX on the creativity of the DT and CFs samples and to compare them.

The present investigation was a psycho-educational comparative survey type study, and followed the method of parallel equated groups by matched pairs. The sample consisted of 450 students (300 boys and 150 girls) of the DT community (experimental group) and 450 students (300 boys and 150 girls) of CFs (control group) of classes IX and X, drawn from five Ashram type and seven general common schools respectively, situated in Gorakhpur, Rampur, Lucknow and Allahabad districts of U.P. Both the groups were equated in terms of age, sex and I.Q. The tools used in the study were Group Test of General Mental Ability (72) of S. Jalota, Achievement Motivation Test of D. Gopala Rao, Test of Measurement of Level of Aspiration of M.A. Shah and M. Bhargava, Comprehensive Anxiety Test of A.K. Sinha and L.N.K. Sinha, Verbal Test of Creative Thinking by B. Mehdi, and Non-Verbal Test of Creative Thinking by B Mehdi. The data collected were tabulated and analysed using suitable statistical techniques.

The major findings were: 1. The DT group as a whole had a significantly inferior sense of AM than the control group. However, the girls of the experimental group did not differ significantly from the control group girls. 2. The experimental group did not differ significantly from the control group with regard to the level of AX, but the girls as a whole were found to have a lesser degree of AX than the boys. 3. The groups did not differ significantly with regard to the mean value of LA but the boys had a significantly low LA as compared to the girls. 4. Significant positive correlation between intelligence and AM, and significant negative correlation between intelligence and AM, and significant negative correlation between intelligence and LA were found in all groups of the sample. Significant negative correlation was also found between intelligence and AX among boys whereas it was positive and not significant among girls of both the groups. 5. Except for the boys of the control group who had a significant negative correlation between AM and AX, all other groups showed no significant correlation. Correlations between AM and LA of almost all groups were positive but not significant except for boys of the experimental group who had a negative but not significant correlation. 6. Significant negative correlation between AX and LA was found only in the experimental group taken as a whole. 7. All groups of the sample had a significant positive relationship between verbal creative thinking (VCT) and nonverbal creative thinking (NVCT) scores. 8. The experimental and control groups did not differ significantly with respect to VCT and NVCT mean scores. 9. Intelligence and AM were found to be positively correlated with VCT and NVCT in each group. 10. AX was found to be negatively correlated with VCT and NVCT in almost all groups. 11. A negative trend of relationship between LA and VCT, and NVCT was observed in the sample except in girls of both groups where it was positive. However none was significant.

575. SUNDARASMITA, V., *A Comparison of Kinetic Family Drawings (K.F.D.) in relation to Creativity, Emotional Indications and Self-concept of Gifted and Average Elementary School Children*, Ph.D. Edu., Pan. U., 1984

The objectives of the enquiry were (i) to compare the styles, actions and symbols used in the K.F.Ds of gifted and average children, (ii) to study the difference in styles, actions and symbols shown in drawings of boys and girls of gifted and average groups of children, (iii) to see whether gifted and average children selected different action for their father, mother and self in K.F.D., (iv) to compare the gifted and average children on variables of K.F.D. creativity, emotional characteristics and self-concept, (v) to study the strength and magnitude of relationship between K.F.D. and creativity, K.F.D. and emotional characteristics, and K.F.D. self-concept in the case of gifted and average children, and (vi) to study the underlying factor structure obtained with the help of factor analysis for variables of K.F.D., creativity, emotional characteristics and self-concept.

In the study the initial sample consisted of 1288 children of grades III to V. It included 682 boys and 606 girls chosen from five zones and 15 schools of Thailand. The sample students were administered the Raven's Standard Progressive Matrices. The children who were falling in the top 5 per cent of the population were identified as gifted children. The children who fell within the range of mean ± 1 S.D. were taken as average children. The final sample consisted of 127

gifted children and 130 average children. They were administered the following tools: (i) the Raven's Ccloured Progressive Matrices (1956); (ii) the Torrance Test of Creative Thinking (1965); (iii) the Dev and Mohan Test of Originality (1972); (iv) the Emotional Characteristic Scale (1981); (v) the Children's Self-description Scale (1972); (vi) the Kinetic Family Drawing (K.F.D.). The data so collected were analysed with the help of t-test, and factor analysis.

The findings of the study were: 1. No styles were used in K.F.D. of gifted and average children. 2. Out of 69 actions used in 257 drawings produced by gifted and average children, it was found that 64 actions were common with the list of actions prepared by Sims. 3. The gifted and average children used 141 symbols in the K.F.D. out of which 100 symbols were common with the list of symbols prepared by Sims. 4. There were seven most frequently selected actions used in the drawings of gifted and average children. These were—standing, going to school, going to work, cooking, working, shopping for food, and cleaning the house. 5. There was no significant difference between gifted and average children with respect to selection of actions for father, mother and self. 6. The most frequently selected actions for their father by the gifted were—working, going to work, standing and reading the newspaper. The actions selected by the gifted for their mother were—cooking, shopping for food, going to work, and cleaning the house. The actions selected for themselves were—going to school, standing, studying and cleaning the house. 7. In the case of average children the most frequent actions selected for their father were—going to work, standing, working and reading the newspaper. The actions selected for their mother were—cooking, standing, shopping for food, working and cleaning the house. Actions they selected for themselves were—going to school, standing, writing and playing. 8. In work categories such actions as cooking and shopping for food were selected more by gifted boys and average girls than by gifted girls and average boys. 9. In non-work, non-play categories, gifted and average girls drew their mother standing more frequently than gifted and average boys. 10. In work categories, gifted and average girls had drawn themselves as cleaning the house, studying and going to school more than gifted and average boys. 11. In play categories, playing football was drawn more by boys than by girls in either group, whereas flying kites and jumping rope were exclusive actions for boys and girls respectively in either group. 12. In non-working play categories, standing was preferred by gifted and average children whereas writing seemed to more popular with the average group. 13. On average the gifted children used more than four symbols and average children used three to four symbols in the K.F.D. 14. The means on the variables of originality and the components of creativity in the case of gifted and average children were higher than the means of average children. 15. On the variables of emotional characteristics both the groups of gifted and average children were found to be free from emotional problems. The self-concept of gifted and average children was also found above average. 16. There existed significant differences between gifted and average children on variables of K.F.D.—action and symbols, flexibility and originality. But no significant differences were found in the case of emotional characteristics and self-concept. 17. In the case of gifted children, K.F.D. (actions) had a positive significant correlation with symbols and miscellaneous characteristics of emotions. The measures of originality, fluency, and flexibility were found to have a positive significant correlation among themselves. All the dimensions of components of emotional characteristics, namely, social withdrawal, unsocialized aggressiveness, emotional instability, miscellaneous characteristics of emotion and total emotional characteristics had a positive significant correlation among themselves. 18. In the case of average children, K.F.D. actions and symbols had a positive correlation between themselves. The dimensions of creativity, namely fluency, flexibility, originality and total creativity, had a positive significant correlation among themselves. The components of emotional characteristics had a positive significant correlation among themselves. The variable of self-concept had a negative relationship with the dimensions of creativity, namely fluency, flexibility, originality and total creativity. 19. Four factors were extracted on the basis of 16 × 16 intercorrelation matrix for combined groups of gifted and average children. Factor I was characterized by significant factor loading on originality and was identified as factor of Original Thinking Ability. Factor II had significant loadings on dimensions of emotional characteristics and was identified as Emotional Characteristics Factor. Factor III had significant loadings on creativity and was identified as Creative Thinking Ability Factor. Factor IV had significant loadings on actions and symbols, and was identified as factor of Kinetic Family Drawings (K.F.D.).

576. TALEGAONKAR, A., *To Develop Teaching Strategies to Encourage Students to Solve Problems in Science Creativity, Jnana Prabodhini,* Pune, 1984 (SIE, Pune financed)

The study was conducted with the purpose of encouraging students for problem solving in science creativity through specific strategies.

The sample of the study consisted of 34 class IX students of Pune City. A pretest-post test matched group design was used in the study. The strategies employed for improvement of creativity were creative problem solving, games, observation, question storming, grou p discussions, laboratory work, and supply of instructional materials to students. To find out whether the students showed any difference in the abilities to solve problems creatively, two self made verbal tests highlighting fluency, flexibility and originality were used by the researcher. One was used as a pretest and the second as a post test; these tests were not standardized. The time taken for administration of the tests was 30 minutes. The training was given for 18 hours extended over a period of six months. Data were analysed qualitatively, through graphic presentations, and through median test.

The findings of the study were: 1. Though there was no significant increase in the ability of lateral thinking as per the results of the post test, the students responded well during the conduct of the experiment. 2. The students could not reach the final solution due to lack of time and equipment for experimentation. 3. The strategy when used in any science like biology, demanded integration of knowledge from different disciplines of science.

577. TIWANA, M., *A Study of Personality, Self-Perception, Values and Alienation of Creative Writers,* Ph.D. Psy., Pan. U., 1982

The objective of the study was to test the following hypotheses: (1) Creative writers are extraverted, neurotic, psychotic and more prone to lying. (2) Creative writers are alienated. (3) Creative writers perceive themselves as less aggressive, less sociable, less emotionally stable, less socially adaptable and less socially intelligent. (4) Creative writers are theoretical and aesthetic in their value orientation and low on political, economic, social and religious values. (5) Creative writers are poorly adjusted on all aspects of adjustment scale.

The study was an exploratory one. A sample of 100 creative writers who had reputed published works in the areas of writing poetry, novels, plays, short stories, etc. was selected. Their age ranged from 23 years to 83 years. They were administered the following tools: (i) the Eysenck Personality Questionnaire (1978), (ii) the Pearline Alienation Scale (1962), (iii) the Srole Anomie Scale (1956), (iv) the Clarke Activity-Vector Analysis (1963), (v) the Allport Value Scale (1960), (vi) a seven-point adjustment scale, (vii) the Mohan Creative Writers Questionnaire (1978).

The findings of the study were: 1. The creative writers emerged as introvert, neurotic, psychotic and socially conforming. 2. Creative writers were alienated and had a strong feeling of normlessness. 3. Creative writers perceived themselves as less aggressive, less sociable, less emotionally stable, less socially adaptable and less socially intelligent. 4. Creative writers were found to be theoretical, aesthetic and social in their association and lower on political, religious and economic values. 5. Creative writers reported themselves to be quite well adjusted. 6. Extraversion was positively related with aggressiveness, social intelligence, health, personal, social and total adjustment. 7. Psychoticism was positively related with neuroticism and negatively related with social desirability, positive values, health, personal, social and total adjustment. 8. Neuroticism was found to be positively related with aesthetic value and negatively related with social desirability, political value, health, personal, family, social and total adjustment. 9. Lie-Scale was positively related with political value and total adjustment. 10. Alienation was positively related with anomie and theoretical value. 11. High positive correlation existed among different vectors of self-perception. 12. Theoretical value was positively related with social value and negatively with aesthetic and religious values. 13. Economic value was negatively related with aesthetic and religious values. 14. Social value was negatively related with religious value. 15. Various dimensions of adjustment were found to have a positive correlation with each other and total adjustment.

* 578. TRIMURTHY, S.P., *A Study of Creative Thinking Ability of Secondary School Students in the Context of Some Psycho-socio Factors,* Ph.D. Edu., SPU, 1987

The objectives of the study were (i) to design and construct reliable and valid verbal and non-verbal tests of

creative thinking ability (CTA), (ii) to determine the extent to which sex influenced creative thinking ability, (iii) to determine the extent to which the urban-rural location influenced CTA, (iv) to determine the extent to which the grade influenced CTA, (v) to study the trends of creative thinking ability in relation to age and I.Q., (vi) to study the relation of test anxiety with CTA, (vii) to study the relation of self-sufficiency *vs.* dependency with CTA, (viii) to study the relation of socio-economic status with CTA, (ix) to study the relation of leadership with CTA, and (x) to study the relation of emotional stability with CTA.

The tests for measuring creative thinking ability were constructed and standardized. The verbal test measured the fluency, flexibility, originality and evaluation of factors of CTA. The test was standardized on a sample of 603 pupils selected from classes VIII, IX and X of secondary schools of Andhra Pradesh. The reliability of the test ranged from 0.72 to 0.89 for the verbal test and for the non-verbal test it ranged from 0.64 to 0.74. The concurrent congruent and factorial validity of the tests were established. The congruent validity for the verbal test was found to be 0.79 and for the non-verbal test it was 0.78. The concurrent validity for the verbal test was found to be 0.73 and for the non-verbal test it was 0.53. The percentile norms were established both for boys and girls. The General Ability Test of M.T. Patel, and the Anxiety Test of H.K. Nijhawan, Self-sufficiency *vs.* Dependency, Leadership Scale and Emotional Stability Scale standardized by A.S. Patel were used. For SES the author used the scale developed by B.V. Patel and I.A. Vora. The 2×2×2 factorial design was used for the study.

The major findings were : 1. The boys were better than the girls in both verbal and non-verbal CTA. 2. The urban students were better than the rural students in both verbal and non-verbal CTA. 3. The students with high I.Q. were found more creative than students with low I.Q. in verbal CTA. In the case of non-verbal CTA, I.Q. did not exert any significant influence. 4. The interactive effects between sex and I.Q., area and I.Q., and sex, area and I.Q. were not significant. 5. The main effect of anxiety did not exert any significant influence on verbal and non-verbal CTA of the students. 6. The interactive effect between sex and anxiety, area and anxiety, and sex, area and anxiety were not significant. The CTA was not influenced by test anxiety in any way. 7. The self-sufficiency *vs.* dependency trait did not exert a significant influence on the verbal and non-verbal CTA of the students. The interaction between sex and self-sufficiency *vs.* dependency, area and self-sufficiency *vs.* dependency, and sex, area and self-sufficiency *vs.* dependency were not significant. 8. The main effect of leadership trait did not exert a significant influence either on verbal or non-verbal CTA. The interaction effect between sex and leadership revealed that boys with low leadership and girls with high leadership were better in non-verbal CTA. The interaction between sex and leadership, area and leadership, and sex, area and leadership were not significant in case of verbal CTA. 9. The emotional stability did not exert a significant influence either on the verbal or non-verbal CTA. The interaction between sex and emotional stability revealed that boys with low emotional stability were more creative on non-verbal CTA. The interaction effects of sex and emotional stability, area and emotional stability, and sex, area and emotional stability were not significant. 10. The main effect of SES was not significant. 11. The variables like sex, area and I.Q. had their influence on CTA whereas other variables like test anxiety, self-sufficiency *vs.* dependency, leadership, emotional stability and SES did not exert much influence on CTA.

579. TRIPATHI, S., *Construction and Standardization of A Test of Creativity in Oriya,* Ph.D. Edu., Kur. U., 1987

The objectives of the study were (i) to construct a test of creativity in Oriya to be used for the high school students of Orissa, and (ii) to standardize the test by determining its reliability, validity and the norms.

The test was standardized on a sample of 400 subjects taken from seven different districts of Orissa. The preliminary draft of the test consisted of nine sub-tests out of which five were verbal and four were non-verbal sub-tests. The five verbal sub-tests were (a) Instances (4 items), (b) Problem solving (3 items), (c) Possibilities (6 items), (d) Alternative uses (3 items), and (e) Seeing defects (4 items). The four non-verbal sub-tests were (a) Seeing defects (2 items), (b) Design formation (4 items), (c) Pattern meaning (4 items) and (d) Line meaning (4 items). The items were scored on the basis of number of responses made and unique responses made. The item analysis was carried out by examining the correlation between the scores on each item with the total score of the subjects. The reliability of the test and its sub-tests was established through split-half method. The criteri-

on validity, discriminant validity, factorial validity and trait consistent validity were established. The final draft of the test had 35 items belonging to nine sub-tests. Out of these, five were verbal and four were non-verbal. These verbal and non-verbal sub-tests, and the number of items included in each of the respective sub-tests were the same as there were in the preliminary draft of the test. The test was scored for the number of raw scores and the uniqueness raw scores. The number of raw scores were the number of responses made for each of the items in each sub-test. The uniqueness raw scores represented the number of unique responses made by the individual student for different items of the sub-tests. The sum of the number of raw scores and uniqueness raw scores of all nine tests represented the total creativity index scores for an individual.

The characteristics of the test were: 1. The coefficient of split-half reliability for the number of raw scores was 0.97 and for the uniqueness raw scores it was 0.77. 2. The criterion validity established against the Wallach-Kogan Test of Creativity came out to be 0.83. 3. The discriminant validity against Raven's Standard-Progressive Matrices and the Cattell Test of General Mental Ability was 0.38 and 0.40 respectively. 4. The inter-correlations between the nine sub-tests were not significant. 5. The percentile norms were established-ranging from P10 to P99. The P10 for total creativity index scores of the sample was 9.32 and P 99 was 52.00.

580. TRIPATHI, V.K.D., *A Study of Personality Traits as related to Creativity among Male and Female Teacher Trainees of High, Middle and Low Socio-Economic Status,* Ph.D. Edu., Avadh U., 1983

The objectives of the study were (i) to develop a new test of creativity primarily with its fluency and originality components, (ii) to prepare an Indian adaptation and standardization of Cattell's 16 Personality Factor Questionnaire Form C and D in the Hindi language for use on an adult population, (iii) to develop fresh norms for both the tests of creativity and personality, (iv) to study inter-relationships between originality and fluency and other components among teacher-trainees, (v) to study relationships between personality and creativity and the effect of socio-economic variables on these two, and (vi) to prepare personality profiles of creative and non-creative teacher-trainees and to compare their emerging patterns.

The sample of the main study consisted of 354 B.Ed. teacher-trainees selected from 572 trainees drawn from five colleges of Pratapgarh and Sultanpur districts of U.P., after checking and rejecting 218 answer sheets which were found invalid. The tools used for collecting data were a Hindi version of 16 PF Questionnaire Form C and D, and Fluency-Originality Composite Test of Creativity, both prepared and standardized by the investigator, and Socio-economic Status Scale Questionnaire (urban) prepared by Jalota, Pandey, Kapoor and Singh. Mean, median, point biserial correlation coefficient and t-test were used for analysing the data and drawing conclusions.

The major findings of the study were: 1. The females were higher on creativity than the males. 2. There was a positive correlation between the SES and creativity scores. 3. Sex-wise analysis of creativity scores of the three SES groups showed a negligible effect of SES on creativity. 4. Female trainees on their personality scores were high in abstract thinking, conscientiousness, tendermindedness, imaginativeness, radicalism, and somewhat less frustrated. 5. The effect of SES on personality was not substantial as the differences were noticeable in less than one-third of the total personality factors. 6. Creative female trainees were higher on intelligence, consciousness, experimental attitude, and self-sufficiency factors than creative male trainees. 7. High SES creatives were superior in consciousness and expeimental attitude. 8. High creatives were more warmhearted, intelligent, emotionally stable, conscientious, venturesome, tenderminded, imaginative, experimental and controlled than their low counterparts. 9. Fluency and originality were positively correlated. Both these factors contributed to creativity. 10. In terms of second order extraversion factor components, high creative teacher-trainees were more introverted than low creative teacher-trainees.

The implications of the study are: (1) The findings would help in selection, training and promotion of actual school teachers by knowing the personality pattern of creatives and other socio-economic aspects. (2) It would help educators and psychologists to predict the creative potential of the individuals on the basis of the personality test scores. (3) The study introduced an innovative approach in teacher-training programmes which would prove helpful for training the future teachers in the art of identifying and teaching creative students in schools.

*** 581.** V. RYAR MICHAEL, *S. J., Preparing and Trying Out the Programme for Developing Creative Thinking Ability in the Students of the Age Group between 10+ and 12+ Controlling some Psycho-socio Factors,* Ph.D. Edu., SPU, 1988

The objectives of the study were (i) to prepare a programme for developing creative thinking ability (CTA) in students of grades V, VI and VII, (ii) to construct a non-verbal CTA test measuring entrance and criterion CTA behaviour of students of grades V, VI and VII, (iii) to construct a verbal CTA test measuring entrance and criterion CTA behaviour of students of grades V, VI and VII and (iv) to study the effectiveness of the CTA development programme on the students of grades V, VI and VII.

The investigator constructed verbal and non-verbal CTA criterion tests. Other tools used for collecting the data were Anxiety Scale, Parental Behaviour Scale, Self-done Activities Scale, Self-sufficiency Scale, Emotional Stability Scale, Neuroticism Scale, Happy-Go-Lucky Scale and I.Q. test. The investigator also prepared a non-verbal and verbal programme for developing creative thinking ability. The experiment was carried out on students of grades V, VI and VII of three schools, out of which one school was treated as a control school and other two schools as experimental schools. The sample included 330 students. Analysis of covariance was used to control the effect of intervening variables.

The major findings were: 1. The experimental groups gained by the CTA programme more than the control group which did not receive any treatment. 2. The adjusted means of the two experimental groups did not differ from each other whereas the mean of the control group was found significantly lower than the means of the experimental groups. 3. The CTA treatment was found to be effective when the different variables like anxiety, parental behaviour, self-done activities, school achievement, self-sufficiency, neuroticism, emotional stability and I.Q. were controlled.

582. VASESI, R., *Cognitive Styles, Needs and Values of High and Low Creative Adolescents,* Ph.D. Edu., Pan. U., 1985

The objectives of the study were (i) to identify high and low creative groups of adolescents on the basis of their performance on the test of creative thinking, (ii) to examine and compare the cognitive style of field dependence-independence of high and low creative adolescents, (iii) to examine and compare the need patterns of high and low creative adolescents, (iv) to examine and comapre the values of high and low creative adolescents, and (v) to study the interactional effect of creativity and intelligence in explaining individual differences in cognitive style, needs and values. It was hypothesized that the high creative group differed from the low creative group.

A sample of 1300 students (of both sexes) of grades IX and X from government schools of the Union territory of Chandigarh was selected. This sample was classified into high and low creativity groups having 349 subjects in the high creative group and 344 subjects in the low creative group. Each of these groups was further classified into high and low intelligence groups. Each of the four groups so formed comprised 93 subjects. In this study extreme group design was employed to examine the mean difference between high and how creative groups on one set of scores on cognitive styles, that is, field dependence-independence; 15 measures of needs, viz., n-achievement, n-deference, n-order, n-exhibition, n-autonomy, n-affiliation, n-intraception, n-succorance, n-dominance, n-abasement, n-nurturance, n-change, n-endurance, n-heterosexuality, n-aggression. The six sets of values included theoretical, economic, aesthetic, social, political and religious values. In the study the tools used were: the Torrance Test of Creativity Thinking-Verbal form A (1966); the Witkin Group Embedded Figures Test (1971); the Edwards Personal Preference Schedule (1959); the Ojha Values Scale; the Jalota Group Test of General Mental Ability (1972). The data so collected were analysed with the help of two-way (2×2) analysis of variance.

The findings of the study were: 1. The high creatives scored significantly higher that the low creatives on the field dependence-independence. 2. On the measures of needs, high creatives were significantly higher on n-achievement, n-autonomy, n-intraception, n-dominance, n-nurturance, n-change and n-endurance, and lower on n-deference, n-order, n-exhibition, n-affiliation, n-succorance, and n-heterosexuality. Differences observed on the measures of n-abasement and n-aggression were nonsignificant. 3. High creatives scored significantly more on the theoretical and aesthetic values as compared to low creatives. The low creatives scored significantly more on economic, social, political and religious values. 4. The variable of intelligence did not contribute significantly to the variance in field dependence-

independence of cognitive styles, 13 of the 15 needs, and all the six values. 5. The results of the analysis of variance revealed that the main effect due to the variable of creativity were significant for the measures of cognitive styles, various needs, namely, n-achievement, n-deference, n-order, n-exhibition, n-autonomy, n-affiliation, n-intraception, n-succorance, n-dominance, n-nurturance, n-change, n-endurance, n-heterosexuality, and all six measures of values. 6. The interactional effect of creativity and intelligence was significant only for one measure of need, i.e., n-nurturance and one type of value, i.e., religious value. 7. Creativity significantly contributed towards variance on all measures of cognitive styles, needs and values except n-order, n-abasement and n-aggression. 8. Intelligence did not lead to significant differences on all these variables except n-endurance and n-aggression. In its interaction with creativity also, intelligence had contributed significant variance only towards n-nurturance and religious value.

The study has its implications for teachers and persons concerned with education that needs of high creatives are different from those of low creatives. Likewise, personality and motivational variables need to be rooted in the predominantly cognitive concept of creativity.

583. VERMA, J., *A Study of the Differences in the Personality Patterns of High and Low Creative Adolescents in Schools as Measured through Rorschach,* Ph.D. Psy., Mee. U., 1983

The objectives of the investigation were (i) to study the differences of the personality patterns of high creative and low creative adolescents, (ii) to know how the cognitive and affective aspects of personality interacted with each other in such individuals, and (iii) to ascertain whether creative adolescents were more imaginative, introverted, emotionally sensitive and better adjusted as compared to the non-creative adolescents.

The sample was selected from the schools under Delhi Administration on the basis of random sampling. The sample comprised 380 students taken from the middle socio-economic group to nullify its impact on creativity. The creativity was measured through the use of the Verbal Test of Creative Thinking by Baqer Mehdi and a Non-verbal Test of Creative Thinking by Baqer Mehdi. The Mixed Type Group Test of Intelligence by P.N. Mehrotra was used to equate the groups on intelligence. The Rorschach Ink Blot Test was used to measure personality patterns of the high and low creative adolescents.

The data were analysed by using techniques like chi-square and analysis of variance.

The findings were: 1. The high creative group possessed more organizational interest and ability. The high creative group produced a superior concept in which the match of the concept to the blot was improved by the omission of certain parts of the blot. They were more accurate and specific. The high creative persons possessed interest and ability to differentiate perceptually. High creatives had a feeling of insecurity. They had a rich responsiveness to the environment in a perceptual sense and they had a flair for unusual things. Both high and low creative groups had almost the same desire to be outside looking. Both groups ignored the usual approach and literally 'dived into' their problems without regard for the surrounding area or context. High creatives were more original, flexible, and had a more fertile imagination. High creative groups were more constructive, self-assertive, more imaginative, self-accepting, intelligent, inner stable, and had a feeling of empathy. They had superior creative potential compared to those who lacked even this degree of integration of ego and impulse life. They had integrated their impulse life with their value-system and they were well adjusted to their environment. Both groups had the same level of expected normal anxiety. High creatives had an optimal level of frustration of affectional satisfaction. Both groups were found to handle their affectional anxiety by introspective efforts, that is, they were able to tolerate their own anxiety. High creatives had a feeling of insecurity for affectional needs. Both groups had a ready control over emotional impact without loss of responsiveness. Both groups were capable of representing keenly felt attitudes about oneself and the environment. High creatives had more introspective tendencies as compared to low creatives. They had more potential adjustive techniques as compared to the low creative group. Both groups were found to see the world as others saw it without an undue emphasis upon the conventional view. High creatives had novelty and uncoventionality. 2. High creatives had superior capacity and fine control of intellectual functions. 3. High creatives produced responses that were very well-differentiated or organized or both. 4. High creatives had a flexibility of approach and a wide range of interpretative background that contributed to the efficiency of intellectual function. They were perceptually responsive

and receptive to the world around them. They were more alert and productive, and quick in taking decisions. They were quick in responding to both chromatic as well as achromatic cards. They had produced more movement responses as compared to low creatives. Further, they had produced more responses which indicated their better adjustment to the environment. 5. High creatives were not more introvert than low creatives. Both high and low creatives reacted emotionally to the environment.

584. VORA, GIRA. C., *An Investigation into the Impact of Divergent Thinking Programme in Mathematics on Creative Levels of the Children of Classes VII and VIII,* Ph.D. Edu., SPU, 1984

The main objectives of the study were (i) to provide a reliable divergent thinking programme in mathematics, (ii) to study the effect of a divergent thinking programme in mathematics on the creativity of the students of standards VII and VIII with respect to reinforcement, i.e. feedback, (iii) to study the effect of a divergent thinking programme in mathematics on the creativity components, viz., fluency, flexibility and originality, (iv) to investigate whether there were grade differences in the creativity, and (v) to investigate whether there were sex differences in creativity.

The investigator constructed the Divergent Thinking Programme consisting of three types of problems, namely, (i) multiresponse type (a) algebra, and (b) geometry, (c) arithmetic, (ii) hidden shape type (geometry) and (iii) make-up problem type (a) algebra and (b) arithmetic. The programme was tried out on a sample of 115 students of whom 52 students were from class VII and 63 were from class VIII. The other tool that was used for collecting data was Passi's Test of Creativity. In order to study the effect of the Divergent Thinking Programme (DTPM) 271 students were selected—130 students of grade VII and 141 students of grade VIII. The $3\times2\times2$ factorial design was used and analysis of covariance technique was used for drawing conclusions.

Some of the findings were: 1. The creativity increased as a result of treatment of the Divergent Thinking Programme in Mathematics (DTPM) with and without feedback at both grades. 2. The Divergent Thinking Programme in Mathematics was equally effective in both groups of boys and girls. 3. The experimental group proved superior in the component of creativity namely, fluency and originality after taking the DTPM than the other group. 4. There was a significant increase in the scores of the first group of students who were given feedback on the component of fluency of creativity. 5. There was no significant graded difference in creativity scores measured on post test. 6. There was no significant difference between the means of both sexes even after taking the DTPM. 7. The programme worked well for both high creative and low creative students. 8. The opinions regarding the DTPM given by students of the classes were quite favourable and encouraging.

585. YAWALKAR, V., *Development of Some Personality Correlates of Scientific Creativity,* Ph.D. Edu., Nag. U., 1985

The study aimed at investigating the efficacy of two creative teaching techniques, viz. Bionics and Morphological analysis conducive to develop some personality correlates of scientific creativity. The personality variables under study were: (i) self-reliance, (ii) dominance, (iii) emotional, (iv) venturesome, (v) super-ego strength.

The sample for the study consisted of 250 students learning in class IX in five sections of two different schools in Nagpur city. Three groups of students were matched initially on intelligence and creativity variables. Allotment of treatment to these three groups was done randomly. In order to teach science using Bionics and Morphological analysis, topics from science subjects suitable for these techniques from the syllabus of class IX were selected. Two periods per week were allotted for experimentation on each group. The experimentation was carried out for one academic session. Personality profile approach was employed for pre-post experimental design. Forms A and B of the Indian adaptation of H.S.P.Q. (1969) were used as pre and post-test.

The findings were: 1. The Bionics group had shown positive gains on four variables i.e. emotional, dominance, superego strength and self-reliance, and negative gains on one variable—venturesome. 2. The Morphological analysis group had shown positive gains on three variables i.e. dominance, superego strength and venturesome and negative gains on two variables—emotional and self-reliance. 3. The control group had shown a general decline on all the five variables. 4. The comparison of differences in mean gains of Bionics and Morphological analysis had shown that the gains on three variables—emotional, dominance and self-reliance were more in the Bionics group whereas the gains on superego strength and venturesome were more

in the Morphological analysis group. However, none of these gains was statistically significant.

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