

**"A Study of Personality, Academic Achievement and  
Psychosocial Factors Amongst Creative and Non-Creative  
Students of IIT."**

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*KBhagoliwal.*  
(KEERTI BHAGOLIWAL)

DEDICATED TO THE SWEET MEMORY OF MY  
GRANDFATHER  
LATE K.S. BHAGOLIWAL, B.A.

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## CHAPTER 1

### INTRODUCTION

## CHAPTER I

### **"Introduction"**

Creation of man is the culmination of God's creative pursuit. The hidden and expressive endowment of this creativity in man reflects the creative endeavour of the Almighty creator. However the true nature of creativity has not been fully understood as yet. Its nature is so complex that it still remains shrouded in mystery and efforts are to be made for its unfolding its multi-dimensional character. The ways are to be paved for healthy expression of creative potentials with which human beings are endowed. If one fails to do so the potentially creative individual may start suffocating and divert his creative endeavour into destructive channels.

The present age is characterized by confusion, tension and violence. The creative ability seldom gets proper channels for its utmost expression. The creative imagination of a child is lost amidst highly mechanical and routined life. This has posed a serious problem before the psychologists and educationists. The creative potentials, present within a man, if not properly expressed through constructive channels, would generate suffocation and divert his creative ability toward destructive tendencies. If the constructive and imaginative endeavour is not properly catered it will generate more and more frustration within the individuals. Any blockage to creative expression on the part of human beings will lead to their psychological death. The human being who is the supreme

creation of God may not justify the purpose of his existence which is meant for creating something novel on this earth and ultimately to add beauty to his creator's gift.

The present educational system and unrealistic syllabi, are so taxing to the growing children that their creative imagination is suppressed and blocked most of the time. While speaking at an international conference at Delhi in January, 1986, Dr.R.Ramanna, Chairman, Atomic Energy Commission, has cast doubt over the contribution of formal education to creative development of children. He has posed a question: Are children being exposed to too much knowledge in their rapid advancing world today at the cost of stunting their creativity? The education must not only aim at intellectual development but also at creative expression.

Such discussions and arguments are indicative of the fact that creativity is an important subject for scientific investigation and empirical study. Various problems related to the proper expression of creative potentials need through discussion and exploration as well as understanding of the nature of creativity in its diversified forms. Only when the concept of creativity is fully understood in different contexts one can provide ways for its channelization.

The analysis of creativity from conceptual and empirical angles constitutes a subject of valuable investigation. Fortunately people have realized the necessity for exploring the true nature of man's creativity, which is reflected in rich literature available on creativity. The review of such literature indicates that creativity has been examined in a conceptual as well as empirical context. The findings associated with various problems of creativity are controversial in nature. Creativity is to be analysed from a multidimensional approach it is highly complex cognitive ability. The controversion regarding the agreed definition of creativity clearly suggest the multiplexity underlying the explanation of creative behaviour.

The most popular way of looking at creativity has been to emphasize on the making of something "new" and "different." Definitions of creativity From (1959) has pointed out two broad meanings of creativity. First it refers to the production of something novel and further it may even refer to the aptitude which may persist even when nothing new is created.

Brunelle has regarded creativity in terms of a process by which some novel idea or an object is produced in a new fashion or arrangement. In the absence of this process there cannot be any product and ultimately no creativity.



Kunt has also considered creativity as consisting of various processes like framing, probing, exploring, affirming and realizing. Through these processes the pursuer's relation to the phenomenon undergoes change and new insight is attained.

Psychologists like Mackinnon (1960), Dewey(1910), Wallas (1926) have also viewed creativity as a process leading to some new idea or object.

Parker (1963) considers creativity as the art of seeking out, trying out and combining knowledge in a novel way which results in something new.

Godner (1962) has stressed that creativity is an organized, comprehensive and imaginative activity of brain toward an original out come. It is, therefore, an innovative and not a reproductive activity.

Mendick (1964) views creative thinking in the light of framing new combinations of associative elements which either meet specified requirements or is found to be useful in some way. The more mutual remote elements of the new combination, the more creative is the process.

Barron (1961) is of the opinion that creativity does not simply mean exploration, invention or discovery of some new things or relations rather it refers to making new combinations out of existing objects and elements.

Celye (1962) while recognizing one more dimension of creativity states that it leads to generalization of the new interpretations.

In spite of some criticisms regarding the originality, novelty and uniqueness in creativity it is observed that there is still stress on creativity as unique mental process which is needed for production of something novel and original. One can also quote Guilford (1968) in support of originality, deviation and uniqueness in creativity. He has considered creativity as a specific kind of thinking, labelled as divergent thinking which makes deviation from the common and obvious thought and action. This type of thinking helps an individual in examining various possible solutions to a problem and not centering around a single correct solution which involves convergent thinking. Divergent thinking enables the individual to be more flexible and fluent involving richer flow of ideas and resulting in some novel and creative solution.

Concepts of Creativity - On the basis of different fundamental basis, different psychologists did extensive studies on creativity and gave different interpretations of the same. On the basis of their ideas, present researcher has tried to classify them according to their similarities and differences of opinion in their studies.

Some psychologists considered curiosity to be the basis of creativity to be the basis of creativity. Murphy (1958) defined it as the tendency to investigate any novelty perceived, tendency to seek information about anything. Ausubel (1958) also regarded it so, as the mental and language developments are necessary, because "why" and "how" questions are later developments which are necessary for curiosity. Day (1968) shows evidence that creativity and curiosity are highly related and a high level of curiosity is necessary for creativity.

Guilford's model of the structure of "intellect" is, however, not free from criticisms. Butcher J.(1970) has cast some doubt on Guilford's distinction of divergent and convergent thinking. Eysenck (1967) extended support to this view and suggested that the divergent thinking of arts specialists largely consists of verbal fluency and is associated with extraversion. Hedson (1960) in a lively and provocative book has maintained that the distinction between divergent and convergent thinking is fundamental one, but that is hardly related to creative ability. In his view it is much more closely related to the differences between scientists and specialists in arts or literary subjects.

Another aspect of the studies on creativity emphasizes that individuals roughly fall into two major categories: "conformers" and the "creators". The former group tries to conform to the

expertations of others by adopting the prevailing thought and ideas where the latter contributes some originals ideas and view points and sometimes the new product.

Creativity has been treated to be synonymous with fantasy and imagination. Goldner (1962) holds that creativity is to be considered as an organized, comprehensive, imaginative activity involved in bringing something original. This clearly supports the notion that creative activity lies in innovation rather than reproduction.

Another notion about creativity is that the higher the intelligence, the higher the creativity Genius is generally considered to be creative. Drevdahl (1956) has empirically examined the relationship between intelligence and creativity; and found that for the purpose of being creative an individual must have the acquisition of knowledge before it can be used in a novel and original fashion.

Some psychologists based their assumptions of creativity on creative persons and considered the whole phenomenon to be centred around those individuals. The following were those psychologists who generally believed so, Simpson (1922), Wallac(1926), Guilferd (1950), Getzels & Jackson (1962), Bowenfeld (1952), Jorrance (1962) etc.etc.

Creativity was also regarded as a "process" which was given tremendous weightage while describing creativity. Spearman (1930) considered creative thinking as the process of visualizing or creating relationships with both conscious or sub-conscious processes operating, Barchillon (1961), Jorrance (1965), Chiseline (1952), Yamamoto (1964), Taylor (1955), Rhodes (1961), John Dewey (1910), Rossman (1931), Vinocke (1960) and Markinnon (1960) also emphasized on creativity as a process.

"Creativity and press:" was another criterion for the study of creativity. Press may be considered as the enteraction between persons & their environment. Persons emphasizing the imper - of press observed that it is the environmental effect that motivates an individual for pursuing certain creative activities. Maslow was the pioneer in defining creativity in terms of press. Vinacke (1960), Stephens (1954), Moore (1961), Ward (1970), Johnson (1973), Glover (1973), Worthen (1968), Earl (1973), Khataea (1971), Gupta (1976), Aggarwal (1977), Singh (1978), Srivastava (1978) & Sharma (1980) emphasized the role of "Press" being the eminent feature of creativity.

Many psychologists considered the out come or product to be the most important aspect of the whole process of creativity. Rhodes (1961) & Guilford (1959) were also of the views who represented creativity in terms of novel and original products.

Freud, Adler, Abraham and Maslow gave their studies on creativity which represented creativity in different ways.

The definitions whether given in terms of person, product or environment indicate that creativity includes four things (i) Transcendence (ii) Originality (iii) Adaptability (iv) Realization.

- (i) Transcendence means that creative ideas must transcend or transform the generally accepted experience of man by introducing new principles that defy tradition and radically change man's views on things.
- (ii) Originality means that the production of an idea or an act that is novel or statistically infrequent.
- (iii) Adaptability refers to the beneficial change to meet the environmental demand, that is, response in order to be creative should be adaptive to or or reality. It must serve to solve a problem; fit a situation or accomplish recognizable goal.
- (iv) Realization refers to the sustenance and elaboration of the original ideas or an art.

To sum up it can be defined as the capacity to devise new ideas and see deeper meaning in objects, events, interpersonal relationships and symbolic materials.

### Recent views on creativity

Guilford (1967) has shown that the abilities of fluency and flexibility in thinking bear special relevance for creative thinking.

Torrance (1966) conceives creativity as "a process of being sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on: identifying the difficulty, searching for solutions, making guesses, or formulating hypothesis about the deficiencies testing and retesting these hypothesis and possibly modifying them and finally communicating the results".

Rasool (1977) has described that scientific researchers gave us an idea that all of us are born with creative potential and if given proper environment and techniques, this potential can be recognised, nurtured and measured. Thus creativity is not a monopoly of a few, if opportunities are given everyone has the potential to be creative in his own way.

Understandably, different people have used different terms to describe their ideas, but there is still a remarkable consistency among as to what general stages the creative process undergoes. Four stages have been identified in the creative process, as identified by Helmholtz.

- (i) Preparation:- This involves a concerned effort to solve a problem. Here the composer tries all combinations,

all directions known to him, and more often his efforts are not crowned with success, and out of sheer frustration he leaves the problem.

(ii) Incubation:- The problem has been left along and conscious thought is directed either at something else or nothing at all. This period may be variable length as the person turns to his everyday business.

(iii) Illumination:- Somehow from out of nowhere the correct answer or association or a whole groups of new ideas in a brief flash of insight.

(iv) Verification:- The new idea must be articulated, tested elaborated, and worked out in practice.

"Relevant studies in creativity" "Work done in Schools & high Schools"

1. Creativity & Intelligence:- Veiman (1975) conducted a study to examine the relationship of creativity to intelligence. It was found that only one measure of creativity and the performance IQ score yielded a significant correlation. This study was conducted on 35 girls of standard Vth & VIth.

Lohmann and Bredtstadler (1976) investigated relationship between factors of intelligence and creativity, derived from a factor analysis of 20 reference tests and from temperament traits (measured by 16 P.F.) using as subjects 266 high school



students 17-19 year old. Multiple correlation using the intelligence - creativity factor as criteria and 16 P.F. variables as predictors reached significant in 3 cases.

Phatak (1962) obtained significant correlation between creativity as measured by the Minnesota nonverbal tests and IQ as obtained on Draw-a-man scale.

Dutt (1973) conducted a study on 200 students of class X in Delhi, equally distributed between boys and girls. They found that 4 variables, intelligence, extraversion, neuroticism and creativity are almost normally distributed. High creative subjects need not necessarily be highly intelligent.

Sharma (1974) conducted a study with 414 males urban and rural graders. It was concluded that development of creative thinking.

Kumar and Raina (1976) studied on 96 Indian 9th graders. Results showed significant effect of creativity and intelligence on achievement motivation, but a non-significant creativity x intelligence interaction.

Hasan & Khan (1976) conducted a study on 100 male 7th and 8th graders (age 12-16 years). It was found that the intercorrelations among the three creativity scores were relatively higher than the correlation of anyone of them with intelligence.

Chadha & Sen (1981) conducted a study on 116 students of 12th from Delhi Higher Secondary School. Out of these, 61 were girls and rest boys. Result showed a significant difference between high creative & low creative boys as well as girls on intelligence. The product moment correlation was also found to be moderate and significantly positive.

Jawa (1975) conducted her study on 534 students of IX, X and XI grades. The results suggested that achievement motivation is positively related to creativity.

## 2. Creativity and personality:-

Raina (1968) investigated some of the personality correlates of creativity of Rajasthan students. He found significant differences of IQ between the two criterion groups (the high & low creatives). He also found a positive correlation but not significant relationship between creativity and intelligence.

Ahmad (1969) conducted a study on 150 girls reading in classes VI, VII and VIII. The obtained result indicated that the two groups did not differ significantly on any personality trait except dominance. The originals were more dominant than the unoriginals.

Pathak (1969) conducted a study on 200 students (100 girls and 100 boys) of class X from two school of New Delhi. She found no significant relationship between creativity and

extroversion (.08) but a positive relationship between creativity and introversion (.13).

Joshi (1973) conducted a study of creativity and personality traits of the intellectually gifted high school students of Gujarat state. There was positive and significant relationship between different creativity scores and different personality traits.

Jha (1974) studied the personality characteristics of 38 creative persons living in Western India. He found that the findings of his investigations are consistent with some of the conclusions arrived at by Maslow in his studies of creative personality.

Bhargava (1979) found that creativity is significant by related with anxiety, independence, education and occupation while alert poise, extroversion, family size are negatively related. Age and income showed no relationship with creativity.

### 3. Creativity and adjustment:-

Pareek (1966) investigated the relationship between creativity and personality adjustment problems; of randomly selected sixty boys and 60 girls from Schools in Sardarshar (India). The results clearly indicated that student who had scored more on creative thinking had lesser number of personality adjustment problems.

#### 4. Creativity and scholastic achievement:-

Paramesh (1973) studied 155 high school students of Madras city and found that there was no relationship between creativity and academic achievement as assessed by marks. Thus, this study has corroborated the contention of some investigators that the really creative will fail in the college and only less creative pupil succeed there.

Passi (1972) found some low relationship between creativity and achievement.

Goyal (1974) found no relationship of creativity with brightners.

Mehdi (1974) discussed the nature of divergent thinking and convergent thinking in relation to intelligence and school achievement. He found out that in real like situations those individuals who make creative contribution to society are not necessarily those who are high intelligent.

Chadha and Mehta (1982) conducted a study on 101 students of 12th grade under 10+2+3 system. They found positive and significant correlation between creativity and scholastic achievement.

#### Difference between Gifted Intelligent and Creative Child

In the words of Barbara Clark gifted and talented children are now referred to as "children who give evidence of high

performance capability in areas such as intellectual, creative, artistic, leadership capacity, or specific academic fields, and who require service or activities not ordinarily provided by the school in order to fully develop such capabilities."

She also describes giftedness and says that "Giftedness is a biologically rooted concept, a label for a high level of intelligence that results from the advanced and accelerated integration of functions within the brain, including physical sensing, emotions, cogution and intuition - such advanced and accelerated functions may be expressed through abilities such as those involved in cognition creativity, academic aptitude, leadership, or the visual and performing arts.

Intelligence in the words of Cattell (1971)," Intelligence is a composite or combination of human traits which includes a capacity for insight into complex relationships, all of the processes involved in abstract thinking, "adaptability in problems solving, and capacity to acquire new capacity. So it is evident by the above written description that giftedness is a higher form of intelligence which is nurtured by the environment.

Some have used creativity synonymously with giftedness; some have limited it to feelings and effective development. It seems in correct to use it in either of those ways, as it has none of the limitations of those concepts; creativity includes far more. It is the highest expression of giftedness.

The definition of giftedness used earlier aids in one's understanding of creativity. As giftedness is the result of total integrated functioning of the human brain, so creativity, the highest expression of giftedness, can be viewed from the biological brain base. All of the functions of human brain system are involved at higher and higher levels when creativity occurs.

Gowan (1981) discusses the relationship between giftedness and relationship between giftedness and creativity by first distinguishing between personal and cultural creativity. He believes that anyone can be taught personal creativity but that giftedness is necessary for cultural creativity, the form that produces major discoveries and ideas which significantly add to and inevitably change the future of human kind. He sees giftedness only as the potential for creativity.

If we believe that individuals come to us already gifted, that they were born that way, we will probably feel that we can do little to affect their development. We may believe that enrichment will be sufficient for people at this ability level to "get by on their own". If however, we consider giftedness as dynamic process in which a person's innate ability is in constant and continuous interaction with the environment, and if we believe that the strength of that interaction will determine

just how much ability this person will be able to develop. We will accomplish far more.

Creative development can be ensured if the dogmatic, authoritarian, restrictive and pedantic influences are removed from our schools. We have to strive towards providing our educational environment that frees our teachers from prejudice, fear of unknown complaining and ignorance. An educational system has to be created which develops individual initiative, a spirit of inquiry, a taste for exploration and distaste for finality, a fearlessness for venturing into new ideas of action and thought. If there is healthy interpersonal relations, where individuality and personal experiences and individual differences and views are respected, creative development is expected to flourish. If the individuals' imagination is given a scheme of free play, the foundation for the development of creative talent is paved. In such an environment creativity will take its own care.

This particular area in the field of social psychology became researcher's central concern because few studies have been done in the area of creativity in India. The studies which have been done are not sufficient enough to explore the complex phenomenon of creativity. To investigate deeply and understand fully the present researcher has made attempts in this direction.

Though psychologists over the world are curious to know more about creativity, few have done extensive investigation. To add more to their findings and knowledge on the subject of creativity the present researcher has discussed and developed a different pattern and way of understanding the same.



**CHAPTER 2**

**REVIEW OF LITERATURE**

## CHAPTER II

### Review of Literature

Although creative thinking is considered to be the highest of mental functions and creative production the peak of human achievement, it is peculiar that only within the past decade creativity has become more of a central concern in psychological research. In 1941 no mention was made of the concept: in 1950 "creative" was added to the higher mental processes but without further elaboration: in 1960 creative thinking appeared in a brief subsection of the article on higher mental processes.

An important feature of research literature in the fields of education and psychology during the past 25 years has been a dramatic rise in the number of titles devoted to creativity. Guilford (1950), during his famous 1950 presidential address to the American Psychological Association reported that upto that time, out of 1,21,000 topics listed in the psychological abstracts, only 186 dealt with the subjects of creativity. But 17 years after Guilford's address, Parnes & Brunelle (1967) reported about 1250 bibliographic entries to have appeared only in the proceeding 18 months. Stievaster (1971), published a bibliography of books on creativity and problem solving covering the publications from 1950 to 1970 which included nearly 1300 titles.

The present researcher seeks to present here studies which have proved to be of significance value in providing an understanding of the creative potential.

A. Kumar (1981) - Personality identification of high and low creatives at age 13 or older. It revealed that the high creative children were less anxious than their counter parts. The study further revealed that the high creative children were significantly more extroverted than the low creatives. The study also highlights the fact that creatives can be identified at 13 years or older on the basis of their personality traits of extroversion/introversion and anxiety.

Anxiety, boredom, avoidance and pleasure. The study revealed that low creative women recall feelings of anxiety more after than high creative women in every course except music education. This pattern points out the existent societal acceptance of women in teaching field. The author's previous study (1981) had shown no difference between the groups regarding their aspirations for music careers, but had given evidence that parents and teachers of low creative women were more likely to reinforce music education as a career. High creative women give evidence of using physical withdrawal from anxiety producing courses in order to maintain the self esteem necessary for creative growth.

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Studying the personality differences of groups defined on the basis of different criteria of creativity, confirmed that significant difference existed between persons chosen on the basis of different criteria of creativity. Creative actualizers were significantly more introversive in personal orientation than the high creative potential group on the other hand, the low creative potential group was just average on the extroversion-introversion dimension. In addition, both the creative actualizers and high creative potential persons proved to be more self actualized than the low creative potential group. The groups were not significantly different for the anxiety construct. The positive relationship between creativity and self actualization was also confirmed.

Studied sex differences in creativity pointed out that there was significant differences between male and female concerning verbal fluency, verbal flexibility and verbal transformation etc. The boys showed superiority even girls even though there was no difference between the groups on verbal originality. The girls scored significantly higher than the boys on nonverbal dimensions such as originality, complexity and productive designing ability.

In yet another study by Kumar was shown that the three interests felt - literary, scientific and fine arts - have positive effects on creating specifically, the high creatives had greater interest in the three areas than the low creatives.

Household and outdoor interest were found to be the cold affectors of creativity. The study also indicates their the differential patterns of interest of high and low creatives.

Saha (1981) showed that high creative students were more secure and mentally healthy than the low creative subjects. Further analysis revealed a relationship of - 0.85 between creativity and mental health. This relationship corroborated the earlier findings also. It may be inferred that there appear a high positive correlation between sense of security in individuals and creative expressions. Haley (1984) suggests that the level of development is perhaps a more significant determinant of creative response styles than socio-economic status. Furthermore, problem solving training, regardless of the specific approach, may provide the necessary experience to strengthen existing preferences for creative expression which are developmentally influenced. The results demonstrate that the culturally deprived group is enable to complete with non-deprived children in creativity. Lacking enriching experiences in their home environment (little attention given to art, a dearth of aesthetic stimuli, a relatively low language level), these children could not produce large number of ideas within a prescribed time (fluency) or detatch themselves from an idea, once they had hit on it. The main effect of both nutritional status and sex were statistically significant. It

revealed statistically significant difference in creativity between the normal and each of the three malnourished groups and the differences favoured the normal. The effect of age on creativity was positive for boys and negative for girls.

In another study by Singh and Farial (1985) the results revealed a significant superiority of first born students over the last born in fluency, in flexibility and in originality components of verbal creativity.

Richardson (1986) showed a significant difference in favour of the females beyond the .001 level. There was a large number of significant correlations relating to females when the relationship between sex of subject and performance on the creativity measures was examined.

Z. Zarengar (1981) The dimensionality of the construct of original thinking was examined by using measures designed to control both for the occurrence of confounding of the construct of originality by that of fluency and for task ambiguity. Subjects were 315 gifted children in the fourth, fifth and sixth grades. The results indicated that original thinking was conceptually distinct from general intelligence.

Serena Wade (1968) worked on differences between intelligence and creativity: some speculation on the role of environment. It was found out that although there is common ground between intelligence and creativity which ought not to be ignored in further creativity research, there is also some reason to suspect that creativity is fostered by a particular type of environment which has little effect on intelligence.

The correlation between intelligence and creativity can be easily attributed to the common factors involved; the remaining variance appears to depend on the psychological safety and freedom (to use Roget's Concepts) in which the child is encouraged to present himself as an independent individual. While the data are not definitive, they do provide some groundwork for further exploration into the nature-nurture question involving cognitive abilities. They cast some doubt on the assumption that any intellectual development is totally independent of psychological support in the home.

Torrance (1969) Tried to find out whether there was any difference concerning creativity scores in case of girls and boys. It was found out there sex difference was a significant feature while finding creativity and scores of boys and girls were different. J. Christie in 1970 worked on environmental factors in creativity. They tried to find out whether school environmental parental control patterns, the need to achieve, parental education and the home background of the person has any effect on one's creativity and they found out that there was. They said that the nurturant environment both at home and in school is one which gives a free reign and the ready response to the explorations of the child.

Julius O. Akinboye (1981): Patterns of creativity in budding engineers - Results generally indicated the the hierarchy of creativity behaviours manifested by the subjects. Creativity

motivation was observed to be basic to all other creativity dimensions. This was followed by fluency, originality and flexibility in that order. Thus: Motivation > Fluency > Originality > Flexibility.

Claudia Clague (1981) - Jweet: The effects of the implementation of creativity training in the elementary school social studies curriculum - The results were (1) student's creativity skills could be increased by either teaching method on the creativity subtests for fluency and originality (2) Social studies skills of students were significantly increased by the procedures which incorporated creativity training into the social studies curriculum (3) the nontreatment groups generated no significant changes in either social studies or creativity skills (4) There were no interactions detected between student sex or intelligence and teaching methods.

Gurpal Singh Jarial (1981): An experiment in the training of nonverbal creativity: The results reveal that training in the field of fluency, flexibility & originality can be one of the strategies to improve open the creative thinking abilities of school children.

John. Wiley Rhodes (1981):- Relationships between vividness of mental imagery and creative thinking - this study has shown that only one aspect of mental imagery, that of vividness yields a multiple correlation coefficient of .33 with total creativity as measured by Torrance just of creative thinking.



Conflict and artistic creativity:- By John. G. Young (1981)  
- The results reveal that conflict has a role in art for the artist as well as the audience. Creative solutions, rather than neurotic or psychotic ones, allow for expression and a form of mastery. Without sensitivity to conflict there can be no art.

Laura Hall Rose & Hsin - Tailin (1984) - A meta analysis of long term creativity training programmes: The overall results of this meta analysis suggest that training does effect creativity. Creative thinking is at once a skill that can be developed through various teaching methodologies and an innate ability that some individuals have in greater abundance than others. This dual nature of creativity is not a contradiction of human development but an affirmation of flexibility and malability of individual potential. Though education and training the innate creative thinking ability of individuals can be stimulated and nourished.

Carol Fasig & William D. Dawling (1984) : - Making career choices using problem solving - The results reveal that by the help of creative Action Book an insight to choosing one's career can be brought upon.

Jana U. Somers & Thomas D. Yawkey (1984):- Imaginery play companions; contributions of creative and intellectual abilities of young children - The results reveal that development of sensitivity, eloboration and originality are creative aspects

linked with imaginary play companions. These have the potential for increasing creative and intellectual thought in both school and home settings.

By Haurel E. Henegar (1984) - Nurturing the creative promise in gifted disadvantaged youth - The results reveal that small group interaction is very helpful for disadvantaged children where they function most productively. In small groups they showed less regressive behaviour, produced more imaginative ideas and exercised better judgement.

By Robert G. Harrington (1984) : - Effects of verbal self instruction on creative play in preschool aged children - It resulted that verbal self-instruction may be an effective method for facilitating certain aspects of creativity in young children's play. Furthermore, these results appear to be consistent with research by Luria which suggests that young children can control their own behaviour by means of oral directiveness to themselves.

Mainpulating of objects and creative problem solving:- by Marilyn E. Gootman & Doren R. Steg (1984) - The results suggest that manipulative solution seeking is an effective creative problem solving skill for older elementary children as well as for younger elementary children and should be encouraged in the class room.

Saramma J. Mathew (1984): A creative problem solving programme for emotionally handicapped children to reduce aggression - The findings indicated that creative problem solving was a significant by effective way, to increase total

creativity, fluency and originality, then by supporting the implementation of the programme. Results were non significant for flexibility support was also found that intervention reduced aggression significantly.

Scott G. Isaksen & Sidney J. Parnes (1985) - Curriculum planning for creative thinking and problem solving : The results show that creative problem solving is one potentially productive means to provide curricula for creative thinking and problem solving.

Lynn R. Buckmaster & Gary A. Davis (1985) - A measure of self actualization and its relationship to creativity - The results reveal that there is strong relationship between creativity and self actualization.

Ingrid Sladeczek and George Domino (1985) - creativity, sleep and primary process; thinking in dreams:- The results provide empirical support for a link between creativity and sleep-dreams both in college samples whose creative achievement is highly potential, as well as in a sample of adults where the criteria of creativity, while not rigorously defined, has met the crucible of real life achievements.

Robert Solomon (1985) : Creativity and Normal Narcissism - The results reveal that pathological narcissism incapacitates the therapists ability to creatively use his or her counter transference. Without normal narcissism or creativity in the therapist, the counter transference becomes a whirlpool and therapeutic progress is unlikely.

Georgianna M. Cornelins and Thomas D. Yawkey (1985)  
:Imaginativeness in preschoolers and single parent families -  
The results show that high oral imaginativeness in pre-school  
children is significantly associated with single parent families  
and suggests differences between single and dual families on  
observed imaginativeness of their children.

Lloyd D. Noppe (1985) - The relationship of formal thought  
and cognitive styles of creativity - This research identifies  
the attainment of formal operations mediated by a differentiated  
yet flexible cognitive style, to be the hallmark of creativity.

J Mark Jisone & Beth L. Wismar (1985):- Micro computers,  
how can they be used to enhance creative dev. - The results  
reveal that by developing courseware materials on the  
microcomputer, teachers will have more control over integrating  
them into the classroom environment. These programs will also  
facilitate, encourage and motivate students to take a more  
active role in their own creative development.

Monte Moses (1985) - Thinking and excellence in education:  
Pieces of the same puzzle:- This study concludes that a  
commitment to the development of the thinking processes of all  
students is the only sure way to achieve excellence in  
education.

Ruth E. Andersn, David S. Glenwick & Stephen R. Levin (1985) -Cognitive impulsivity and creativity in hearing impaired and monimparied elementary school children - The studies show that atleast for hearing children the training in cognitive flexibility, rather than in replacing an impulsive style with a reflective one, may be warranted in cognitive behaviour modification, programs.

Nano F. Farabough (1985) - Data revealed that psychiatric patients could learn to think more creatively as evidenced by their increase as t-scores in verbal and figural tests. The study further revealed that subjects most frequently increased verbal or figural flexibility scores.

S. Ribner and N. Bolnick (1985) - The effect of imbalanced states on the creative individual and process - The findings are consistent with the theories that consider creative individuals capable of to creating the tension of opposite values in their personalities and as responsive to them so as to engage in their encounter and effect a reconcilliation.

Training programmes for developing creativity in school children - By P.C. Katiyar & G.C. Jarial (1985) - This study indicated the possibilities of the development in students' verbal and non-verbal creative thinking abilities through deliberately designed training programmes and declared that the present strategy can prove helpful in this direction.

A. Jedrczak, T.M. Sidhi (1985) programme, pure consciousness, creativity and intelligence - It says that the transcendental meditation sidhi programme has an effect on creativity and intelligence independently of duration of practice of the T.M. technique.

D.H. Wells (1986) - Behavioural dimensions of creative responses. It says that through awareness and instruction (behavioural dimensions) creative potential can be increased.

Thomas D. Yawkey (1986) - Creative dialogue through sociodramatic play and its uses - The results show that creative dialogue is effective in promoting language for several reasons. It promotes role-playing and stresses motor actions in play enactments. It also emphasizes decentering abilities. Role playing, motor actions and decentration are keys to mental representation which links pretend play, creativity and language growth.

Louis Bachtold and Patricia Worley (1986) - Imagination, originality and temperament of preschool children - It said that temperament in general - the how of behaviour - bears little relationship to divergent thinking of pre-school children, and persistence accounts for only a portion of the variance in imagination and originality. Nonetheless, since persistence in preschool children can be perceived as a

noncomplaint behaviour in many situations, it is important that adults who interact with young children consider the potential role of perseverance in the development of reflectivity, imagery and innovative ideation.

R.C. Hooda and G.S. Jarial (1986): Effect of teaching through mastery learning strategy on the creativity of students - This shows that teaching through mastery learning helps improve the different dimensions of verbal and non-verbal creativity.

Berenice D. Bleedom (1983) : Creativity criminality and crossovers - This report and speculation is offered with the intention of developing awareness of crossovers between creativity and criminality, and of stimulating research and programming in creativity and problem solving both in prison populations as treatment and problem solving service, in school populations for "potential delinquents" as prevention of socially unacceptable creative behaviour.

John Hattie & Donald Fitzgerald (1983) - Do left handers tend to be more creative - The results show that there is no relationship between handedness and creativity.

Susan L. Trostle and Thomas D. Yawkey (1983) - Facilitating creative thought through object play in young children - It concludes that using objects to enhance a youngster's creativity results in his growth along several

important dimensions. The enhancement of imagination, adaptive thought, social skills, cognitive functioning and understanding of the external world of the young child are the paramount outcomes when the adult sensitivity adapts the environment to promote creative thought.

Sharon Golub & Karen Sorci Hahn (1983) - Training creative thinking in the open and traditional classroom - The results say that no significant differences were found between the traditional and open classroom control groups. However, there were significant differences between the control and experimental groups on all measures following exposure to training. More over the gains in creativity were significantly greater for the experimental subjects in the open classroom, supporting the view that with training the open classroom facilitates creative growth and expression.

N. Hota School Achievement and Persinality : A TAT study - The results indicated that significant positive relationship is found between school achievement and conflict level, self assertiveness and future outcomes of SS. A high degree of positive relationship was found between school achievement and self assertiveness in urban area children and aggressiveness and school achievement relationship in tribal area children. Boys and girls do differ significantly in their conflict and school achievement relationship. Besides high achievers and low achievers do differ - significantly in their personality traits except "affiliation" trait.



Ramalingam Balakrishnan and vedagiri Ganesan (1980) - creativity and job satisfaction - The results revealed that the high, moderate and low creatives do not differ significantly in their levels of job satisfaction with regard to each of their five motivators and five Hygies, as all the ratios were not significant. This revealed the fact that the creativity of these blue-collar workers has no effect on their job satisfaction.

Km. Beena Thandani (1983) - Creativity in relation to risk taking attitude - the result of this analysis shows that there are no significant relationships of fluency, flexibility and originality of verbal measures and collaboration by non-verbal measure of creativity with risk taking attitude. While originality verbal measure as creativity is significantly related with risk taking attitude.

E.Geeta and Sushila Shrivastava (1983) - The effect of birth order and sex on the creative ability of children - The study indicates that boys are more creative than girls and birth order does not have any bearing on creative ability of children.

A.K.Singh (1981) - A study of relationship of socio-economic status, sex and urban-rural background with creative thinking abilities of high school children. The results of the study were -

1. Socio-economic status has a definite effect on creative thinking abilities favouring the advantaged and average class children.

2. Irrespective of sex, socio-economic status has a significant impact over the creative thinking abilities of a child.
3. Socio-economic status has a marked impact over the creative thinking abilities among both the urban and rural children.
4. There is evidence of significant difference among the mean creativity scores of the advantaged urban, advantaged rural, average urban, average rural, disadvantaged urban and disadvantaged rural children.
5. Urban rural difference in respect of the mean creativity scores was greatest within advantaged children; insignificant within average children and insignificant within disadvantaged children.
6. There is evidence of significant difference among the creativity scores of urban children belonging to different social classes. A similar trend was found with rural children.
7. Urban children, in general, scored better than their rural counterparts in advantaged and average classes.

8. There is evidence of significant difference among the mean creativity scores of advantaged male, advantaged female, average male, average female, disadvantaged male and disadvantaged female children.
9. Within social classes (advantaged, average and disadvantaged) there is evidence of insignificant sex differences in respect of creativity scores.
10. There is evidence of significant difference in respect of creativity scores of male children belonging to different social classes. It was found that advantaged male children scored better than both average male and disadvantaged male groups. This was also true with female children.

In general an inconsistent pattern regarding the superiority of one sex over the other in respect of creativity scores.

P.C. Katiyar, G.S. Jarial and D.N.Sansanwal (1981) - A study of the effects of socio-economic status and sex on the enhancement of verbal creative thinking abilities through creative developing programme - The results indicated a significant effect of the programme in developing the verbal fluency, flexibility, originality and composite creativity. The students of low socio economic status scored significantly higher

than those of high socio economic status on the composite verbal creativity. The interaction among treatment, socio economic status and sex, and between treatment and socio economic status, effected significantly the students' gain on verbal flexibility and composite verbal creativity, respectively.

R.B.Singh and A.K.Singh - Personality and family syntality of high and low creative children - By this study following results emerge:-

1. The high creative group is significantly higher on the trait of premsia and has high strength of self sentiment. The high creative group has a stronger super ago strength and the children of this group possess high guild proneness. On the rest of the factors there is no significant difference between the high creative and low creative children.
2. The fathers of low creative children are less intelligent and possess concrete thinking as compared to the fathers of high creative children who are comparitively more intelligent & possess concrete abstract thinking. The fathers of low creative children are unsteady in purpose. They are often casual and lacking in efferts for group undertaking and cultural demands as compared to fathers of high creative children who tend to be exacting in character, dominated by sense of responsibility preserving,

responsible, plainful "fi the unfergiving minute". However the fathers of low creative children appear to be more excited in this study than those of high creative children.

3. The mothers of low creative children were found to be more assertive, independent minded, hard and tough than the mothers of high creative children. The mothers of low creative children are suspicious, self opiniated, and critical character than the mothers of high creative children.
4. There is no significant difference between parents of high & low creative children on affestationate - cold dimension. The main reason is that there is no deprevation suffered by the subjects on this attitude.

Bhoodev Singh - Change in some characterstics of behaviour and its effert on pupil creativity - Results showed that characterstics of teacher behaviour helps in developing creative potentials among children.

M.K.Sharma (1984) - Academic achievement of School students vis - a - vis their parents' education - The results rerealed the fast that parental education is highly associated with the academic achievement of their sons and daughters.

M.M.Patel & J.C.Parikh (1984) - A study of identification patterns and academic achievement of talented students - The results revealed that academic achievement varied directly as a

function of the degree of talent in both boys and girls and no significant relationship was found with identification patterns and academic achievement.

Garg A. Davis (1969) - Training Creativity in Adolescence : A discussion of strategy - The results show that his model "thinking creatively" : A guide to training imagination represents a new effort to combine the main components of the various strategies for stimulating creativity into a package which is both interesting and informative for adolescents. It attempts to increase students' awareness of and appreciation for novel ideas, to teach techniques for producing new idea combinations, to provide exercise for some creative abilities and through humour, to create a free atmosphere encouraging spontaneity and imagination.

Harold K. Hughes (1969) - The enhancement of creativity - The results revealed that the ideal collegiate climate for the development of future creative scientists include the following features: a moderate reliance on rote memory, a variety of teaching methods, materials, topics and out of class experiences, formal course requirements in non-science areas; and self directed education. The existence of this climate implies a staff capable of its creation or, in other words, a staff of human beings sensitive to the needs of other human beings.

Creative development in school children by Dibakar Kundu (1985) - It says that a student not only needs education but on the other hand also seeks creative education. According to Kundu talented students should be spotted out earlier and trained so that countries developing needs for future years are met.

R.P. Singh (1987) Department of Education, RBS College, Agra - Teacher's role in promotion of creative talent - The study reveals the fact that teacher plays key role in promoting creative talents in students and it is the school climate which improves upon one's aptitude towards being original and innovative.

Bleadorn Bernice D (1988) - Creativity: Number one leadership talent for global future - Results revealed that there is eminent need for creativity in future leadership.

Burus, Mary T(1986) - Musical creative learning and problem solving - Discusses the use of structured classroom musical creativity exercises as means of improving children's problem solving abilities regarding divergent functioning, and complex thinking and feeling.

Roach, Ben (1986) - Developing creative potential in MBA students - Describes an alternative pedagogical approach and resulting effective course in institution and creativity offered as part of the MBA curriculum in business administration.

W

Long, Shirley and Hiebert (1985) - Effect of awareness and practice in mental imagery on creative writing of gifted children - Explored the relationship between mental imagery and the ability to write creatively and originally using 43 gifted children in grades 3 - 6. Nineteen samples were in an experimental group and 24 in a control group. Guided instruction in imagery improved the quantity and quality of writing of the samples.

Sherill and Claudine (1986) - Fostering creativity in handicapped children - Results revealed that through modelling, specific teaching behaviour, dance and other methods creativity can be improved in these children.

Dr D. Pestonjee and Dr. S.H. Usmani (1982) - Creativity in relation to alienation ego strength and intelligence - The results revealed that intelligence and ego-strength are the important determinants of creativity. It also said that there is weak negative relationship between alienation and creativity.



Khire (1976) conducted a study on 9-17 year high school students. Results show that (1) There was significant correlation between school grades and "Advanced Progression Matrices" scores, (2) correlation between APM scores and creativity over a wider range of intelligence were significant but low and (3) the effect of social status was positive.

Raina (1970) in his study on teachers under training found that the high creative students as compared to low creative were significantly higher on creative motivation. The low creative groups was significantly higher on critical motivation. No difference was seen on power motivation.

Singh (1972) studied 239 students out of which 131 were boys and 108 girls. The analysis of high and low creative boys as well as high and low creative girls indicated no statistically significant difference between the high & low creative groups of each sex, though high creative groups had somewhat higher achievement motivation. Comparison between high creative boys and girls revealed no statistically different between each of the groups, but the boys tended to have higher need for achievement.

Goyal (1969) made a study of some personality traits of creative children at the middle school stage of Patiala District in Punjab. He concluded that creative pupils at the middle

school stage possessed a higher level of energy, rejected repression and suppression for the control of impulses, were more of introverts, were more independent in both thought and action, had open minds, could tolerate ambiguity and entertained opposing values.

Gakhar (1975) explored the intellectual and personality correlates of creativity. The results show that both creativity and intelligence are two distinguishable modes of the same intellectual functioning yet at the same time they are not distinctly independent of each other. The two criterion groups are found to be significantly differing on personality traits of self acceptance and self sufficiency. The measure of creativity, intelligence and personality cluster together in specific combinations yielding though in a restricted manner.

Mallappa and Upadhyay (1977) compared the personality of high creative person with that of low creative persons in an attempt to determine personality correlates of creativity. Findings show the high creative differed from the low creatives in personality, although both groups had a nearly average personality pattern. High creatives were more intelligent, more socially bold, were less tense, and had a stronger self sentiment than the creative subjects.

Singh (1977) studied creativity as related to intelligence, achievement and security - ensecurity. 14-16 year old high school students who were 80 in number were the samples. Resultsshow significant correlation between creativity and intelligence, creativity and achievement and intelligence and achivement.

Badrinath and Satyanarayan (1978) studied a few correlates such as age, sex, religion, birth order, mother tongue, scholastic achievement. Samples were 9th standard students of Kendriya Vidyalaya (114 stuedents) of Bangalore. Scholastic achievement was found to be not influencing the creative thinking as there was no significant difference in conclusion.

The above written studies clearly indicate that though many studies have been done on reativity, few have been done in the field where creativity is been studied in connection with personality factors, academic achievemnt and psychosocial factors. The studies have been done either on school children, handicapped children, gifted children, high IQ children or other higher education areas but not on IIT students. After analysing the above written facts the present researcher had to decide for this particular area where new findings could be revealed, and some new dimensions could be explored.

## CHAPTER 3

### METHODOLOGY

## CHAPTER III

### METHODOLOGY

To create is to produce something new and original which is away from traditional and the thinking which involves this act is creativity. Creativity can be seen in many ways like scientific creativity, artistic creativity, poetical creativity etc. etc. In this era of the world scientists and researchers have been realizing that creativity is of great importance, which is needed to modify the world and to improve the situations of life and make the life more easy and comfortable. Unless there is creativity, there will be no innovations and new discoveries. However intelligent one may be he/she cannot innovate unless they are also creative. It is well known that students who join IIT are supposed to be the cream of India. When it concerns mental ability, talent and academic advancement. While being toppers do they possess in general certain creative ability in them? Can they innovate and create something new? If one finds high level of creativity in quite a number of IIT students, would their family background, socio-demographic features and socio-economic factors will vary from those who have lower or nil level of creativity? Is it possible to identify creativity in these students so that they could be

directed towards innovations and new discoveries in the areas in which they have shown the same? These are the issues which are being attempted to be handled in this research endeavour.

Objectives of the Study -

1. To find out the creativity level of IIT students and to ascertain if the same varies amongst them.
2. To find out if there is any variation in the parental background of high and low creative students.
3. To find out if the extroversion - introversion dimension amongst IIT students vary and also to ascertain if these personality factors are in anyway related to the students level of creativity and parental background.
4. To find out if the level of academic achievement amongst IIT students vary and to ascertain if the same is in anyway associated with their parental background, their creativity level and socio-economic factors.

Hypothesis - on the basis of the above objectives certain hypothesis were laid down:

1. Hypthesis 1 - The high creative students may vary from that of low creative students in regard to their parental background.

2. Hypthesis 2 - There may be a correlation between creativity and the personality traits (extroversion - introversion dimension) creativity and academic achievement and academic achievement vs. personality factors of IIT students.
3. Hypothesis 3 - The personality traits (extroversion - introversion) may vary in terms of the background of parents.
4. Hypothesis 4 - The academic achievement may vary amongst IIT students, in terms of their creativity level, differential parental background and socio-economic status.

#### Research Design -

To put the above hypothesis to empirical testing the creative index for each student was computed according to the norms of torrance creativity test. The mean creativity index as (CI = 118) given by torrance was taken to indicate the average level of creativity and the students who scored above or below this score were considered as high or low creative respectively. Thus there were in all 57 high creative and 93 low creative students. These two groups were then compared for the different variables, such as parental background, socio-economic status, personality traits and academic achievement, to ascertain if the two groups in anyway differed from each other on the factors.

### The Sample -

The sample for the study was selected from the Indian Institute of Technology, Delhi, as it is generally held that the students getting admission to IIT are generally very bright and those who pass out to quite an extent migrate to highly developed countries for further studies and take up jobs in highly esteemed institutions there etc. To ascertain if all students who enter IIT are also creative, and if so could we do something to make use of their creative and innovative talents, was the main question that led to taking IIT students as samples of the study. The students were chosen from IIIrd and IVth year as the motivational level will be more or less the same in these 2 years of study as they are considered highly crucial years for employment prospects. Then 75 students each from IIIrd and IVth year were taken.

### The Sitting -

The sitting was again IIT premises but generally the hostel as students were generally very busy during the day time attending to their course work, lectures and practicals. The atmosphere thus was relaxed and the students were able to respond to all the questions and questionnaires cooperatively and without hesitation.



#### Procedure -

To ascertain the creativity level of the chosen 150 students Torrance Test of Creativity Figural Part A was used.

To find out their personality trait Neymann and Kholstads' Extroversion - Intraversion test was used.

The third variable which taken for this study was socio-demographic background. To ascertain this, a questionnaire was designed which had in all 44 questions covering information regarding students' parental background, their participation in creative activities etc.

The fourth variable was academic achievement and this was ascertained by taking the marks obtained by them from the academic records kept at IIT.

#### Tools -

Torrance Test of Creativity Figural Part A consisted of three activities each given a time span of ten minutes for completion. The first one was "Picture Construction activity. In this activity an oral figure was given to the sample and he/she was supposed to add anything by help of drawing to that figure to make it meaningful. An appropriate title was to be given to it and one short story was to be written about that figure; the second activity was "Picture Completion". In this

many incomplete figures were given and one was supposed to complete them according to one's imaginations and write short titles below them and continue one story or one theme; the third activity was "Lines". In this many pairs of lines were given and one was supposed to make meaningful pictures out of those lines and write titles. These three activities were conducted in 30 minutes time. For the scoring of this creativity test Torrance Manual for scoring Test A was used. Scores were given on fluency, originality, abstractness or title, elaboration, resistance to premature closure in concern to creative ability. After adding up these scores, the raw scores were taken from the manual and summed up. To measure the creative strengths either + or ++ were given according to the occurrence of these strengths namely emotional expressiveness, storeytelling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines, unusual visualization, internal visualization, extending or breaking boundaries, humour, richness of imaginery, colourfulness of imaginary and fantasy. Lastly the scores of creative ability and creative strengths were added up to find out the creative index. Students who acquired more than 118 scores were considered high creative and students getting less than this were considered low creative students.

To find out the personality factor Neymann Kholstad Test Extroversion - Intraversion test was used. This test constituted of 50 questions which had yes/no answers. For each question one was supposed to either tick on Yes or No. After the test was completed the total number of Yes or No answers were calculated. Yes answers were considered as positive numbers and No answers as negative answers. Positive and Negative numbers were put together and then final score was found out. If positive score came as final score student was considered extrovert, if it came negative he was introvert and for a zero (0) answer he was considered an ambivert.

The questionnaire which was made to acquire information regarding parental background gave information regarding parents income, their education, their participation in creative activities, their social life, their choice of books, their professional qualification and how their responsibility of encouraging the children to participate in creative activities was fulfilled. It also had questions which gathered information regarding the student himself like his way of thinking, the way he solves the problems, his social participation, his ordinal position, his interest of going to the libraries, his interest of participating in creative activities, extra-curricular activities and games etc. After getting this filled up by all of them tables were made to differentiate between the parents of high and low creative students between extroverts and introverts and between high and low academic achievers.

To find out the academic achievement academic records were checked. The students were divided into two groups; high and low academic achievers. Those who get more than 65% were considered as high achievers and those who got less than 65 were considered low achievers.

#### Statistical Analysis -

After making tables for high and low creative students.  $\chi^2$  (Chi-square) value was calculated and it was found out whether these two groups significantly differed concerning their parental background. To calculate the  $\chi^2$  following formula was used -

$$\chi^2 = \frac{(f_o - f_e)^2}{f_e}$$

To find out the difference between high and low academic achievers again  $\chi^2$  was calculated. For those questions where the values did not come significant, a graphical representation was done and bar diagrams were made.

Lastly for extrovert, introvert and ambiverts bar diagrams were made and they were compared among themselves and it was found out whether these three differed concerning their parental background and their upbringing. T value was calculated to see this difference. Formula used was -

$$t = \frac{D}{D} \quad \text{where} \quad D = \frac{SD_1}{N_1} + \frac{SD_2}{N_2}$$

$$\text{and } D = N_1 - N_2$$

It was also desired whether there was any correlation between creativity and other variable coefficient of correlation was used and "r" was calculated between (1) creativity and academic achievement (2) creativity and extroversion - intraversion (3) Academic achievement and extroversion - intraversion.

The formula used to calculate "r" was -

$$r = \frac{E_{xy} - N \times \text{Mean } x \times \text{Mean } y}{\sqrt{E_{x^2} - N \times (\text{Mean } x)^2 \times E_{y^2} - N \times (\text{Mean } y)^2}}$$

Where Mean x =  $E_x/N$

Mean y =  $E_y/N$

After calculating the correlation partial correlation was also used to find out whether these correlations remained the same or changed after controlling another corresponding variable. For this following formula was used -

$$r_{1.2} = \text{CR \& ACA.ACH} \quad r_{13} = \text{ACA.ACH \& EXT}$$

$$r_{2.3} = \text{CR. \& EXT.INT.}$$

So

$$r_{12.3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{1 - r_{13}^2} \cdot \sqrt{1 - r_{23}^2}}$$

The preceding chapter presents data analysis in detail.

**CHAPTER 4**  
**RESULT & ANALYSIS**

## CREATIVE STUDENTS AND PARENTAL BACKGROUND

An attempt has been made to ascertain if creative students differ from their non-creative counterparts in regard to the background factors of their parents. This aspect includes income of parents, education and profession, qualifications, their interest, interaction in the society, creative features and various aspects related to their behaviours at home and outside as well as towards their own words.

(1) In regard to parental income following results emerge:

TABLE - 1

### Income of Parents

Income Group	High Creative		Low Creative		Total
	No.	%	No.	%	
High (A)	33	57.8	47	50.5	80
Higher Middle (B)	13	22.8	19	20.4	32
Middle (C)	7	12.2	24	25.8	31
Lower Middle (D)	3	5.26	1	1.07	4
Low (E)	1	1.75	1	1.07	2
Total	57		93		150

$$\chi^2 = 5.97 \quad \text{NS}$$

$$\text{df} = 4, \quad P < .05$$

Out of 150 students (75 IV 4R & 75 III 4R) taken for the study, nearly 53% were from high income group, 21% from higher middle income group, 21% from middle income group, negligible percentage of lower middle and lower income group. When creative and non-creative students are compared on this fact, it is seen from the table above that there was no significant difference between the creative and non-creative students in regard to the income factor. However, it is interesting to note that nearly three-fourth of the IIT students were from high and higher-middle income group. Negligible percent were from lower and lower-middle income categories. Within this broad general trend, it is observed that relatively larger percentage of low creative students were from higher income group than the high creative students.

(2) Education of Parents

An attempt was made to ascertain if the education level of the parent in any differed between the high creative and low creative students table below presents those results



TABLE - 2

Education of Parents

Education	FATHER						MOTHER					
	A	High Creative		Low Creative		Total	B	High Creative		Low Creative		Total
		No.	%	No.	%			No.	%	No.	%	
Post-Graduate	8	14.0	16	17.2	24	7	12.2	17	18.2	24		
Guaduate	25	43.8	39	41.9	64	19	33.3	40	43.0	59		
upto 12th	15	26.3	26	27.9	41	24	42.1	23	24.7	47		
upto 8th	9	15.7	12	12.9	21	7	12.2	13	13.9	20		
Total	57		93		150	57		93		150		
	$\chi^2 = 5.97$ NS						$\chi^2 = 5.08$ NS					
	df = 3						df = 3					

From Table-2 following inferences could be drawn

- (i) Only about 16% of the parents (both father and mother) of the IIT student sample of this study belong to higher secondary education, where as 40% of them are atleast graduates. Almost 30% were post graduates and only 14% of the parents are above post graduation.
- (ii) Within the above broad trend it is interesting to note that relatively more mothers of the students have the educational qualification till post-graduation and above as compared to the fathers of the students.

(iii) No significant difference was found in case of parents of high and low creative students. But more of high creative students have parents having education till post-graduation and above in comparison to parents of low creative students.

(3) Professional Qualification of Parents

TABLE - 3

<u>Professional Qualification of Parents</u>										
	FATHER					MOTHER				
	High Creative No.	High Creative %	Low Creative No.	Low Creative %	Total	High Creative No.	High Creative %	Low Creative No.	Low Creative %	Total
Prof. quali- fication & job	30	52.6	37	38.1	67	12	21.0	27	29.0	49
Prof. qual. & sli. lower job	17	29.8	27	27.8	44	19	33.3	18	19.3	37
Prof. qual. & lower job	6	10.5	12	12.3	18	4	7.0	12	12.9	16
Others	4	7.0	17	17.5	21	22	38.5	36	38.7	58
Total	57		93		150	57		93		150
	$\chi^2 = 4.70$					$\chi^2 = 6.50$				
	df = 2					df = 2				

- (i) It is seen that only 1/8th of the total IIT students were offsprings of those fathers who were at lower jobs with no professional qualification where as 3/4th of the fathers were at higher jobs and had professional qualification such as doctors, engineers, professors etc.
- (ii) When it concerned the mothers, more than half of them were at higher jobs and had professional qualification and only 1/10th had no professional qualification and were also at lower jobs. The remaining 40% though did not have professional qualification they however were in jobs such as businessmen etc.
- (iii) When father and mother of IIT students were compared, more fathers were found to be having professional qualification and were at higher jobs in comparison to mothers.
- (iv) No significant difference was found between high and low creative students. But more of high creative students had fathers with professional qualification and higher job in comparison to father of low creative students.
- (v) An interesting trend was noted that more mothers of low creative students were professionally qualified in comparison to mothers of high creative students.

(4) Participation of Parents in Creative Activities

TABLE - 4

Participation of Parents in Creative Activities

Area of Activities	FATHER				Total	MOTHER				Total
	High Creative No.	High Creative %	Low Creative No.	Low Creative %		High Creative No.	High Creative %	Low Creative No.	Low Creative %	
Painting, Sketching, Design	31	61.4	26	27.9	57	26	45.6	23	24.7	49
Writing & Poetical	14	24.5	21	22.5	35	9	15.7	13	13.9	22
Dance, Drama Musical	34	59.6	31	33.3	65	31	54.3	45	48.3	76
None	8	14.0	29	31.0	37	14	24.5	28	30.1	42
Any other	5	8.7	2	2.1	7	4	7.1	4	4.3	8
Total	57		93		150	57		93		150
	$\chi^2 = 19.69$					$\chi^2 = 5.77$				
	df = 4					df = 4				

(i) It is found out nearly 3/4 of fathers of IIT students indulged in creative activities and only 1/4 of them did not indulge in creative activities. Similar was found for mothers.

(ii) In case of high and low creative students significant difference was found. Much more fathers of high creative students indulged in creative activities like painting, sketching, music, designing, writing, poetical, dance, drama and poetical.

(iii) When it concerned their unparticipation in creative activities, it was found significantly high in case of fathers of low creative students. Similar results were found in case of mothers also and their indulgence in creative activities.

(5) Rewards in Creative Activities

TABLE - 5

Rewards in Creative Activities

Creative Activities	FATHER				Total	MOTHER				
	High Creative No.	Low Creative No.	High Creative %	Low Creative %		High Creative No.	Low Creative No.	High Creative %	Low Creative %	
Fame	8	2	4.0	2.1	10	4	2	1.0	2.0	6
Gr. Deg.	2	9	3.0	10.0	11	0	5	0.0	-	5
PG Deg.	2	8	4.0	8.0	10	0	11	0.0	-	11
Certificate	12	13	20.0	14.0	25	11	10	20.0	10.0	21
Awards	4	10	7.0	10.0	14	8	6	14.0	6.0	14
None	30	60	50.0	66.0	90	26	67	50.0	70.0	93
Total	57	93			150	57	93			150

$\chi^2 = 12.96$

df = 5

$\chi^2 = 25.96$

df = 5

- (i) Most of the fathers 60% as well as mothers had not acquired either of the things such as awards, certificates, degree or fame in creative activities.
- (ii) It is interesting to find that in both parents the acquired thing was certificates which shows their indulgence in creative activity actively.
- (iii) In case of fathers of low creative students, it was found out that much more number of fathers did not acquire either of those rewards in creative activities. Similar was found in case of mothers also.
- (iv) Significant difference was found in case of acquiring fame and certificates by fathers. Fathers of high creative students acquired it in much more percentage than fathers of low creative.
- (v) In case of mothers of students much more difference was found and it was much high in case of fame, certificates and awards. It was acquired in much more percentage by mothers of high creative students.

(6) Parents Choice of Books

TABLE - 6

Parents Choice of Books

Books	FATHER				MOTHER					
	High Creative No.	%	Low Creative No.	%	Total	High Creative No.	%	Low Creative No.	%	Total
Fiction	16	28.0	18	19.3	34	16	28.0	15	16.1	31
Literary	17	29.8	22	23.6	39	13	22.8	18	19.3	31
Scientific	8	14.0	8	8.6	16	5	8.7	5	5.3	10
Creative ideas	11	19.2	6	6.9	17	9	15.7	7	7.5	16
Technical	12	21.0	10	10.7	22	7	12.2	7	7.5	14
Nothing Spl.	21	36.8	44	47.3	65	28	49.0	49	52.6	77
Total	57		93		150	57		93		150

$$\chi^2 = 7.70$$

$$df = 5$$

$$\chi^2 = 6.40$$

$$df = 5$$

- (i) By the data we find that almost 50% of the both father and mother were not specific about the books they read.
- (ii) Among fathers and mothers both most of them indulged reading literary and fiction books in comparison with other kind of books.
- (iii) In case of high and low creative student, fathers much more fathers of low creative were unspecific about their books than high creative fathers. Similar was found for mothers also.

(iv) Significant difference was found in case of reading habits of parents their choice of books. Parents of high creative students showed much more interest and indulgence in reading books all kinds like fiction, literature, science, creative ideas and technical.

(7) Membership of Libraries

TABLE - 7

Membership of Libraries

Libraries	FATHER					MOTHER				
	High Creative		Low Creative		Total	High Creative		Low Creative		Total
	No.	%	No.	%		No.	%	No.	%	
Inter. Forum	7	12.2	6	6.4	13	7	12.2	5	5.3	12
Own instt. Library	12	21.0	24	25.8	36	11	11.8	12	12.9	23
Many others	10	3.0	6	6.4	16	8	14.0	5	5.3	13
No membership	17	29.0	22	23.6	39	16	28.0	21	22.5	37
Not interest in reading	15	26.3	30	32.2	45	16	28.0	32	34.4	48
Total	57		93		150	57		93		150

$\chi^2 = 8.40$

df = 4

$\chi^2 = 6.82$

df = 4

(i) Almost 50% of the parents were found interested in reading and were also keen in going to the libraries where the other 1/2 were not interested in either of the two.



- (ii) It was interesting to note that parents of high creative students were found to be members of international forums in much higher rate than parents of low creative students.
- (iii) When it concerned the parents being only limited to being the member of their own institute library, it was more in case of parents of low creative students.
- (iv) When it concerned the mothers of students, the mothers of high creative students were the members of many libraries in a much higher rate than the mothers of low creative students.

(8) Choice of Journals - Table below shows the choice of journals in case of parents of high and low creative students.

TABLE - 8

Choice of Journals

Books and Journals	FATHER					MOTHER				
	High Creative No.	%	Low Creative No.	%	Total	High Creative No.	%	Low Creative No.	%	Total
Science	13	22.8	14	15.0	23	7	12.2	8	8.6	15
Music	2	3.5	2	2.1	4	1	1.75	4	4.3	5
Maths	4	7.0	2	2.1	6	2	3.5	3	3.2	5
Quiz	1	1.7	1	1.0	2	3	5.2	2	2.1	5
G.K.	19	33.0	26	27.9	45	18	31.5	23	24.7	41
Any other	3	5.2	3	3.2	6	3	5.2	3	3.2	6
Total	57		93		150	57		93		150

$\chi^2 = 9.38$

$\chi^2 = 4.00$

(i) It was found out that almost 1/3rd of the parents indulged in reading books and journals on general knowledge.

(ii) No significant difference was found out while differentiating between high and low creative students. It was found out that parents of high creative children were highly interested in reading books and journals on science, music, maths, quiz, G.K. etc. The rate of parents indulging in reading these many books and journals was low in case of parents of low creative students.

(9) Social Activities and Social Life of Parents - Four categories were made in question 9 to know about parents involvement in social activities. First category was for parents who were social and had many friends, second where they are very social and have unlimited friends, third for they being moderately social and having few friends and fourth being very unsocial category where they would not like to participate in social activities. The table below will give the exact picture.

TABLE - 9

Social Activities and Social Life of Parents

	FATHER					MOTHER				
	High Creative		Low Creative		Total	High Creative		Low Creative		Total
	No.	%	No.	%		No.	%	No.	%	
Social	36	63.1	51	54.8	97	35	61.4	50	53.7	85
Very Social	3	0.27	6	6.45	9	3	0.27	4	4.3	7
Moderate	18	31.5	31	33.3	49	20	35.0	34	36.5	54
Unsocial	0	0	0	0	0	0	0	0	0	0
Total	57		93		150	57		93		150
	$\chi^2 = 14.96$					$\chi^2 = 0.428$				
	df = 2					df = 2				

- (i) By the study it was found out that almost 2/3rd parents of the total students were social and indulged in social activities where as rest 1/3 came under the category of either very social and moderately social. None of the parents were unsocial.
- (ii) Parents of high creative students showed more being social than parents of low creative students.
- (iii) Significant difference was found in case of fathers of high and low creative students. More fathers of high creative students were interested in indulging in social activities in comparison to fathers of low creative students.

(iv) It was interesting to note that low creative students had much more parents being very social and moderately social and comparison to high creative people.

(10) Friends of Parents Participating in Creative Activities -

A separate table is made to find out about the friends of parents and their participation in creative activities -

TABLE - 10

Friends of Parents Participating in Creative Activities

Creative activities of friends	FATHER				MOTHER					
	High Creative No.	Low Creative %	High Creative No.	Low Creative %	High Creative No.	Low Creative %	High Creative No.	Low Creative %		
Participate in cr. act.	2	0.12	6	6.45	8	2	0.12	5	5.37	7
Never	5	8.77	11	11.8	16	3	5.2	10	10.7	13
Some of them don't	50	87.7	76	81.7	126	52	91.2	87	93.5	139
Total	57		93		150	57		93		150

$\chi^2 = 1.00$

df = 2

$\chi^2 = 8.30$

df = 2

(i) More than 75% of the parents had friends with mixed attitudes towards indulging in creative activities and it showed that some of the friends do participate in such activities and some of them don't.

- (ii) Very few parents had friends who participate in creative activities and it was interesting to note that more parents of low creative students had such friends.
- (iii) Significant difference was found between high and low creative students concerning the parents having friends who never participate in creative activities. High rate of such friends was found in case of parents of low creative students in comparison to parents of high creative students.

(11) Responsibility of Parents for Encouraging Children to Participate in Creative Activities - It was desired to know whether children were sent to experts, whether parents took personal interest or by both these they fulfilled their responsibility.

TABLE - 11

Responsibility of Parents for Encouraging Children to participate in Creative Activities

	High Creative		Low Creative		Total
	No.	%	No.	%	
Sending Children to experts	8	1.96	12	12.9	20
Taking personal initiative	17	29.8	21	22.5	38
Both	17	29.8	21	22.5	38
None	17	29.8	30	32.2	47
Total	57		93		150

$$\chi^2 = 1.99 \quad \text{NS} \quad \text{df} = 3$$

- (i) Almost 2/3rd of the parents of both high and low creative students sent their children to experts and also took personal initiative in fostering creative ideas.
- (ii) No significant difference was found in case of taking personal initiative. More parents were found taking personal initiative in case of high creative students in comparison to low creative students.

(12) Adoptation of Bringing up Technique - Parents adopt either of the techniques for bringing up their children such as authoritarian, democratic or permissive. Table below shows the difference between parents of high and low creative and the technique they adopted for bring up.

TABLE - 12

Adoptation of Bring up Techniques

Attention of Parents	High Creative		Low Creative		Total
	No.	%	No.	%	
Authoritarian	6	10.5	7	7.52	13
Democratic	33	57.8	52	55.90	85
Permissive	22	38.5	36	38.7	58
Total	57		93		150

$$\chi^2 = 0.36911 \quad df = 2$$

- (i) More than 50% of the parents belonged to democratic type and rest came under the categories of authoritarian and permissive. But only 8% of the total parents came under authoritarian category.
- (ii) In case of high and low creative students were in high percentage adopting democratic techniques of upbringing.

(iii) Authoritarian parents were also found more in case of high creative students.

(13) Ordinal Position of Students - Whether the creative ability of a student were in anyway related to his being at particular ordinal position, it was desirable to know that and the table below shows this -

TABLE - 13

Ordinal Position of Students

Ordinal position	High Creative No.	%	Low Creative No.	%	Total
Eldest	13	22.8	31	33.3	44
Middle	16	28.0	25	26.8	41
Youngest	27	22.4	37	39.7	64
Total	57		93		150

$\chi^2 = 1.86$  NS df = 2

(i) Nearly 1/2 of total students came under the category of being youngest. Rest 1/2 was constituted by both eldest and middle ordinal position categories.

(ii) No significant difference were found out between high and low creative students.



(14) Parents Attitude at Particular Ordinal Position - It became desirable to find out parents attitude towards the students they being at particular ordinal position -

TABLE - 14

Parents Attitude at Particular Ordinal Position

Parent's attitude for that Ordinal Position	High Creative No.	High Creative %	Low Creative No.	Low Creative %	Total
Favourable	52	91.2	31	33.3	83
Moderate	11	19.2	6	6.45	17
Unfair	1	1.75	2	2.15	3
Equal treatment to all	28	49.1	48	51.6	76
Only children	3	5.2	4	4.3	7
Total	57		93		150

$\chi^2 = 26.52$        $df = 4$

- (i) More than 50% of the students came under the category of having parents with favourable attitudes towards their particular ordinal position in the family.
- (ii) Negligible parents adopted unfavourable attitude both in case of high and low creative students.

- (iii) Significant difference was found in case of parental attitude in case of high and low creative students. Much more parents adopted favourable attitude towards their children irrespective of their ordinal position in case of high creative students in comparison of low creative students.
- (iv) When it concerned their attitude being moderate mere of parents of high creative students showed it in comparison to low creative.
- (v) The treatment being equal to all the sibling was observed then it was found almost same in case of high and low creative students.
- (vi) Very few children came under the category of only child in the house and the percentage was almost same in case of high and low creative students.

(15) Expressiveness on part of Parents - Some parents are expressive and some are not capable of doing so. The study needed this aspect also to be known and find out whether the parents of high and low creative students differed in anyway regarding this -

TABLE - 15

Expressiveness on part of Parents

Expression	High Creative		Low Creative		Total
	No.	%	No.	%	
Both	34	59.6	53	66.9	87
Father	3	5.26	6	6.4	9
Mother	14	24.5	26	27.9	40
None	5	8.7	10	10.7	15
No comm.	0	0	0	0	0
Total	57		93		150

$$\chi^2 = 0.37$$

$$df = 4$$

(i) It was found out by the study that more than 50% of the parents were expressive and generally communicate with their children.

(16) Decision Making in Case of Parents - Each house has different way of functioning and at different places different people are decision makers. It was interesting to find out whether the decisions of the house were taken by father or mother and whether this particular aspect differed in case of high or low -

TABLE - 16

Decision Making in case of Parents

Decision making	High Creative		Low Creative		Total
	No.	%	No.	%	
Father	13	22.8	18	19.3	31
Mother	3	5.26	0	0	3
Both	25	43.8	44	47.3	69
Consultation with Children	16	28.0	35	37.6	51
Total	57		93		150

$$\chi^2 = 4.23$$

$$df = 3$$

- (i) Almost 50% of the decisions of the house were taken by both the parents mother as well as father both in case of high and low creative students.
- (ii) Almost negligible decisions were taken by mothers in the family whether the child is high or low creative. But still the percentage was much more in case of mothers of high creative students.
- (iii) No significant difference was found among fathers of high and low creative students. More decisions were taken by fathers in case of high creative students.

(17) Responsibility of House being Accomplished by whom - It was desired to know whether the responsibility of household was accomplished by father, mother or servants -

TABLE - 17

Responsibility of house being Accomplished by whom

Responsibilities	High Creative		Low Creative		Total
	No.	%	No.	%	
Mother	11	19.2	25	26.8	36
Both	26	45.6	34	36.5	60
Servants	10	17.5	18	19.5	28
Division of labour	13	22.8	19	20.4	32
Total	57		93		150

$$\chi^2 = 1.68$$

$$df = 3$$

- (i) Nearly 1/2 of the total IIT student had parents who used to share the responsibilities of the house and rest 50% had all sorts of division of labour like mother, by servants or by equal division of labour.
- (ii) In case of mothers of low and high creative students, mere mothers of low creative students performed the daily responsibilities than the mothers of high creative.
- (iii) When it concerned responsibilities of the house accomplished by both father and mother, it was mere of a case in case of high creative students than in case of low creative.

(iv) It was also interesting to note that in case of low and high creative students, more of low creative students showed responsibilities being accomplished by servants than in the houses of high creative students.

(18) Creative Instruments Found Lying in the House During Early Childhood and Childhood of Students - Creative instrument can be a tool in encouraging a child to think and act creatively. Those instruments if found lying at homes could act as an inspiration for indulging in such activities. Table below show different creative instruments such as blank sheets, musical instrument, paint brush, books or colour pencils being found at both high and low creative students -

TABLE - 18

Creative Instruments Found Lying in the House during Early Childhood and Childhood of Student

Instrument	High Creative		Low Creative		Total
	No.	%	No.	%	
Paint brush	25	43.8	28	30.1	53
Musical Instrument	15	26.3	28	30.1	43
Blank sheets	31	59.3	31	33.3	62
Colour Pencils	32	56.1	41	44.0	73
Books on craft puzzle	28	49.1	24	25.8	52
Creative works of parents	7	12.2	3	3.2	10
None	7	12.2	17	18.2	24
Total	57		93		150

$\chi^2 = 17.31$

df = 6

- (i) Nearly 50% of the students were found to be having colour pencils at their houses during their early childhood and childhood.
- (ii) 2/3rd of the total students were found to be having paint brushes, books on craft and puzzles, musical instruments and many blank sheets in their houses during their childhood.
- (iii) Very few of them showed the existence of creative works of parents or none of the creative instruments at their houses.
- (iv) Significant difference was found in case of high and low creative students. Many more students who were highly creative had paint brushes, blank sheets, colour pencils, books on craft and puzzles and creative works of parents in much higher percentage than in case of low creative students. Low creative students had very low percentage of these instruments lying in their homes during early childhood and childhood.

(19) Hours of Study - It was desired to find out whether one's hour of study in anyway was related to the creativity of students. Table 19 shows the hours of study being different in case of high and low creative.

TABLE - 19

Hours of Study

Hours of study	High Creative		Low Creative		Total
	No.	%	No.	%	
2 - 4 hours	16	28.0	21	22.5	37
4 - 6 hours	7	12.2	11	11.8	18
More than 6 hours	3	5.26	5	5.37	8
Nothing specific	33	57.8	55	34.9	88
Total	57		93		150

$$\chi^2 = 0.4588$$

$$df = 3$$

- (i) More than 50% of the students had no specific hours of study. Nearly 25% of them had 2 - 4 hours of study and very few of them had more than 6 hours of study.
- (ii) No significant difference was found in case of high and low creative students. High creative students had much more higher hours of study in comparison to low creative students.
- (iii) An interesting trend was also found that when it concerned they not having any specific hours of study, more of high creative students were found to be coming in this category.



(20) Schedule of Student for Everyday - It was desired to know so what sort of daily time schedule these students follow and whether they wanted to spare sometime for creative activities or not.

TABLE - 20

Schedule of Students for Everyday

Schedule	High Creative		Low Creative		Total
	No.	%	No.	%	
All the time studies	0	0	5	5.3	5
Some studies and some cr. activity	4	7.01	10	10.7	14
Some recreation & Cr. act. + study	34	59.6	39	41.9	73
Most cr. activity	5	8.7	9	9.6	14
Nothing special	16	5.2	30	32.2	43
Total	57		93		150

$\chi^2 = 6.94$                        $df = 4$

(i) Nearly 50% of the total students indulged in studies, creative activities and recreation at the same time. 1/3rd of them had nothing specific about their indulgence in either. Very few of them had all the time of studies.

(ii) No significant difference was found in case of high and low creative students. None of the high creative students had all the time for studies.

(iii) Students who had all the time for creative activities were same in number in case of high and low creative students.

(21) Choice of Books - Every students has different choice of books. We tried to find out whether high and low creative were different concerning their reading habits.

TABLE - 21

Choice of Books

Books	High Creative No.	%	Low Creative No.	%	Total
Fiction	38	66.6	41	44.0	79
Literary	17	29.8	22	23.6	39
Scientific	25	43.8	25	26.8	50
Creative ideas and their implication	17	29.8	17	18.2	34
Course books	14	24.5	19	20.4	33
Nothing specific	7	12.2	21	22.2	28
Total	57		93		150

$\chi^2 = 11.28$

df = 5

- (i) Almost 50% of the students were found to be interested in reading books on fiction. Rest were interested in other types of books such as literary, scientific, course books, and books on creative ideas.
- (ii) Significant difference was found in case of high and low creative students. Much higher rate of students who were high creative indulged in reading different types of books such as fiction, literary, scientific, creative ideas and their implications and course books in comparison with low creative students.

(22) Membership of Libraries - The question No. 22 indicated the membership of libraries in case of high and low creative students.

TABLE - 22  
Membership of Libraries

Member of libraries	High Creative		Low Creative		Total
	No.	%	No.	%	
Own Instt.	45	78.9	70	75.2	115
Many others	22	38.5	14	15.0	36
No mem. of any & read by borrowing	4	7.0	6	6.45	10
Not interested in lib. & reading	0	0	8	8.6	8
Total	57		93		150

$\chi^2 = 13.16$                        $df = 3$

- (i) More than 75% of the students were found to be the member of their own institute library and only 1/5th of them being the member of many other libraries.
- (ii) Significant difference was found in case of high and low creative students. High rate of high creative students were the members of many other libraries in comparison to low creative students.

(iii) When it concerned their being interested in reading but not being the member of any library and the act of reading being accomplished by borrowing, it was more in case of low creative students.

(23) Choice of Journals - It became also of interest to know about choice of journals in case of high & low creative students and whether they differed concerning this in anyway.

TABLE - 23  
Choice of Journals

Journals	High Creative		Low Creative		Total
	No.	%	No.	%	
Science	32	56.1	43	46.2	75
Music	4	7.0	6	6.45	10
Maths	9	15.7	16	17.2	25
Quiz	11	19.2	13	13.9	24
G.K.	28	49.1	41	44.0	69
None	14	24.5	27	29.0	41
Total	57		93		150

$$\chi^2 = 1.82$$

$$df = 5$$

(i) Nearly 50% of the students were found to be interested in reading journals on science. Many of them were equally interested in reading journals on G.K., maths, and quiz. Very few of them read anything about music.

(ii) More journals on maths were read by low creative students in comparison with high creative students.

(24) Participation in Creative Activities - Students were compared in concern to their participation in creative activities -

TABLE - 24

Participation in Creative Activities

Creative Activities	High Creative		Low Creative		Total
	No.	%	No.	%	
Painting	16	28.0	11	11.8	27
Music	25	43.8	31	33.3	56
Scientific inventions	21	36.8	19	20.4	40
Maths' Puz.	27	47.3	38	40.8	65
Dance	9	15.7	11	11.8	20
Drama	12	21.0	8	8.6	20
Poetical or writing	18	31.5	15	16.1	33
None	9	15.7	26	27.9	35
Total	57		93		150

$$\chi^2 = 20.65$$

$$df = 7$$

(i) Nearly 50% of the students indulged in solving maths puzzles. Many of them were also interested in music, painting, scientific inventions, dance, drama and poetical writing.



- (i) Nearly 75% of the total students had favourable attitude towards indulging in extra-curricular activities. Rest of them had moderate attitude. Very few of them had unfair or negative attitude towards indulgence in such activities.
- (ii) No significant difference was seen in high and low creative students. Low creative students showed much positive attitude towards indulging in extra-curricular activities.
- (26) Participation in Extra-curricular Activities - Separate table is made to find out whether students participated in such activities or not.

TABLE - 26

Participation in Extra-curricular activities

Participation	High Creative		Low Creative		Total
	No.	%	No.	%	
Participation for fun & part sake	32	56.1	69	74.1	101
Acquire prizes and awards	15	26.3	15	16.1	30
Never participate	0	0	6	6.4	6
Dont appreciate and are wastage of time	1	1.75	11	11.8	12
Total	57		93		150

$$\chi^2 = 9.36$$

$$df = 3$$

- (i) More than 2/3rd of the students used to participate in extra-curricular activities for the sake and participation and fun. 1/5 of them also acquired prizes and awards.



(ii) Significant difference was found while comparing high and low creative students, more high creative students are found who acquire prizes and certificates in comparison to low creative students.

(iii) None of high creative students were found who do not participate in extra-curricular activities where as many such were found in case of low creative students.

(iv) Quite a few of low creative students considered participation in such activities; a wastage of time where high creative students were almost non who thought that way.

(27) Professor's Attitude towards on Students - It was desirable to know to what sort of attitude does the Professor has about a particular student whether low and high creative students had different impressions on their Professors.

TABLE - 27

Professor's Attitude towards one Student

Professor's Attitude	High Creative		Low Creative		Total
	No.	%	No.	%	
Highly cr.	16	28.0	10	10.75	26
Most obe. and good student	21	36.8	24	25.8	45
Most hard working and sincere	16	28.0	28	30.0	44
Disobe. & Bad at studies	1	1.75	2	2.15	3
Most insincere in all	3	5.26	6	6.45	9
Highly uncr.	1	1.75	1	10.75	2
Most disturbing element	3	5.26	6	6.45	9
Total	57		93		150

$$\chi^2 = 7.693$$

$$df = 6$$

- (i) By the study it was found out that the attitude of the professor towards the students were very good. Atleast 75% of them were considered as obedient, good at studies, obedient and creative. Very few of them were considered as insincere, uncreative and disturbing element of the class.

(ii) No significant difference was found in case of high and low creative students. Much more high creative students were considered to be highly creative, most obedient and good at studies in comparison to low creative students by their professors.

(iii) When in concerned the professor's attitude considering the students as highly uncreative, it was found much more in case of low creative students.

(28) Social Activity of Students - When it was found out whether parents were social or not it was also desirable to know about the social life of students and know whether low and high creative students differed in anyway.

TABLE - 28

Social Activity of Students

Social	High Creative		Low Creative		Total
	No.	%	No.	%	
Social	25	43.8	53	56.9	78
Very Social	5	8.7	6	6.45	11
Moderate	14	24.5	25	26.8	39
Unsocial	2	3.5	5	5.3	7
Total	57		93		150

$\chi^2 = 1.72$

df = 3

(i) More than 50% of the students come under the category of being social and having many friends. Few of them came under the category of being very social and moderately social. Very few or negligible number of students were found to be unsocial.

(ii) No significant difference was found between high and low creative students. Slight difference was found in case of them such as - under the very social category more of high creative students come and more of low creative students were seen under social, moderate and unsocial category in comparison to high creative students.

(29) Age of Friends - The students was interested in indulging in friendship with his age mates, people below his age, above his age or all age. Table 29 shows this -

TABLE - 29

Age of Friends

Friend's Age	High Creative No.	% %	Low Creative No.	% %	Total
Above age	2	3.5	5	5.3	7
Below age	2	3.5	2	2.15	4
Classmates	31	54.3	49	52.6	80
All ages	26	45.6	50	53.6	76
Total	57		93		150

$\chi^2 = 0.957$

df = 3

- (i) Nearly 1/2 of the total students had interaction with friends of their age. Rest 1/2 had interaction with people of all age and only a few of them had friends above or below their age.
- (ii) No significant difference was found among high and low creative students.
- (30) Friends of Student - Whether research student was interested in making friends with people of his own sex, people of opposite sex or both become a point of attention which needed to be found out. Table 30 shows this -

TABLE - 30

Friends of Students

Friend's Sex	High Creative		Low Creative		Total
	No.	%	No.	%	
Your own sex	24	42.1	43	46.2	67
Opposite sex	2	3.5	2	2.15	4
Both	20	35.0	24	25.8	44
Most same sex, few opposite	13	22.8	27	31.1	40
Total	57		93		150

$\chi^2 = 1.89$

df = 3

- (i) Nearly 50% of the students had friends of their age. 1/3rd of them were having friends of both sexes and another 1/3rd showed having friends of mostly of same sex and same of opposite sex. Only a few or negligible number of students had friends of opposite sex.
- (ii) No significant difference was found among high and low creative students. Slight difference was seen amongst them, like more of high creative students had friends of opposite sex and of both the sexes in comparison to low creative students.
- (31) Participation of Friends in Creative Activities - It was desirable to know whether friends of low and high creative students participated in creative activities and whether friends of high and low creative differed concerning this -

TABLE - 31

Participation of Friends in Creative Activities

Par. cr. act.	High Creative		Low Creative		Total
	No.	%	No.	%	
Participate	15	26.3	11	11.8	26
Never	2	3.5	7	7.5	9
Some do & some don't	39	68.9	79	84.9	118
Total	57		93		150

$\chi^2 = 10.95$

df = 2

- (i) More than 75% of the students were found to be having friends out of which some participate in creative activities and some of them don't. Only 1/6 of total students showed friends who participated in creative activities.
- (ii) Significant difference was found amongst high and low creative students. Much more high creative students had friends who participated in creative activities in comparison to low creative students.
- (iii) Significantly more of low creative students showed friends who either never participated in creative activities or some of them did and some of them did not in comparison to high creative students.

<sup>W</sup>  
 (32) Artists and Writers being Entertained as Guests - Contact with such people could be of some importance for a student and could act as an inspiration for participating in creative activities. The question no. 32 was designed to know this -

TABLE - 32

Artists and Writers being Entertained as Guests

Guests	High Creative		Low Creative		Total
	No.	%	No.	%	
Artists & Writers	4	7.01	5	5.3	9
None	43	75.4	61	65.5	104
Any other	12	21.0	29	31.1	41
Total	57		93		150

$\chi^2 = 1.9$                        $df = 2$

- (i) More than 65% of the total students showed no artists and writers being entertained at their houses as guests, only a few them showed guests of this kind being entertained at their place.
- (ii) No significant difference was found among high and low creative students. But more of his creative students showed having artists and writers as their family friends and being entertained at their houses in comparison to low creative students.



(iii) Many of them came under the category where they entertained guests other than writers and artists. They indicated having guests as painters, designers, poets, singers and dancer's at their places. This constituted almost 1/4 the total students.

(33) Interest and Participation in Games - It was desirable to know whether students were interested in games or not and whether high and low creative differed regarding their participation in games.

TABLE - 33

Interest & Participation in Games

Games	High Creative		Low Creative		Total
	No.	%	No.	%	
Outdoor	11	19.2	17	18.2	28
Indoor	13	22.8	23	24.7	36
Both	17	29.8	27	29.0	44
None	16	28.0	33	35.4	49
Total	57		93		150

$\chi^2 = 0.652$

df = 3

- (i) Almost 1/3rd of the total students showed no interest in either indoor or outdoor games. Among the rest of the students they equally participated in outdoor and indoor games.
- (ii) No significant difference was found amongst high and low creative students. But more of high creative students participated in outdoor games in comparison to low creative students.
- (34) Prizes and Awards in Games - Table 34 indicates the difference concerning choice in case of high and low creative students.

TABLE - 34

Prizes and Awards in Games

Prizes	High Creative		Low Creative		Total
	No.	%	No.	%	
Outdoor	16	28.0	22	23.6	38
Indoor	7	12.2	11	11.8	18
Both	11	19.2	11	11.8	22
None	22	38.5	56	60.2	78
Total	57		93		150

$\chi^2 = 4.763$

df = 2

(i) Almost 75% of the total students were those who did not acquire any prizes, awards or certificates in games. Rest of them constituted of those students who acquired them in outdoor and indoor games.

(ii) No significant difference was found between high and low creative students. Much more percentage of high creative students had acquired those in outdoor games, indoor games and many who acquired both in comparison to low creative students.

(iii) When it concerned them not acquiring awards, certificates and prizes in those games; significantly low creative students were more in percentage than high creative students or it can be said this way also that few of high creative students did not acquire prizes, certificates and awards in games.

(35) Inspiration to Participate in Creative Activities - One must have someone as inspiration to indulge in creative activities. Table below indicates it and tells the difference between high and low creative students.

TABLE - 35

Inspiration to Participate in Creative Activities

Inspiration	High Creative		Low Creative		Total
	No.	%	No.	%	
Parents	26	45.6	44	47.3	70
Friends	30	52.6	32	34.4	62
Books	16	28.0	17	18.2	33
Teachers	5	8.77	11	11.8	16
None	4	7.01	12	12.9	16
Total	57		93		150

$$\chi^2 = 3.398$$

$$df = 4$$

- (i) Nearly 50% of the students got inspiration to indulge in creative activities by their parents. Many of them got it by friends and books and a few of them only from teachers. Very few of them had no inspiration at all.
- (ii) No significant difference was found in case of high and low creative students. Much more percentage of high creative students got inspiration from friends and books in comparison to low creative students.
- (36) Visit to Exhibitions - When students were asked about their interest in visiting exhibitions they differed.

TABLE - 36

Visit to Exhibitions

Visiting Exhibitions	High Creative No.	High Creative %	Low Creative No.	Low Creative %	Total
Always	23	40.3	39	41.9	62
Depends upon com.	28	49.1	43	46.2	71
Dont feel	5	8.7	13	13.8	18
Total	57		93		150

$$\chi^2 = 0.858$$

$$df = 2$$

- (i) Nearly 50% of the total students come under the category where the students are not much interested in visiting creative and science exhibitions but it depends upon the company. Nearly 40% of the students always awaited the opportunity of going to such exhibitions. Very few of them were those who don't feel like visiting.
- (ii) No significant difference was found among high and low creative students. Slight difference was found in case them not feel like visiting - Much more of low creative students were found to be uninterested in visiting in comparision to high creative students.

(37) Interest for Going in Isolation - An attempt was made to know whether students were interested in spending sometime of their day in isolation or not.

TABLE - 37

Interest for Going in Isolation

Isolation	High Creative		Low Creative		Total
	No.	%	No.	%	
Yes	35	61.4	59	63.4	94
No	1	1.75	3	3.2	4
Sometime	21	36.8	32	34.4	53
Never	1	1.75	1	1.07	2
Total	57		93		150

$$\chi^2 = 0.438$$

$$df = 3$$

- (i) Nearly 60% of the total students come under the category where they liked spending their time in isolation. Nearly 35% of them were those who were interested in being in isolation but sometimes only. Very few of them were found not to be interested in it.
- (ii) No significant difference was found among high and low creative students. Some difference was seen in the category of them being uninterested in indulging in isolation and much more low creative students were found to be coming under it in comparison to high creative students.

(38) Activity in Isolation - Students indulged in different activities when they were in isolation. It was desirable to know their indulgence in either of these activities like reading books, making something on one's own, solving puzzles etc. etc. and to know how far high and low creative students differed in this regard.

TABLE - 38

Activity in Isolation

Indulge in act. in isolation	High Creative		Low Creative		Total
	No.	%	No.	%	
Reading books	41	71.9	65	69.8	106
Making something of one's own	22	38.5	15	16.1	37
Solving puzzles	14	24.5	18	19.3	32
Playing com. games	5	8.77	5	5.3	10
None	7	12.2	15	16.1	22
Total	57		93		150

$$\chi^2 = 14.31 \quad \text{df} = 4$$

- (i) Almost 70% of the total students were interested in reading books in the time of their isolation. 30% of them were those who were interested in making something on their own and solving puzzles. Very few of them were interested in playing computer games or were not interested in either.

(ii) Significant difference was found in case of high and low creative students when it concerned their indulgence in either of activities in isolation, much more of high creative students were indulging in activity where they wanted to make something of their own and solving puzzles in comparison to low creative students. Even in case of reading books and playing computer games it was more in case of high creative students.

(39) Expression Capability - One can be expressive or unexpressive, outspoken or non-communicative. Table 39 shows this capability being different in case of high and low creative students.

TABLE - 39

Expression Capability

Capability	High Creative		Low Creative		Total
	No.	%	No.	%	
Expression of views & social	42	73.6	70	75.2	112
Outspoken, bold & enterprising	6	10.5	13	13.9	19
Not much comm. keep feelings	12	21.0	23	24.7	35
Total	57		93		150

$\chi^2 = 0.521$

df = 2



- (i) More than 75% of the total students were capable of expressing their views and were social. Almost of 20% of them were not capable of communication much and kept their feeling to themselves. Only 5% of them were outspoken, bold and enterprising.
- (ii) No significant difference was found among high and low creative students. Slight difference was seen like more of low creative students were expressive, social bold and outspoken in comparison to high creative students.
- (40) Thought Process - Each individual has different way of thinking on one issue. Different ways of thinking are adopted by high and low creative students. Which is shown in table 40.

TABLE - 40

Thought Process

Thinking process	High Creative No.	%	Low Creative No.	%	Total
Divergent	43	75.4	67	72.0	110
One direction	3	5.26	9	9.67	12
Unusual solution	13	22.8	14	15.0	27
Total	57		93		150

$\chi^2 = 2.07$

df = 2

- (i) Nearly 75% of the total students indulged in divergent thinking and gave equal importance to all possibilities. Nearly, 20% of them found unusual solution out of unusual thinking. Only 5% of them indulged in one direction thinking.
- (ii) No significant difference was found in case of high and low creative students. Much more of high creative students were found to be finding unusual things out of unusual solutions of the one problem in comparison to low creative students. In case of they being divergent at thinking also there were more of high creative students found.

(41) Type of Decisions - Whether one's decisions are self oriented, other's oriented or are the results of discussion with peers or parents was an interest of this study. Table 41 shows this -

TABLE - 41

Type of Decisions

Decisions	High Creative		Low Creative		Total
	No.	%	No.	%	
Self Oriented	21	36.8	40	43.0	61
Other's oriented	5	8.7	13	13.9	18
Out of discussion with parents	31	54.3	43	46.2	74
Total	57		93		150

$$\chi^2 = 1.58$$

$$df = 2$$

- (i) Nearly 50% of the total students came under the category of decisions being taken after having discussion with parents. Nearly 40% of them were capable of taking decisions on their own or were self-oriented. Very few of them took decisions which were other's oriented.
- (ii) No significant difference was found amongst high and low creative students. Low creative students were more self oriented and their decisions were more other's oriented in comparison to high creative students.
- (iii) More of high creative students showed discussion with parents and then decisions were taken in comparison to low creative students.
- (42) Individual being Centred Around - It was desirable to find out one's attitude, emotion, ideas and thoughts being centred around one's own self, towards others or towards anyone at particular time.

TABLE - 42

Individual being Centred Around

Centred Around	High Creative		Low Creative		Total
	No.	%	No.	%	
Own self	13	22.8	26	27.0	39
Towards others	7	12.2	19	20.4	26
Towards anyone	39	68.4	58	62.3	97
Total	57		93		150

$\chi^2 = 1.88$

df = 2

- (i) Nearly 70% of the students had thoughts, emotions and ideas centred around anyone at particular point of time. 25% of them showed it towards their own self. Very few of them showed these as centred around others.
- (ii) No significant difference was found in case of high and low creative students. More of low creative students showed it being centred around their own self and towards others in comparison to high creative students.
- (43) Problem Solving - Everyone has different way of solving the problems. Some people get engrossed while solving the problems, some forget it start thinking on other issues and so on. An attempt is made to find out the difference between high and low creative concerning problem solving.

TABLE - 43

Problem Solving

Problem Solving	High Creative		Low Creative		Total
	No.	%	No.	%	
Engrossed	24	42.0	47	50.0	71
Forget problem	7	12.2	20	21.0	27
Sometimes in I & sometimes in II	35	61.0	32	34.0	67
Total	57		93		150

$$X^2 = 7.94$$

- (i) Nearly 50% of the students showed that they were engrossed completely while solving a problem. Rest of them were found to be sometimes engrossed in solving the problem and sometimes forgetting the problem.
- (ii) Significant difference was found in case of high and low creative students. More of high creative students were found to be solving the problems sometimes being engrossed and sometimes forgetting it in comparison to low creative students.
- (44) Academic Achievement - High and low creative students were distributed separately under the categories of different percentage of marks and then compared -

TABLE - 44

Academic Achievements

Percentage	High Creative No.	%	Low Creative No.	%	Total
65 to 75	18	31.0	31	33.0	49
55 to 65	14	24.0	21	22.5	35
45 to 55	2	3.5	4	4.3	55
More than 75	23	40.3	32	34.0	55
Total	57		93		150

$$\chi^2 = 0.45$$

(i) 1/3rd of the total students came under the category of acquiring percentage about 75%. Next 1/3rd were who acquired it between 65 to 75. Left 1/3rd got between 55 to 65. Negligible students showed being low academic achievers and acquired marks between 45 to 55.

(ii) No significant difference was found in case of high and low creative students. But slight difference was observed. More of high creative students showed it in the category of acquiring marks above 75%.

## DIFFERENCE BETWEEN HIGH AND LOW ACADEMIC ACHIEVERS

Academic achievement is an important factor when it concerns students who are going to be professionals in future. Keeping this in mind academic achievement was also taken as one of the variables and students were divided in two groups namely high and low academic achievers. Students who acquired more than 65% were considered under the category of high achievers and who acquired less than this were put under the category of low achievers. Out of 150, 111 were found high achievers and 39 a low achievers.

After dividing them in these categories, it was desired to find out the difference in their parental background and whether their parents differed in anyway in connection to their participation in creative activities etc. etc.

The following graphs illustrate the difference between the two.

### A. (Education of Parents) -

TABLE II

	HAC		LAC		
	No.	%	No.	%	
Schooling	31	13.96	16	20.5	47
Graduation	94	42.3	24	30.7	118
Post-Graduation	73	32.8	15	19.2	88
Above PG	23	10.36	11	14.10	34
Total	222		78		300
$\chi^2 = 7.89$	df = 3				

The  $\chi^2$  value comes as 7.89 which is highly significant.

1. Nearly 40% of the total students had parents who were graduates. 30% of them were post-graduates and rest constituted of parents who were educated till school only and who were above PG.

2. Significant difference was found among high and low academic achievers. That is significantly more parents of high academic achievers had education till graduation and post-graduation as compare to the low academic achievers.

B. (Professional Qualification of Parents) -


TABLE III


	HAC		LAC		
	No.	%	No.	%	
Professional qualification + higher job	86	38.7	22	28.2	108
Professional qualification + slightly lower job	62	27.9	20	25.6	82
Professional qualification + lower job	6	2.70	2	2.56	8
Others	17	7.65	7	8.97	24
Total	222		78		300
$\chi^2 = 1.994$		df = 3			



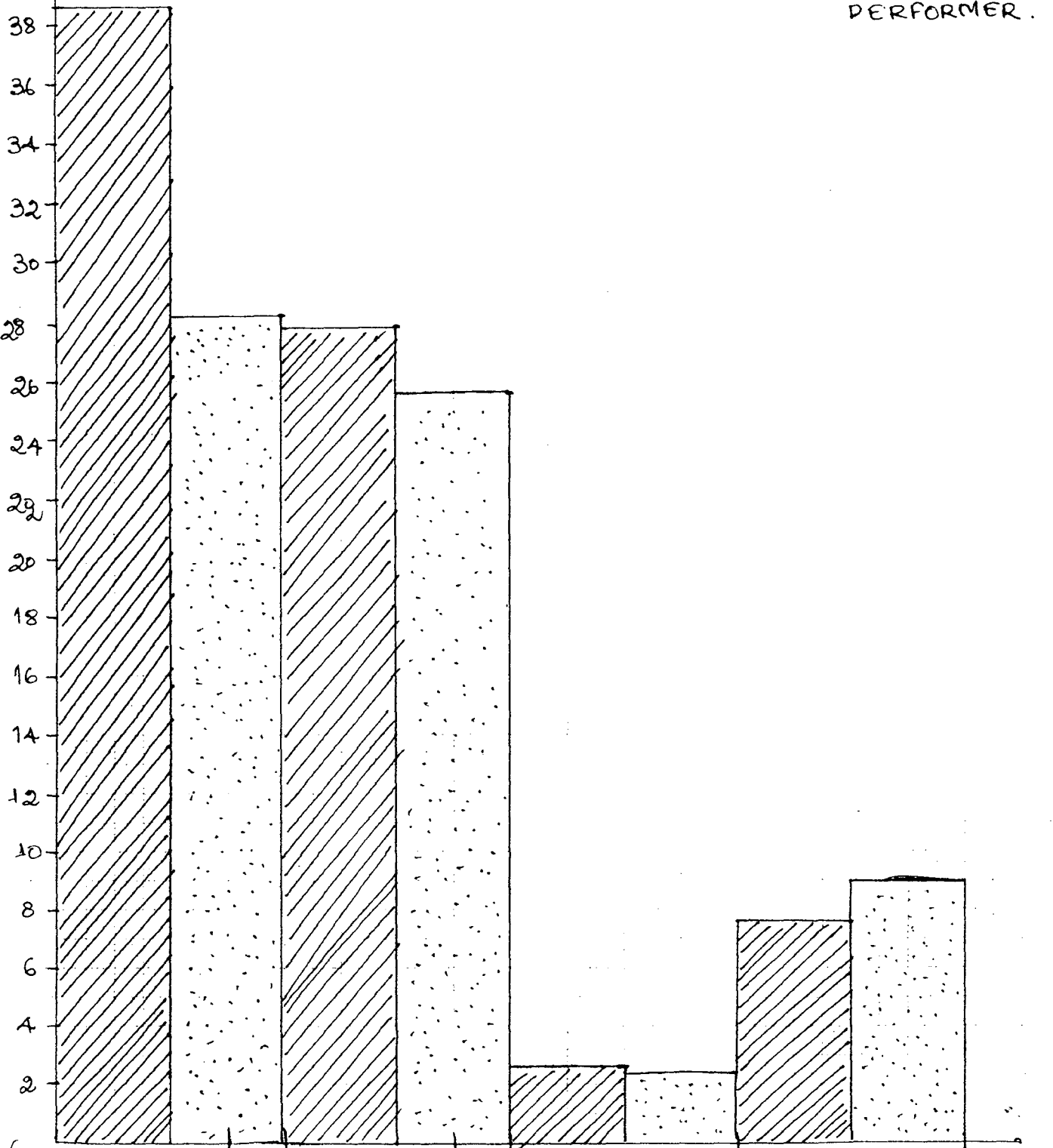
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1 cm. = 2%

 = HIGH ACADEMIC PERFORMER

 = LOW ACADEMIC PERFORMER.

PROF. QUAL. HIGHER JOB    PROF. QUALIFICA. SLIGHTLY LOW JOB    PROF. QUALIFI. LOWER JOB.    NO PROFE. QUA.    x



1. Nearly 40% of the parents had professional qualification and were at higher job and 30% of them were also having professional qualification but were at slightly lower job. 15% of them had no professional qualification but were at higher job like businessman. Very few or almost negligible parents had lower jobs.

3. Also, from the graph it is clear that the parent who have low or no professional qualification, are found relatively more amongst low academic achievers than higher academic achievers.

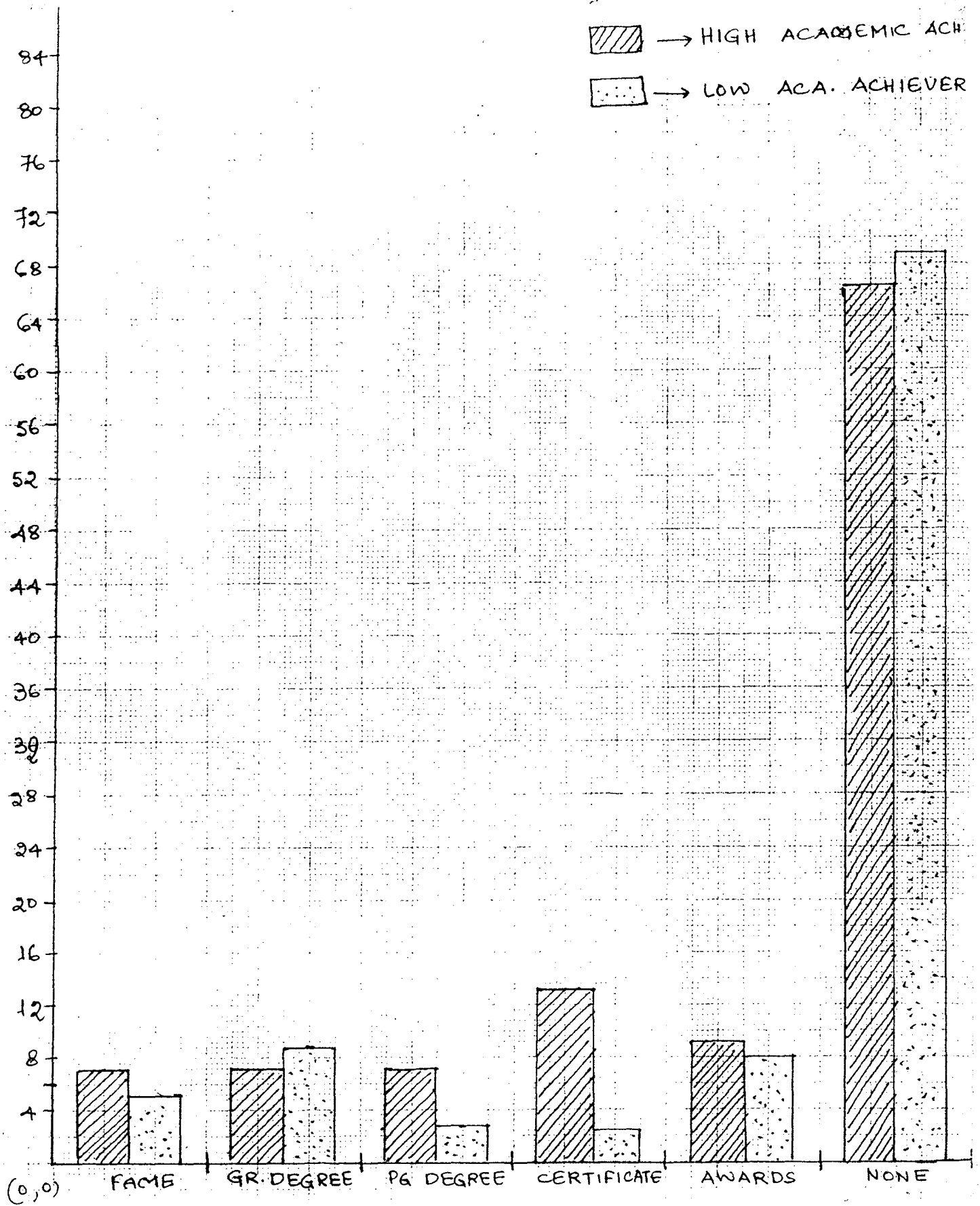
C. (Indulgence of Parents in Creative Activities) -

TABLE IV

Indulgence of parents in cr. act.	HAC		LAC		
	No.	%	No.	%	
Painting, Drawing or sketching	91	40.9	16	20.5	107
Writing and poetical	51	22.9	15	19.2	66
Dance, Drama and Musical	96	43.2	38	48.7	134
None	62	27.96	24	30.76	86
Total	222		78		300

$$\chi^2 = 7.68 \quad df = 3$$

1. Significant difference was found in case of high and low academic achievers. Much more of high academic achiever parents indulged in creative activities such as painting, drawing or sketching, writing and poetical.
2. More parents of low achievers were interested in indulging in dance, drama and musical.



"PARENTS' SUCCESS IN CREATIVE ACTIVITIES"

D. (Parents Success in Creative Activities) -

TABLE V

	HAC		LAC			
	No.	%	No.	%		
A	15	6.75	4	5.12	19	Acquired either -
B	15	6.75	7	8.97	22	A = Fame
C	16	7.20	2	2.56	18	B = Gr. Degree
D	30	13.5	8	3.60	38	C = PG Degree
E	21	9.45	7	8.97	28	D = Certificate
F	147	66.2	54	69.2	201	E = Awards
						F = None
Total	222		78		300	
	$\chi^2 = 3.223$		df = 5			

The  $\chi^2$  value does not come significant so graphically the difference between HAC and LAC has been shown.

1. Nearly 67% of the parents were found to be of the kind who had not acquired either of the rewards in creative activities such as fame, graduate degree, post-graduate degree, certificates or awards. Rest constituted of those parents who had acquired the above.

2. No significant difference was seen among high and low academic achievers but slight difference was seen in this respect such as more parents of high achievers had parents who acquired these things in comparison to low achievers and it is clearly seen by the graph.

E. (Participation of Friends of the Parents in Creative Activities) -

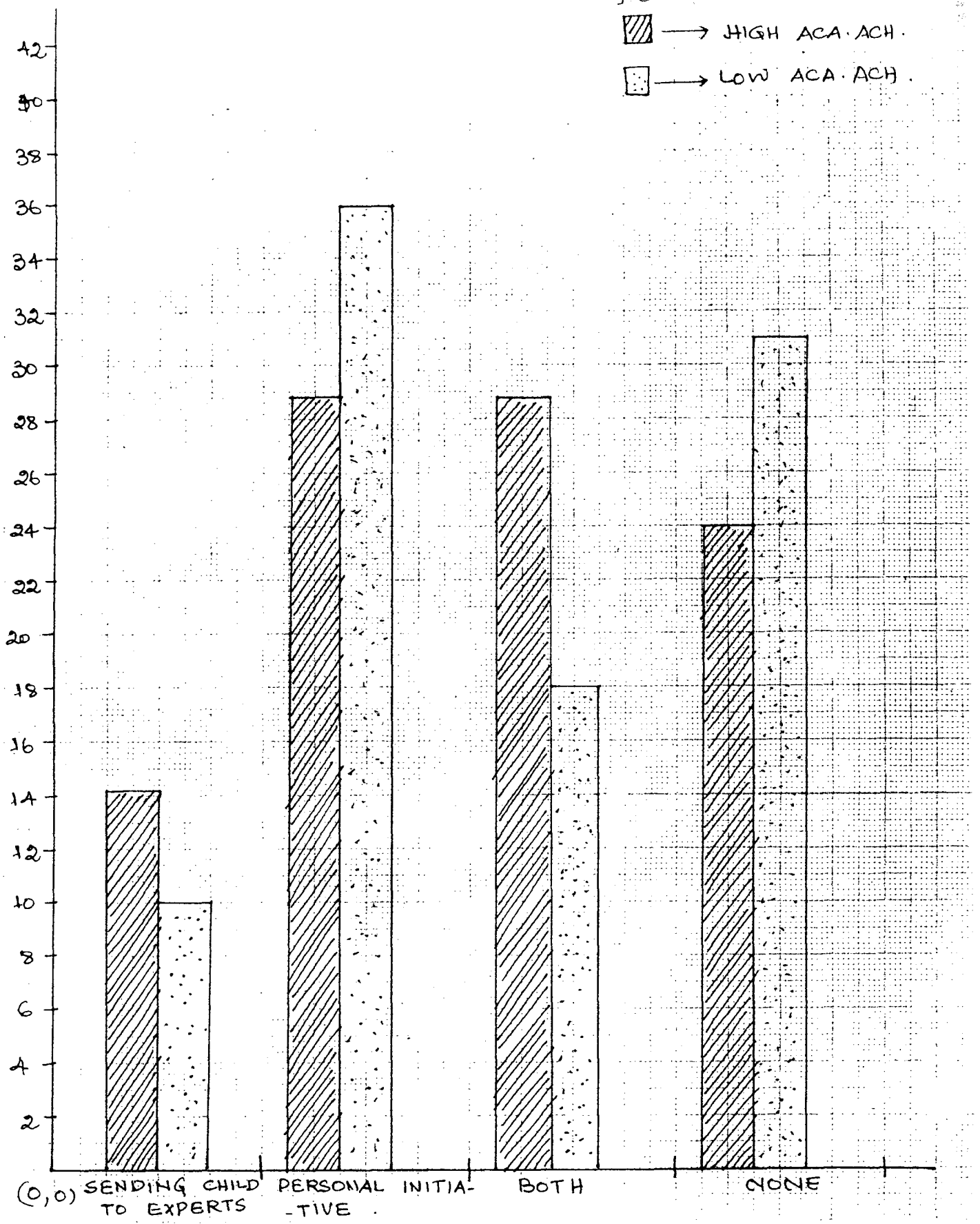
TABLE 10

	HAC		LAC			Friends of parents - participation in cr. activities
	No.	%	No.	%		
A	0	0.0	10	12.8	10	
B	38	17.11	20	25.64	58	A = They do B = Never
C	194	87.38	55	70.5	29	C = Some do some don't
Total	222		78		300	

$$\chi^2 = 79.65 \quad df = 2$$

The  $\chi^2$  value comes significant.

1. High significant difference was found among high and low academic achievers. Much more friends of parents of high achievers were the type who participated in creative activities.
2. When it concerned their non-participation it was much higher in case of low academic achievers.



" PARENTS' CONTRIBUTION IN ENHANCING CREATIVE ACTIVITIES



F. (Parent's Contribution in Enhancing Creative Activities in Children) -

TABLE 11

	HAC		LAC			Encouraged by parents for cr. activities by
	No.	%	No.	%		
A	16	14.4	4	10.2	20	A = sending children to expert B = Taking personal initiative C = Both D = None
B	32	28.8	14	35.84	46	
C	32	28.8	7	17.9	39	
D	27	24.3	13	33.3	40	
Total	111		39		150	

$$\chi^2 = 3.00 \quad df = 3$$

$\chi^2$  value is not significant so let us examine the difference by the help of graph

1. No significant difference was seen among parents of high and low achievers. But slight difference was observed like when it concerned parents fulfilling their duty of making the children learn creative activities, they performed it by sending children to experts and also taking personal initiative, it was more in case of high achievers in comparison to low achievers.

G. Creative Instruments Found at Home at Childhood -

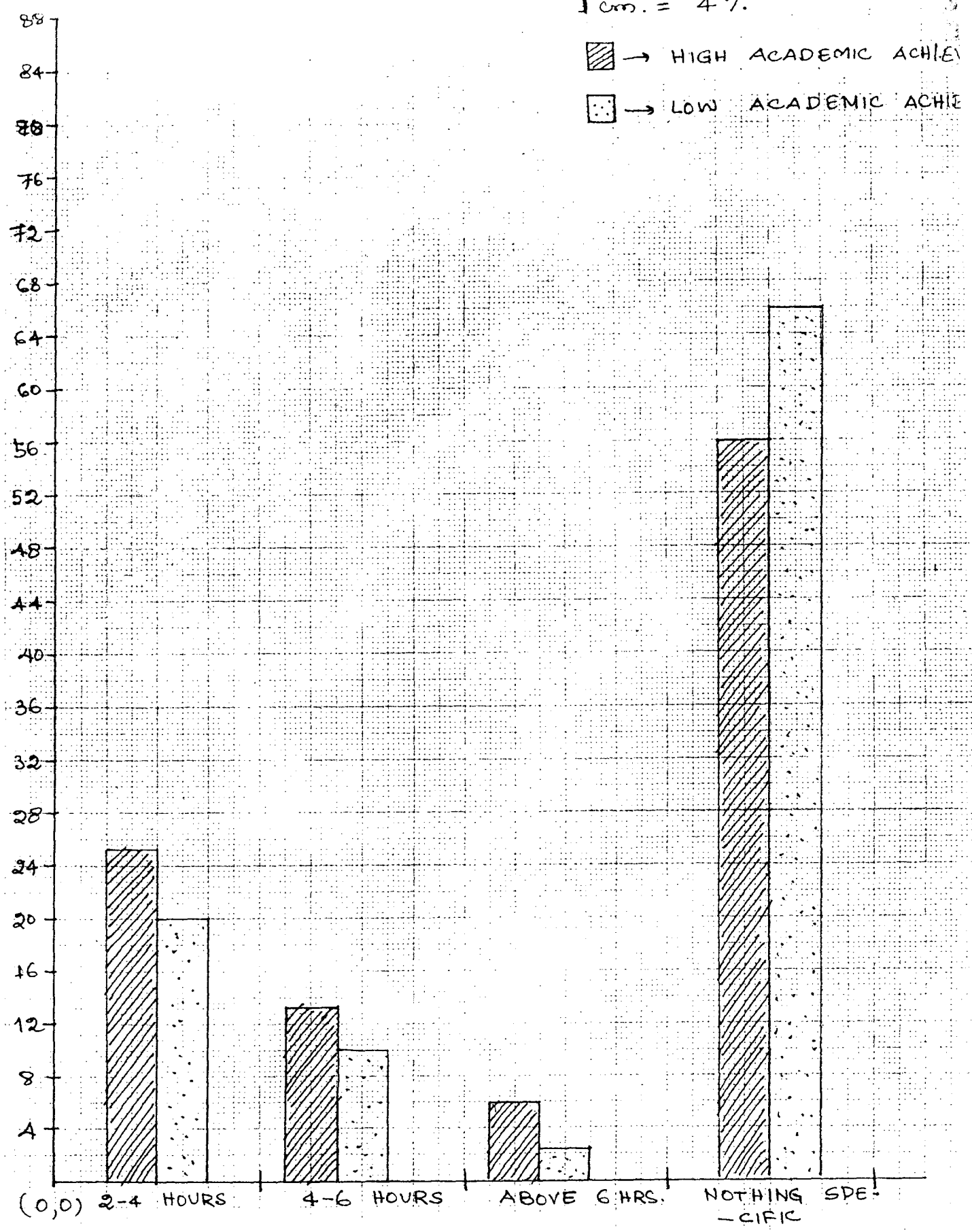
TABLE 18

	HAC		LAC			
	No.	%	No.	%		
A	42	37.8	9	23.0	51	Cr. Instruments found at home at childhood - A = Paint Brush B = Musical Instrument C = Blank Sheets D = Colour Pencils E = Books on Craft F = Cr. work of parents G = None
B	31	27.9	10	25.64	41	
C	54	48.6	9	23.0	63	
D	60	54.0	10	25.64	70	
E	35	31.53	15	38.46	50	
F	8	7.20	2	5.12	10	
G	16	14.4	8	20.5	24	
TOTAL	111		39		150	

$$\chi^2 = 12.584 \quad df = 6$$

1. Significant difference was seen among high and low academic achievers. Much more creative instruments like paint brush, musical instrument, blank sheets, colour pencils, books on craft and puzzles and creative works of parents and grand parents, were found at the homes of high academic achievers in comparison to low academic achiever.

1 cm. = 4%



" HOURS OF STUDY "

H. Hours of study one student puts each day -

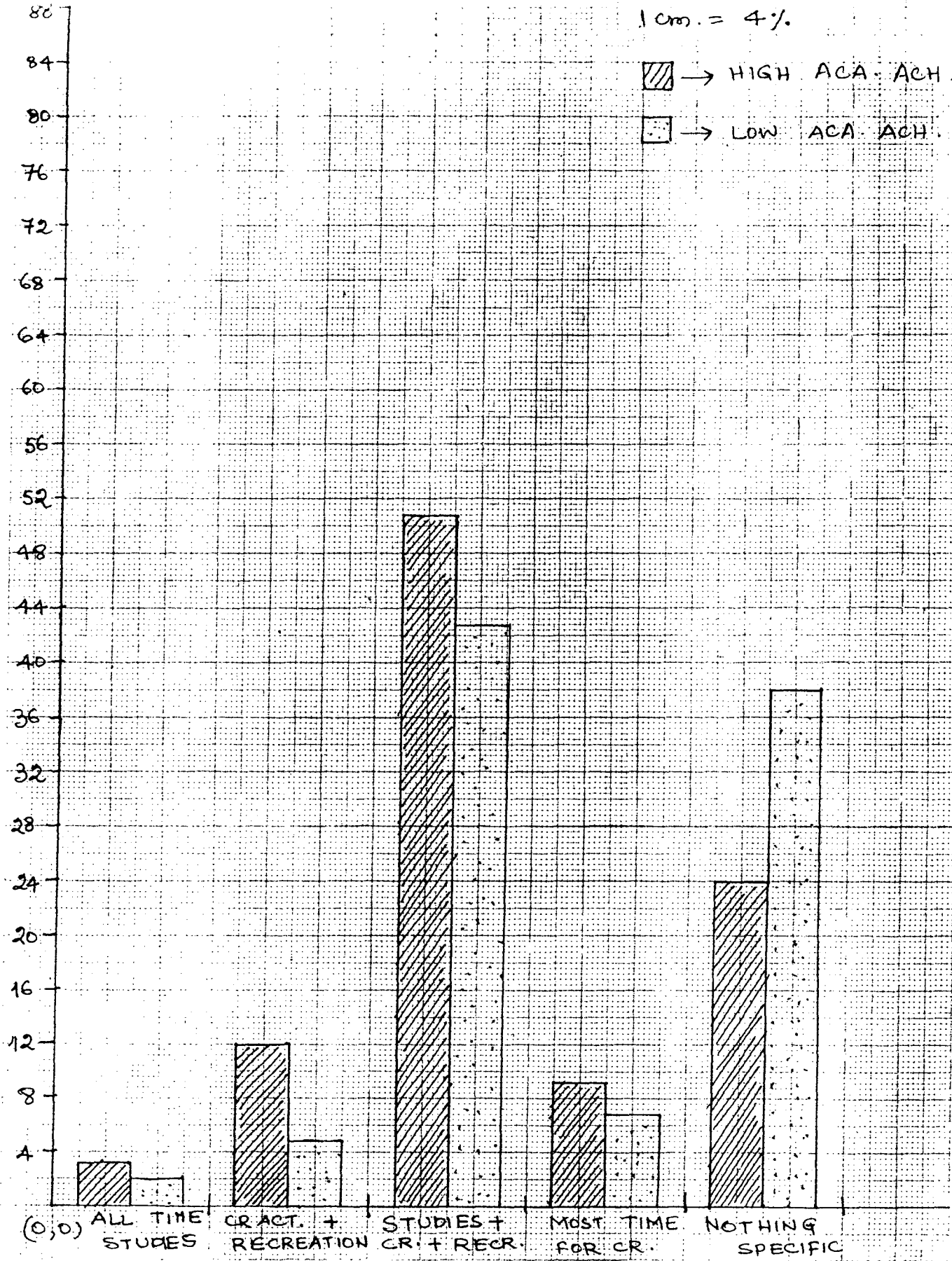
TABLE 19

	HAC		LAC			
	No.	%	No.	%		
A	28	25.2	8	20.5	36	Hours of study
B	14	12.6	4	10.2	28	A = 2 - 4
C	7	6.30	1	2.56	8	B = 4 - 6
D	62	55.8	26	66.6	88	C = above 6
TOTAL	111		39		150	D = nothing specific

$$\chi^2 = 5.19 \quad df = 3$$

The  $\chi^2$  value does not work out significantly so a graphical presentation has been done -

No significant difference was found among low and high achievers. But the graph clearly explains the difference being there like when it concerns their hours of study being 2 - 4 hours, 4 - 6 hours or above, it is seen more in case of high academic achievers in comparison to low achievers.



" SCHEDULE OF THE STUDENTS "

I (Schedule of the students)

TABLE 20

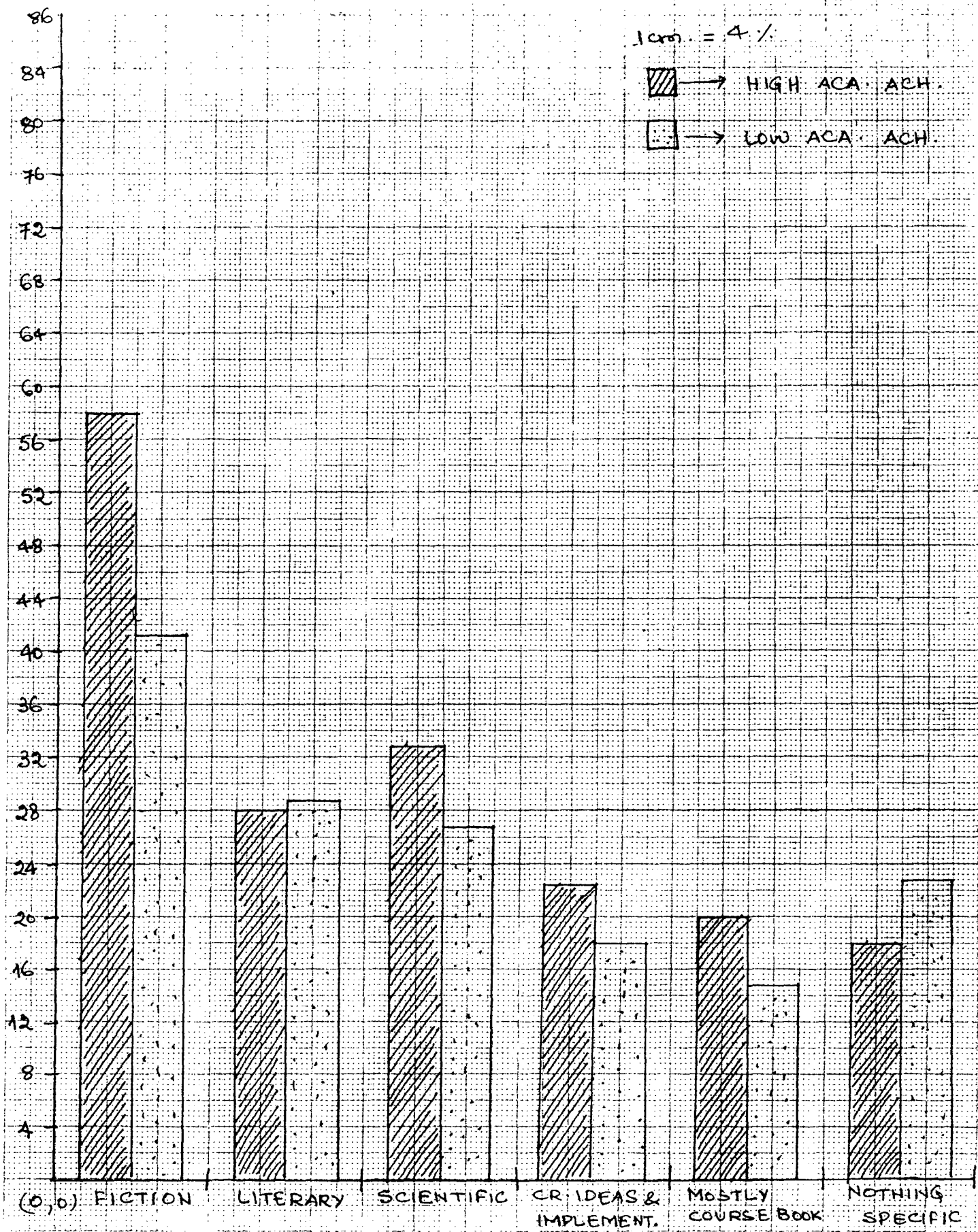
	HAC		LAC		
	No.	%	No.	%	
A	4	3.60	1	2.56	5
B	14	12.6	2	5.12	16
C	57	51.3	17	43.58	74
D	10	9.0	3	7.69	13
E	27	24.33	15	38.46	42
TOTAL	111		39		150

Schedule has -  
A = All times for studies  
B = Some for Cr. some for Studies  
C = Some of studies & some for recre. + cr.  
D = Most of the time cr.  
E = Nothing specific

$$\chi^2 = 4.04 \quad df = 4$$

Though no significant difference is seen between high and low achievers but difference is obviously observed by the graph.

The graphs says that more students who were high academic achievers had their schedule which had either all the time for studies, or some for studies, recreation and creative acts in comparision to low achievers. When it concerned most of the time for creative activities, then also same trend was seen.



"CHOICE OF BOOKS"

J. Books student reads -

TABLE 21

	HAC		LAC		
	No.	%	No.	%	
A	64	57.6	16	41.02	80
B	31	27.9	11	28.2	42
C	37	33.3	10	25.6	47
D	26	23.4	7	17.9	33
E	23	20.73	6	15.3	29
F	20	18.0	9	23.07	29
G	16	14.4	8	20.5	24
TOTAL	111		39		150

Books -  
A = Fiction  
B = Literary  
C = Scientific  
D = Cr. ideas & implementation  
E = Mostly course books  
F = Nothing specific  
G = None



$$\chi^2 = 3.2007 \quad df = 6$$

It is not significant so a graphical presentation is done -

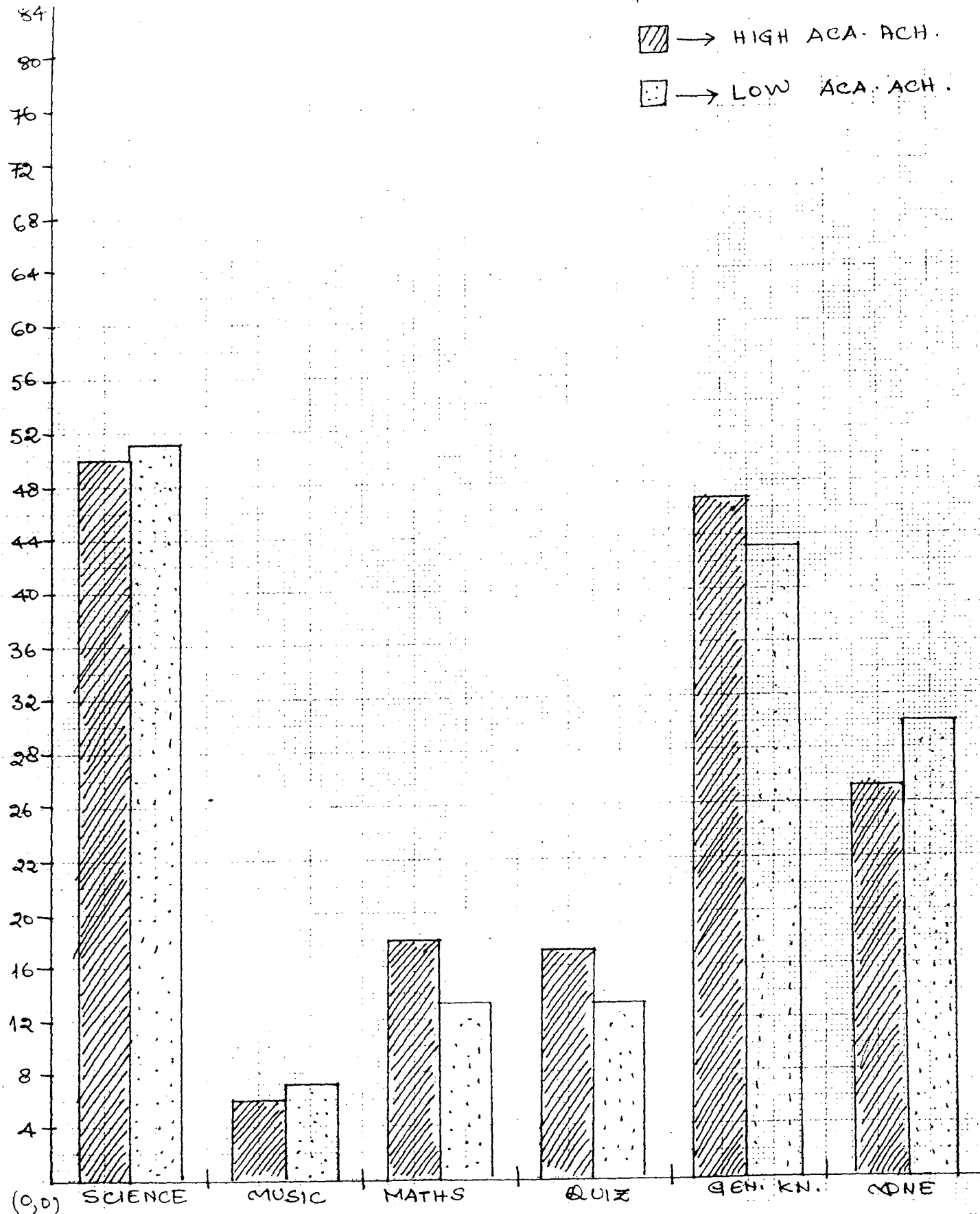
1. No significant difference was seen amongst high and low academic achievers. But the graph says that high academic achievers were seen more in percentage reading books on fiction, science, creative ideas - their implementation and course books.
2. When it concerned they reading literary books, it was slightly more in case of low academic achievers.



1 cm. = 4 %

▨ → HIGH ACA. ACH.

▤ → LOW ACA. ACH.



(0,0)

" STUDENTS' CHOICE OF JOURNALS "

K. (Student's Choice of Journals) -

TABLE 23

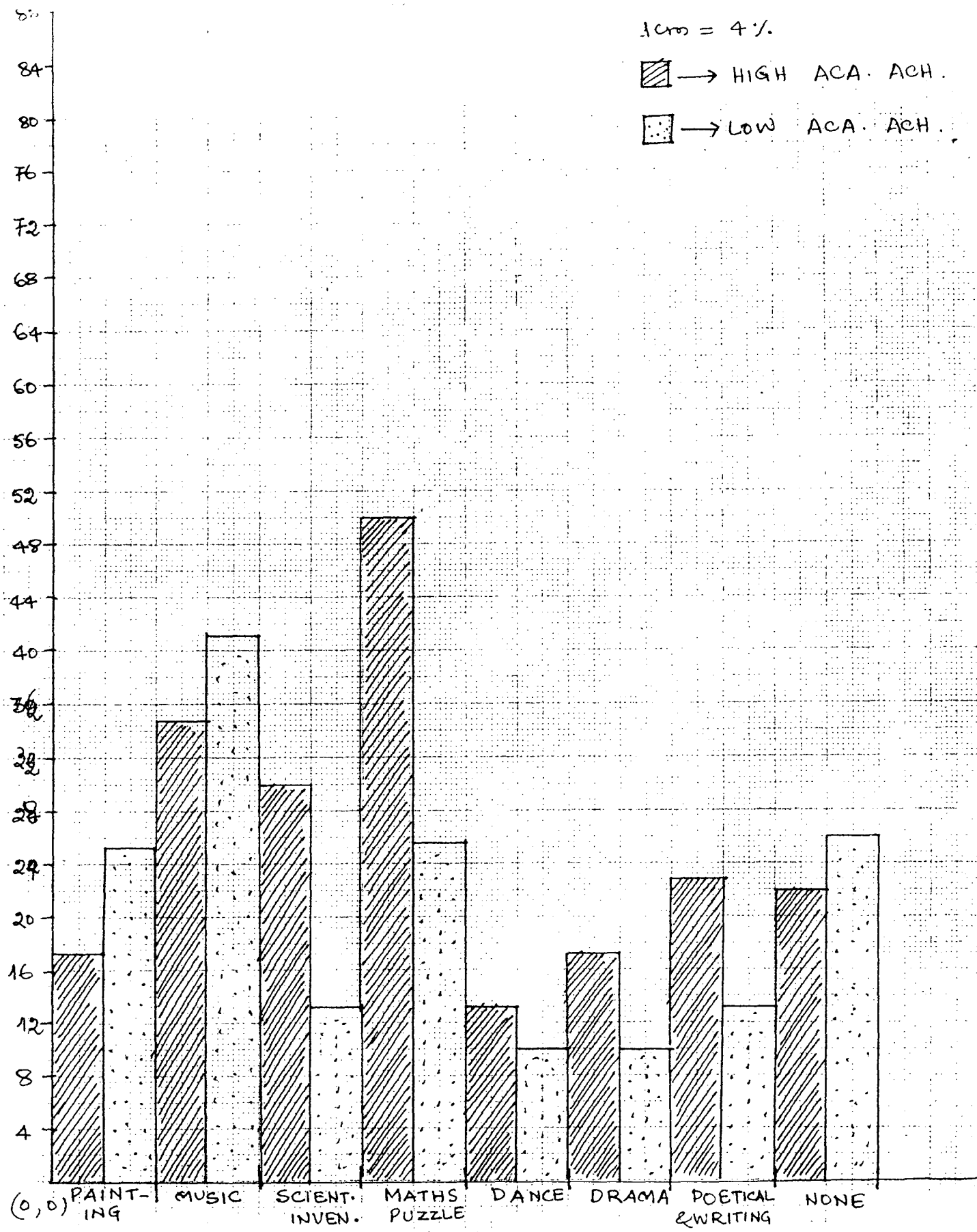
	HAC		LAC		
	No.	%	No.	%	
A	55	49.5	20	51.28	75
B	7	6.30	3	7.69	10
C	20	18.0	5	12.8	25
D	19	17.1	5	12.84	24
E	52	46.83	17	43.56	69
FG	30	27.0	12	30.76	43
TOTAL	111		39		150

Books and Journals -  
A = Science  
B = Music  
C = Maths  
D = Quiz  
E = G.K.  
F = None

$$\chi^2 = 1.054 \quad df = 5$$

The  $\chi^2$  value is not significant, so let us examine it by graph-

1. No significant difference was seen among high and low achievers. But the graph indicates quite a lot of difference was seen. But more high academic achievers were those who read journals on maths, quiz and general knowledge in comparison to low academic achievers.
2. When it concerned their being interested in reading journals on science and music, more low achievers were found interested in doing so as compared to high achievers.



"PARTICIPATION IN CREATIVE ACTIVITIES"

L. (Student's Participation in Creative Activities) -

TABLE 24

	No.	HAC %	No.	LAC %	
A	19	17.1	10	25.6	29
B	39	35.1	16	41.0	55
C	33	29.7	5	12.8	38
D	55	49.5	10	25.6	65
E	15	13.5	4	10.2	19
F	17	15.3	4	10.2	21
G	26	23.4	5	12.8	31
HI	24	21.6	10	25.6	34
TOTAL	111		39		150

You indulge in activities -  
A = Painting  
B = Music  
C = Scientific inventions  
D = Mathematical puzzles  
E = Dance  
F = Drama  
G = Poetical or writing  
G = None

$$\chi^2 = 7.87 \quad df = 7$$

The  $\chi^2$  value does not come out significant so the graph shows the difference -

1. No significant difference was seen when it concerned the students participating in creative activities. But when graphically they are represented more high academic achievers indulged in creative acts like dance, drama, poetical writing, solving maths puzzles and scientific inventions, in comparison to low academic achievers.
2. More low academic achievers were interested in indulging creative activities like painting and music in comparison to high academic achievers.

M. (Professor's Attitude Towards the Students) -

TABLE 27

	HAC		LAC			
	No.	%	No.	%		
A	16	14.4	7	17.9	23	Professor's attitude towards you -
B	38	34.2	2	5.1	40	A = Considers you as highly cr.
C	35	31.5	7	17.9	42	B = Most obedient & good at studies
D	3	2.7	0	0.0	3	C = Most hard working and sincere
E	5	4.5	4	10.2	9	D = Disobedient and bad at studies
F	1	0.9	1	2.56	2	E = Most insincere towards all activities
G	8	7.2	0	0.0	8	F = Highly in cr.
TOTAL	111		39			G = Most disturbing element

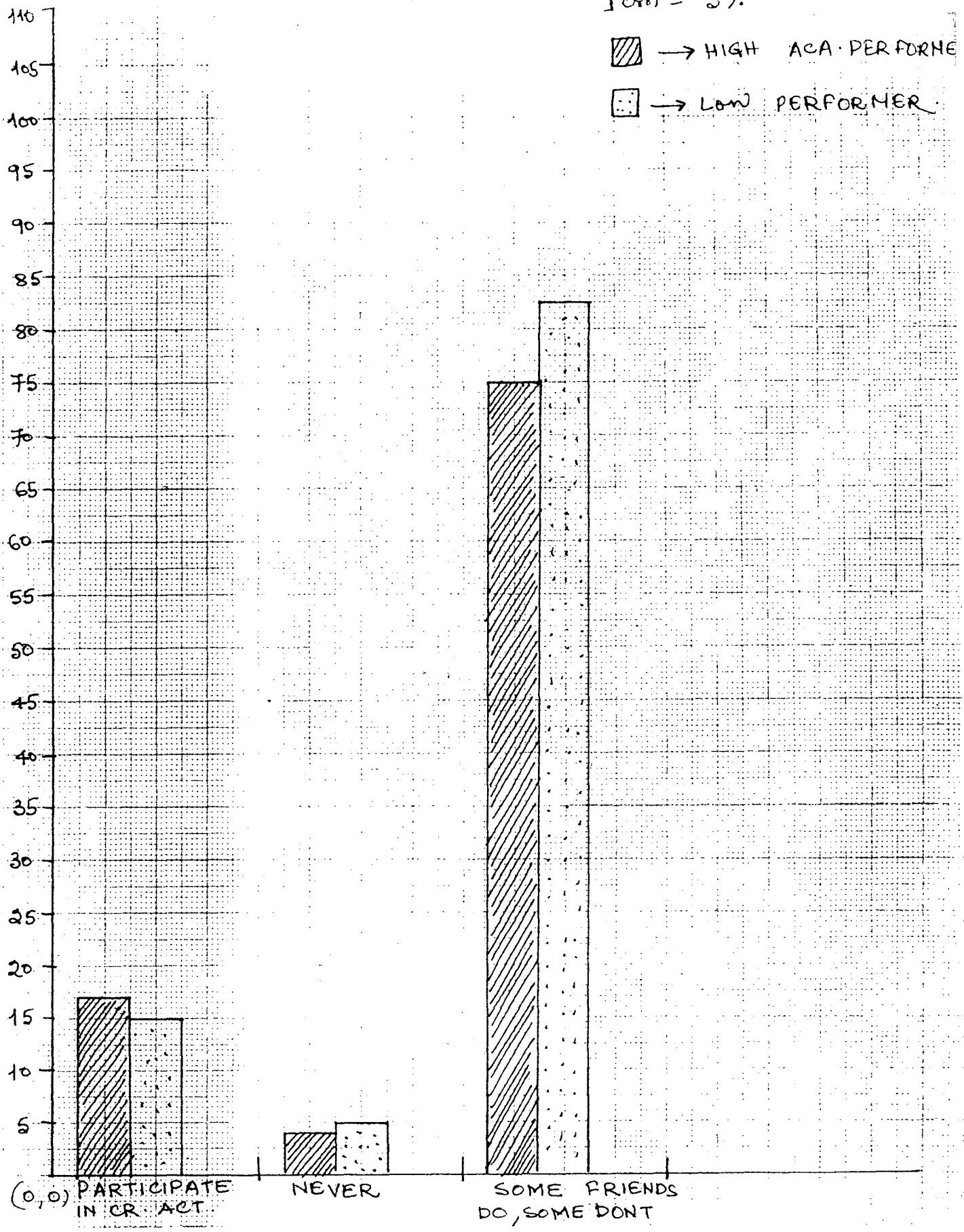
$$\chi^2 = 17.27 \quad df = 6$$

1. Significant difference was found among high and low academic achievers. The professor's attitude towards high academic achievers was significantly found good like he was considered most obedient and good at studies, and most hard working and sincere in a high rate in comparison to low academic achievers.
2. When it concerned they being considered as highly creative it was found slightly more in case of low academic achievers.
3. The professor's attitude being highly uncreative and most insincere towards all activities, it was more of a case in case of low academic achievers.

1 cm = 5%

▨ → HIGH A.C.A. PERFORMER

▤ → LOW PERFORMER



" FRIENDS OF STUDENTS PARTICIPATING IN CR. ACT.

N. (Friends of Students Participating in Creative Activities) -

TABLE 31

	HAC		LAC		Friends -	
	No.	%	No.	%		
A	19	17.1	6	15.3	25	A = Participate in cr. activities
B	5	4.5	2	5.1	7	B = Never
C	84	7.56	32	82.05	116	C = Some of them do and some of them don't
Total	111		39		150	

$$\chi^2 = 0.196 \quad df = 2$$

$\chi^2$  value does not come significant so graphically an attempt is made to show the difference -

1. No significant difference was seen among the high and low academic achievers in connection to their friends being interested or uninterested in creative activities.
2. When it concerned their friends participating in creative activities, it was more of a case in case of high academic achievers.
3. More low academic achievers were having friends who never participated in creative acts in comparison to high achievers.
4. The graph says that more low academic achievers had friends out of which some of them participated in creative activities and some of them don't in comparison to high achievers.

0. (People Like Artists and Writers being Entertained at Home as Guests) -

TABLE 32

	HAC		LAC			Following people were entertained as guests -
	No.	%	No.	%		
A	2	1.8	7	17.9	9	
B	82	73.8	18	46.1	100	A = Artists & writers B = None
C	28	25.2	13	33.3	41	C = Any other
Total	111		39		150	

$$\chi^2 = 16.54 \quad df = 2$$

1. Significantly more of low academic achievers showed artists and writers being entertained at their homes as guests in comparison to high academic achievers.
2. When it concerned none of those kinds being entertained as guests it was significantly high in case of high academic achievers.



P. (Visit to Science and Creative Exhibition) -

TABLE 36

	HAC		LAC			Interest in going to science and creative exhibition
	No.	%	No.	%		
A	48	43.2	12	30.7	60	A = Always avail the opportunity B = Not much but depends upon company C = Don't feel like
B	11	9.9	19	48.7	30	
C	11	9.9	8	20.5	19	
Total	111		39		150	

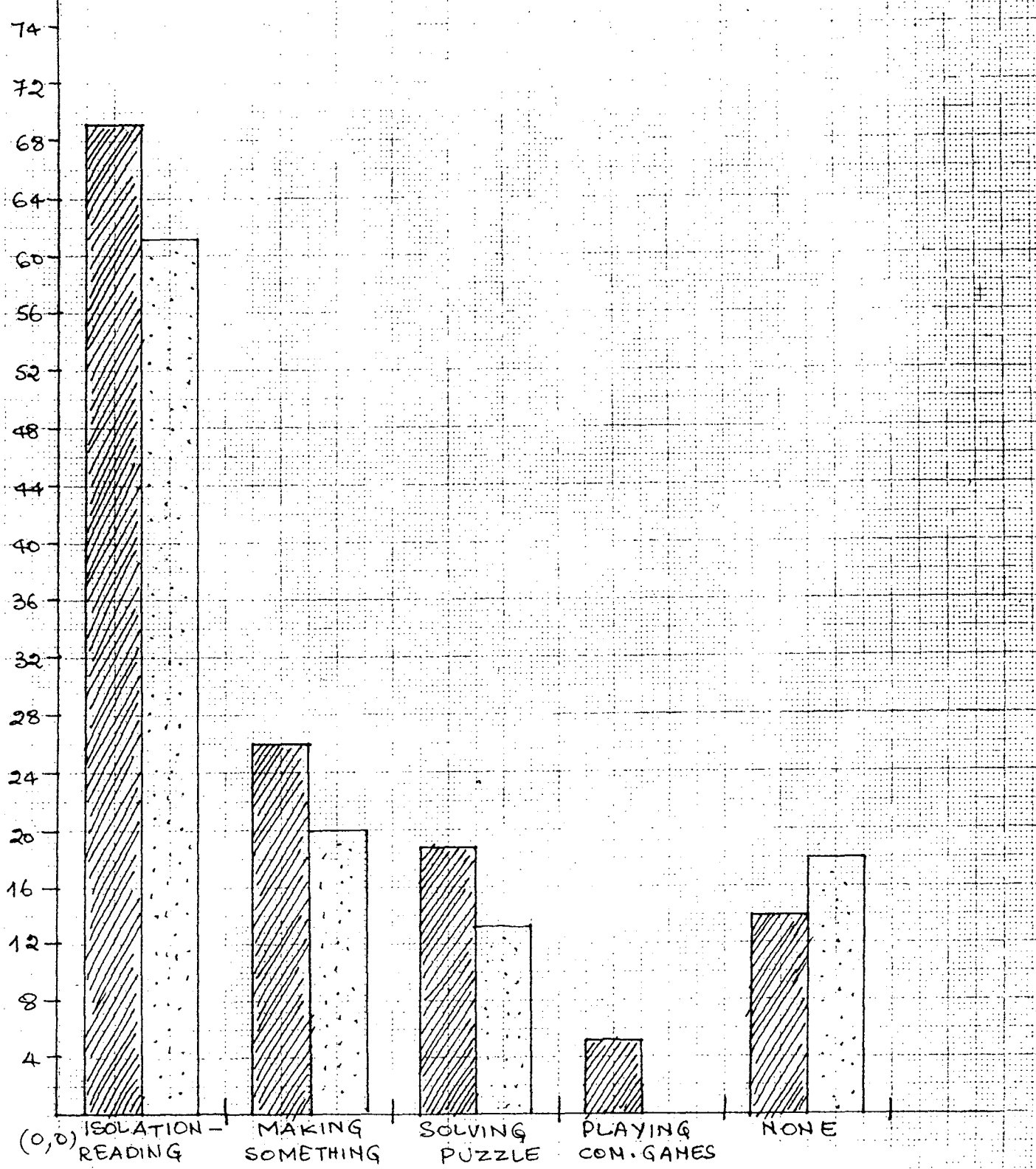
$$\chi^2 = 25.40$$

1. Significantly more high academic achievers were of the type who wanted to avail all opportunities of going to science and creative exhibitions in comparison to low achievers.
2. When it concerned they not being much interested but it depend upon company it was found more in case of low achievers.
3. Significantly more low academic achievers were those kinds who were not at all interested in visiting such exhibitions in comparison to high academic performers.

1cm = 4%

▨ → HIGH ACHIEVER

▤ → LOW ACHIEVER



"ACTIVITIES IN ISOLATION"

Q. Indulgence in Different Activities in Isolation -

TABLE 38

	HAC		LAC			In isolation -
	No.	%	No.	%		
A	77	69.3	24	61.5	101	A = Reading books
B	29	26.1	8	20.5	37	B = Making something of one's own
C	21	18.9	5	12.8	26	C = Solving puzzles
D	6	5.4	0	0.0	6	D = Playing computer
E	16	14.4	7	17.90	23	E = None
Total	111		39		150	

$$\chi^2 = 3.54 \quad df = 4$$

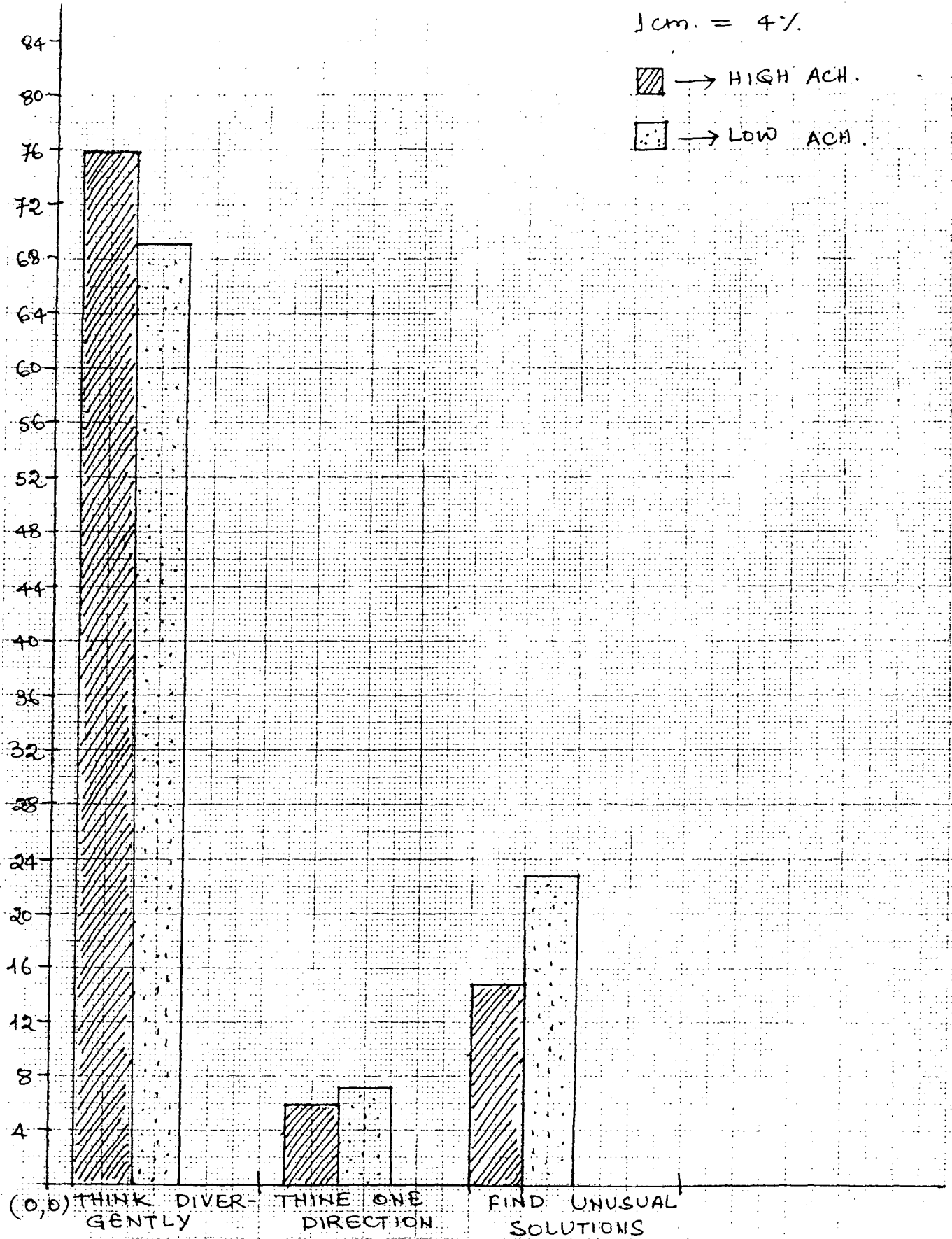
The  $\chi^2$  value does not come out significantly so the graph will show what is desired -

1. In isolation more high achievers indulged in reading books, solving puzzles, playing computer games and making something on one's own though there was no significant difference seen.

1cm. = 4%

▨ → HIGH ACH.

▤ → LOW ACH.



"THINKING PROCESS OF STUDENT"

R. Thinking Process of Students -

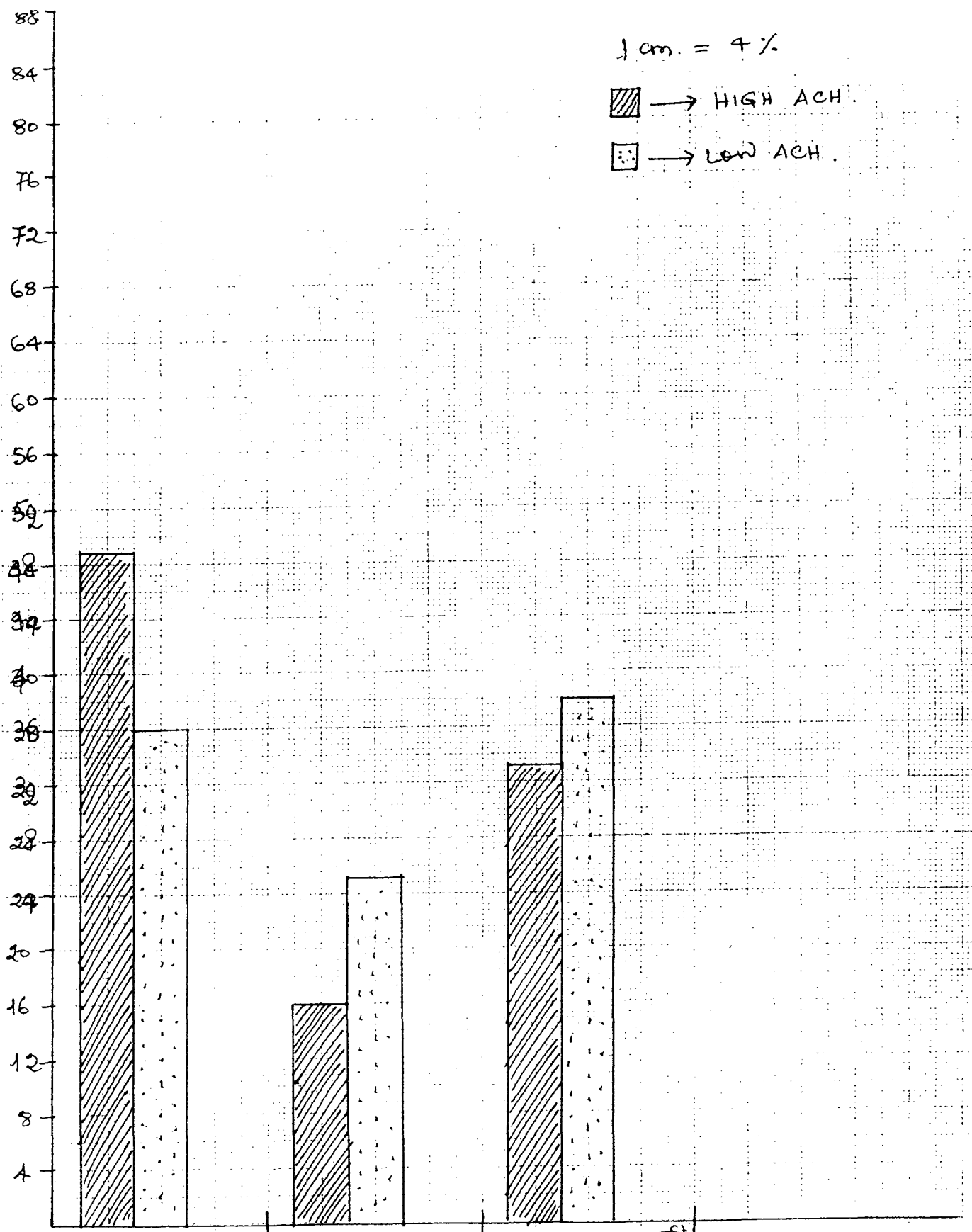
TABLE 40

	HAC		LAC			Thinking process involves -
	No.	%	No.	%		
A	85	76.5	27	69.2	112	A = Divergently think on issues and give equal exp. to all possibilities.
B	7	6.30	3	7.6	10	
C	17	15.3	9	23.0	26	
Total	111		39		150	B = One directional thinking

$\chi^2 = 1.28$        $df = 2$       C = Unusual solution of some problem.

The  $\chi^2$  value does not come out significant but the graph indicates the difference -

1. Though there was no significant difference seen among high and low achievers but the graph clearly indicates the difference in their thinking process. More high achievers though divergently on all possibilities in comparison to low achievers.
2. When the thinking process indicated they being one directional or arriving at unusual solutions it was seen more in case of low achievers.



(0,0) ENGROSSED PROB. SOLVING FORGET & START THINKING ELSE SOMETIMES IS IND.

" PROBLEM SOLVING BEHAVIOUR "

S. Problem Solving Behaviour of Student -

TABLE 43

	HAC		LAC		
	No.	%	No.	%	
A	55	49.5	14	35.8	69
B	18	16.2	10	25.64	28
C	37	33.3	15	38.4	52
Total	111		39		150

While solving a Problem -  
A = Engrossed in solving  
B = Sometimes forget it and start thinking on other issues  
C = Somtimes first & sometime second

$$\chi^2 = 2.73 \quad df = 2$$

$\chi^2$  does not come out significant but the graph shows the difference between high and low academic achievers -

1. Though significantly high and low academic achievers don't differ concerning their attitude towards solving problems. But graphically they seem to be differing like more high achievers were engrossed in solving problems and did not think on other issues.
2. More low academic achievers were those who forgot the problem and start thinking on other issues in comparison to high academic achievers.

## DIFFERENCE IN EXTROVERTS, INTROVERTS AND AMBIVERTS

An attempt was made to ascertain if the creative and non creative persons in anyway differed in their personality features. For this purpose Neymann - Kholstad's extroversion, - intraversion questionnaire was used and the scores of each student was taken and related to their creativity index scores. Correlational analysis was calculated out to find out if creativity is correlated with personality factors. Table below presents the r value between creativity and personality of all the 150 students of IIT taken for this study.

TABLE 1  
"Creativity and Personality"

	Creativity	Extro-Intra.
Mean	118 101.86	0 3.46
SD	35.01	9.34
N	150	150
r	+ .20	+ .20

From the above table it is seen that there is a somewhat low but positive correlation between creative and personality factors. To be more specific hyper the extraversion, greater the creativity and vice-versa.



While there is a positive relationship between creativity and personality, it was considered worthwhile to find out the mean extroversion - intraversion scores of high and low creative students to ascertain if these scores differ between the two groups. Table II below presents these results -

TABLE II

"Mean Extroversion - Intraversion scores and T Value"

	Mean	SD	N		T Value
High Cr. > 118	2.84	8.79	57 (N1)	HC	HC:AC - 7.18 HC:LC + 12.5
Aver Cr. >70 to <118	4.10	8.33	68 (N2)	AC	AC:HC + 7.18 AC:LC + 17.2
Low Cr. < 70	5.24	11.45	25 (N3)	LC	LC:HC - 12.5 LC:AC - 17.2

From the above analysis it is seen that high creative people have significantly lower extroversion scores than low creative students.

The T values when compared with T table give significant results. It shows that high achievers in comparison to low & average achievers are significantly different.

### Personality of IIT students in General

When the entire 150 students taken for this study from IIT are considered for extroversion - Intraversion dimension, it is seen that 60% of IIT students fall in the category of extroverts, 23% fall in the category of introverts and 17% as ambiverts.

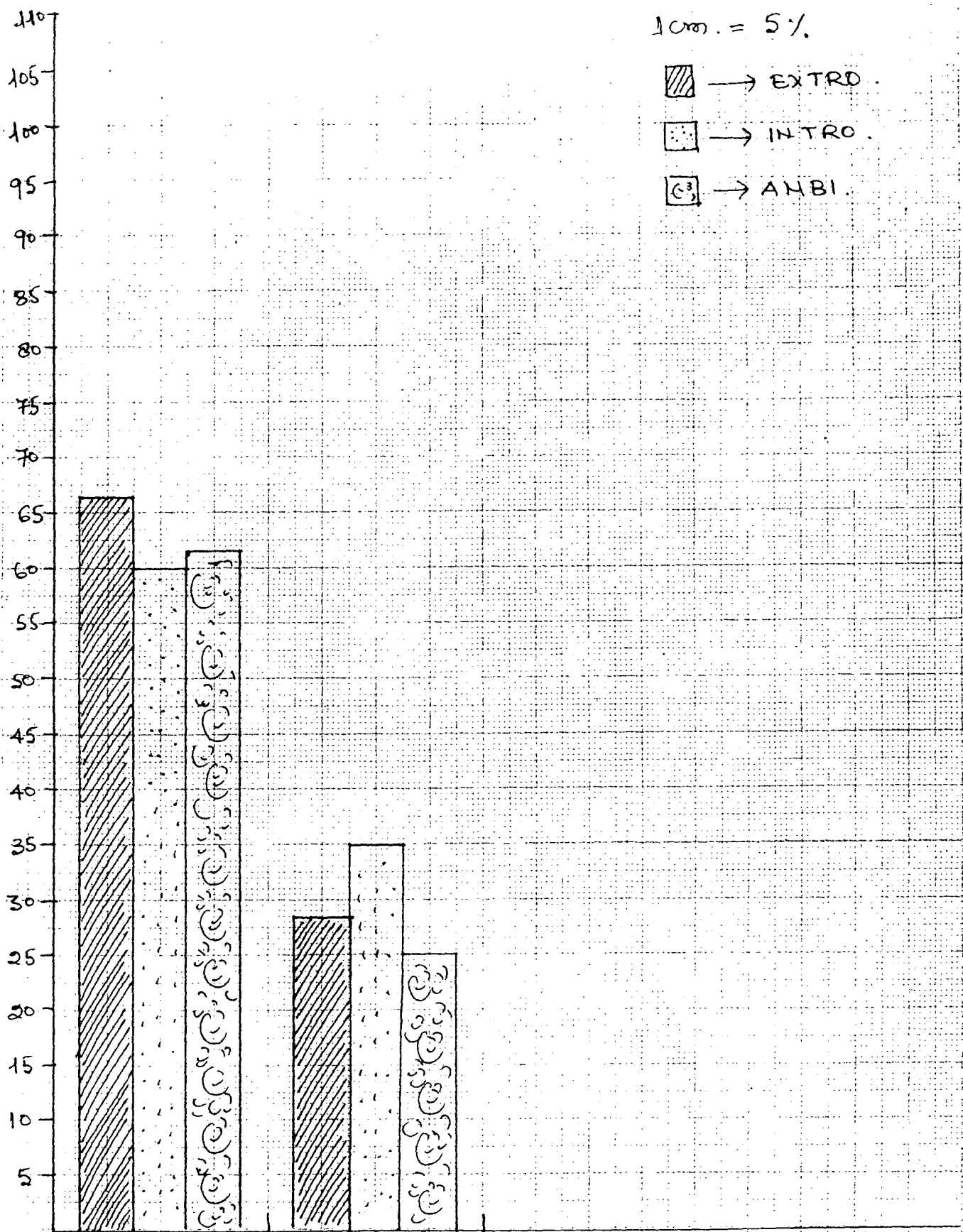
Correlation coefficient was taken between creativity vs. academic achievement, creativity vs. extroversion-intraversion, academic achievement vs. extroversion-intraversion. The results showed a significant negative correlation between creativity and academic achievement and indicates that as the creativity increases, the academic achievement comes down and vice-versa. A low degree of positive correlation was found between creativity and extroversion. Almost no correlation was found between academic achievement and extroversion-intraversion.

TABLE III




"Table for Correlation"

<u>r (coefficient of correlation )</u>	<u>After partial correlation</u>
Creativity Vs. Academic Achievement ( - .51)	- .41
Creativity Vs. extroversion intraversion (+ .20)	+ .18
Academic Achievement Vs. extroversion (+ .08)	- .02

When partial correlation was taken out controlling one of the above written variable, it showed not much difference. But slight difference was observed like when academic achievement was controlled, the correlation between other two remained almost the same. In other combination where personality factor was controlled, the correlation between creativity and academic achievement remained negative correlation like before but slightly less negative correlation. In the last combination where creativity was controlled, the correlation between academic achievement and extroversion become negative instead of no correlation.



1cm. = 5%

-  → EXTRD.
-  → INTRO.
-  → AMBI.

(0,0) PARENTS PART IN CR. ACT.      NO PARTICI. IN CR. ACT.

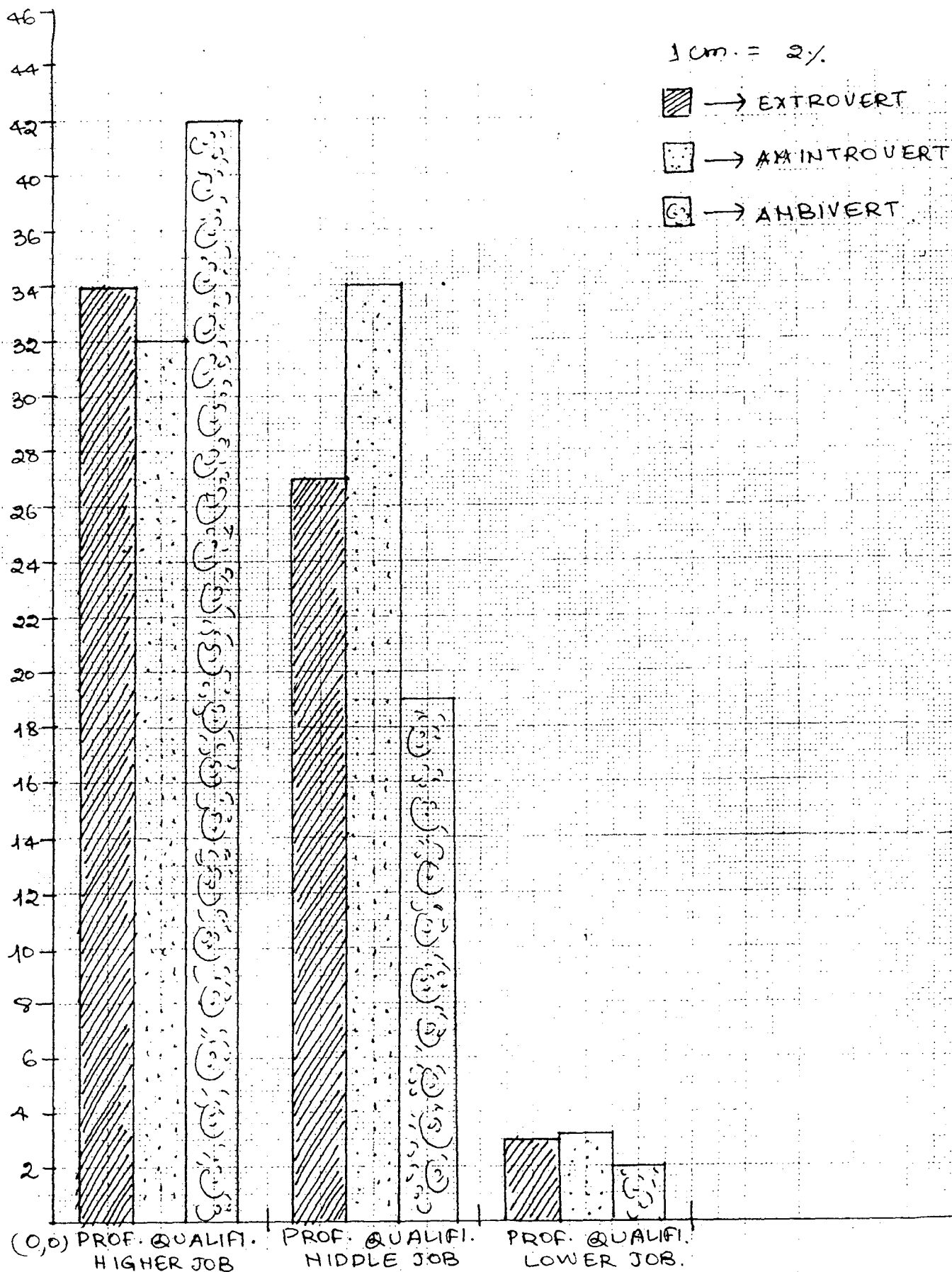
" PARENTS PARTICIPATION IN CREATIVE ACTIVITIES "

## GRAPH I

An attempt is made to see whether extroverts, introverts and ambiverts differ in any way concerning their parents' participation in creative activities -

Inference from graph I

1. When the parents of extroverts, introverts and ambiverts are compared in connection to their participation to creative activities, more parents of extroverts participated in such activities.



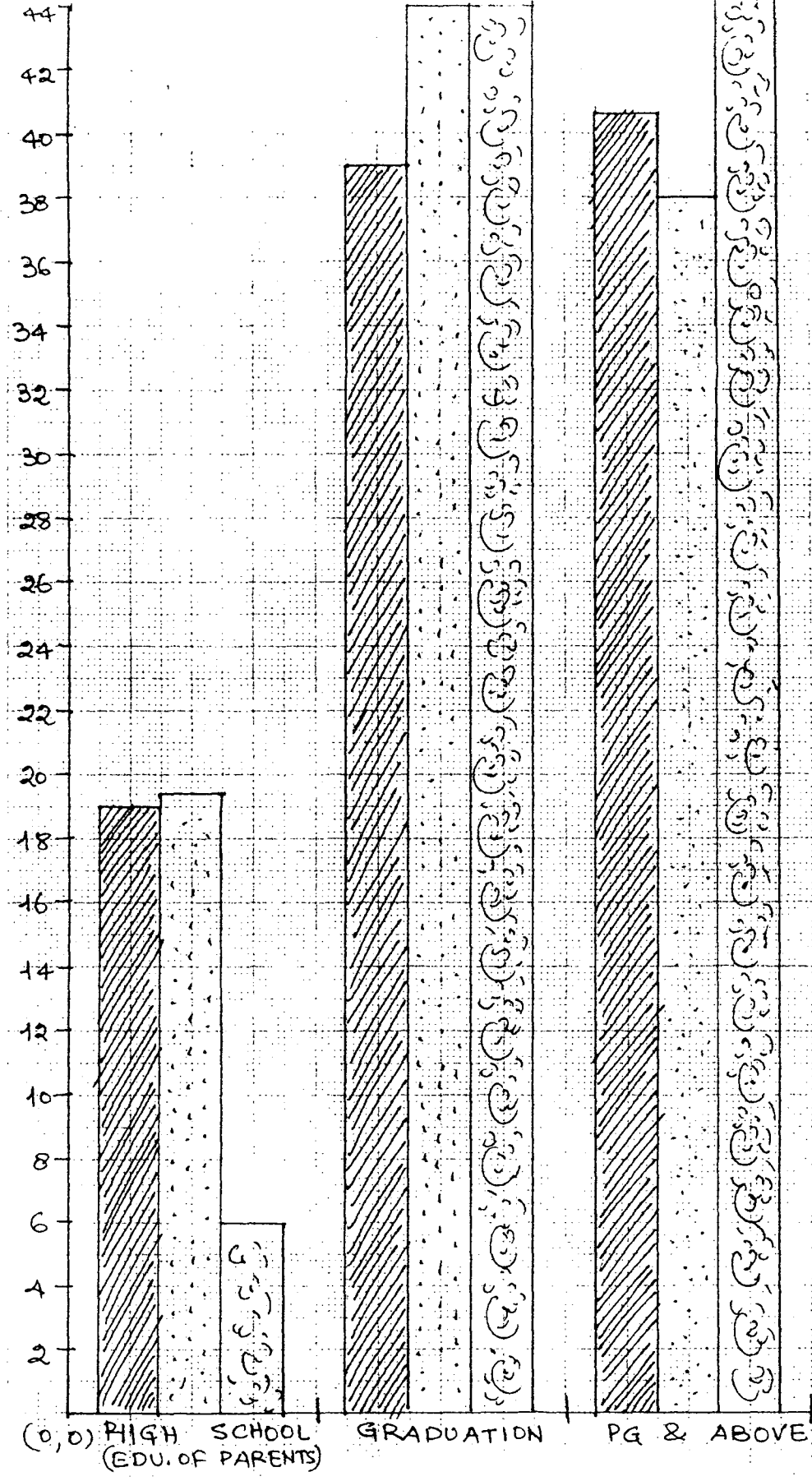
" PROFESSIONAL QUALIFICATION OF PARENTS "

## GRAPH II

Professional Qualification and type of job in case of parents of extroverts, introverts and ambiverts -

Inferences from graph II

1. More parents of ambiverts are those who were found to be having professional qualification and were at higher jobs like doctors, engineers and prof. in comparison to introverts and ambiverts.
2. More parents of introverts were at slightly lower jobs like teacher, low officers and executives. When it concerned the parents being at lower job but also having professional qualification some trend is observed.



1 cm. = 2%

- EXTROVERTS
- INTROVERTS
- AMBIVERTS

" EDUCATION OF PARENTS "

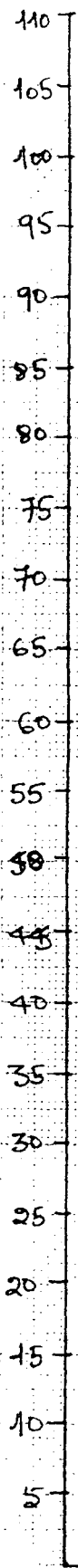


### GRAPH III

Educational level of parents being different in case of parents of different extroversion - intraversion.

#### Inferences from graph III

1. When the parents of extroverts, introverts and ambiverts are compared concerning their educational qualification, more parents of ambiverts were those who were educated till graduation, post-graduation and above in comparison to parents of introverts and extroverts.
2. More parents of extroverts and introverts were educated only till school in comparison to ambiverts. Over all very few parents were of this type.



(0,0) HIGH INCOME GROUP    MIDDLE INCOME GROUP    LOW INCOME GROUP

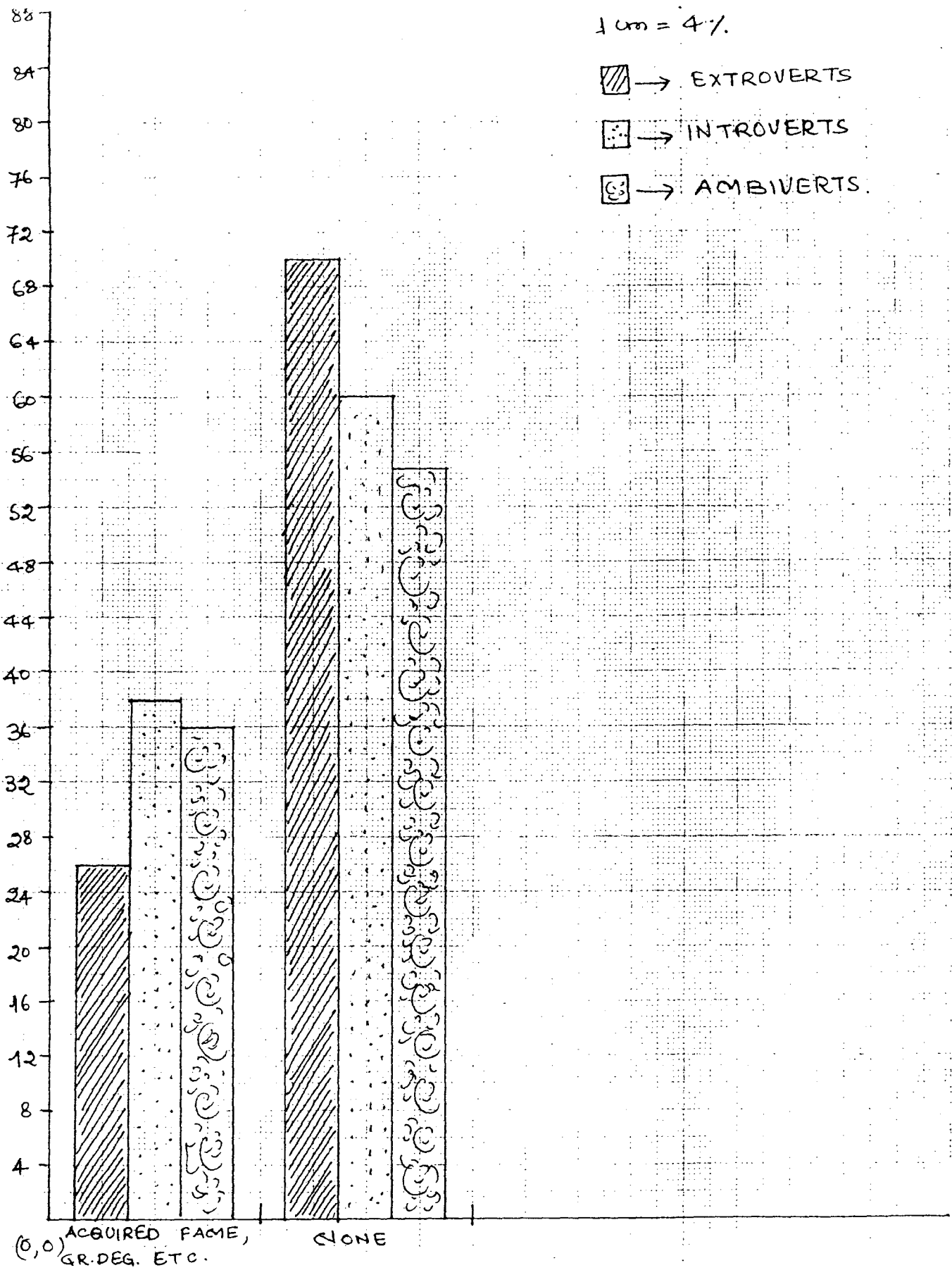
" INCOME GROUP OF PARENTS "

#### GRAPH IV

Income group of parents - the parents being either at high, middle or low income groups and whether they differed in case of extrovert, introvert and ambivert.

#### Inference from Graph IV

1. While comparing the income groups of parents, it was indicated by the graph that more parents of introverts were of high income group in comparison to other two. More than 75% of the parents belonged in general to this HIG group.
2. When middle income group parents were compared, minimum parents of introverts belonged to middle income group where as in this regard parents of extroverts and ambiverts were found in same percentage who belonged to middle income group.
3. Almost negligible parents belonged to low income group.



(0,0) ACQUIRED FAME, GR. DEG. ETC. NONE

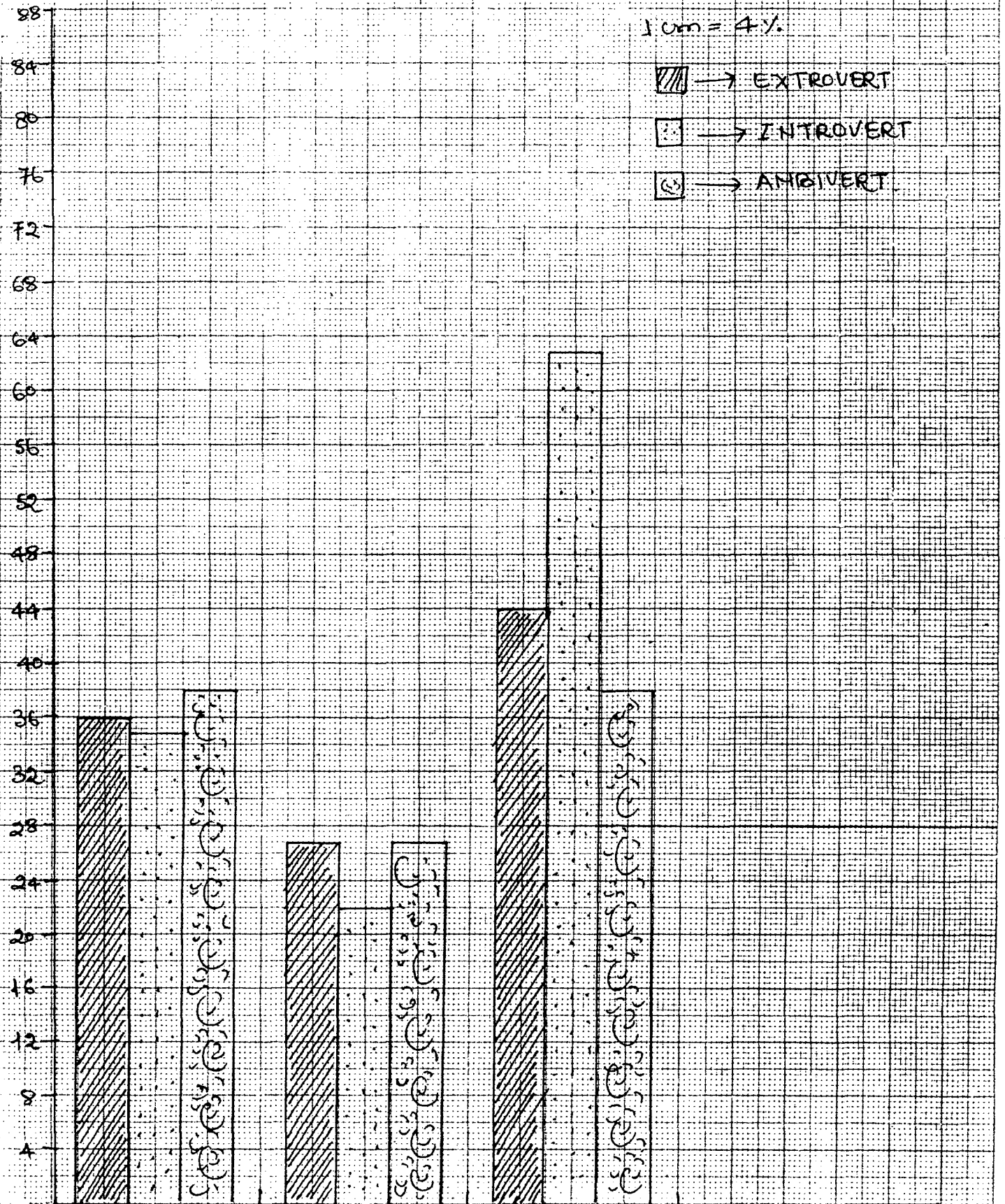
" PARENTS' REWARD IN CREATIVE ACTIVITIES "

## GRAPH V

Parents rewards in creative activities - whether the parents acquired either of the things in such activities or they did not acquire either of these.

Inference from Graph V

1. When the rewards of parents concerning creative activities were compared more parents of ambiverts had acquired fame, graduate degree, post-graduate degree, certificates, awards etc. in comparison to parents of other two.



(0,0) FICTION & LITERARY

SCIEN., TECH., CR. IDEAS

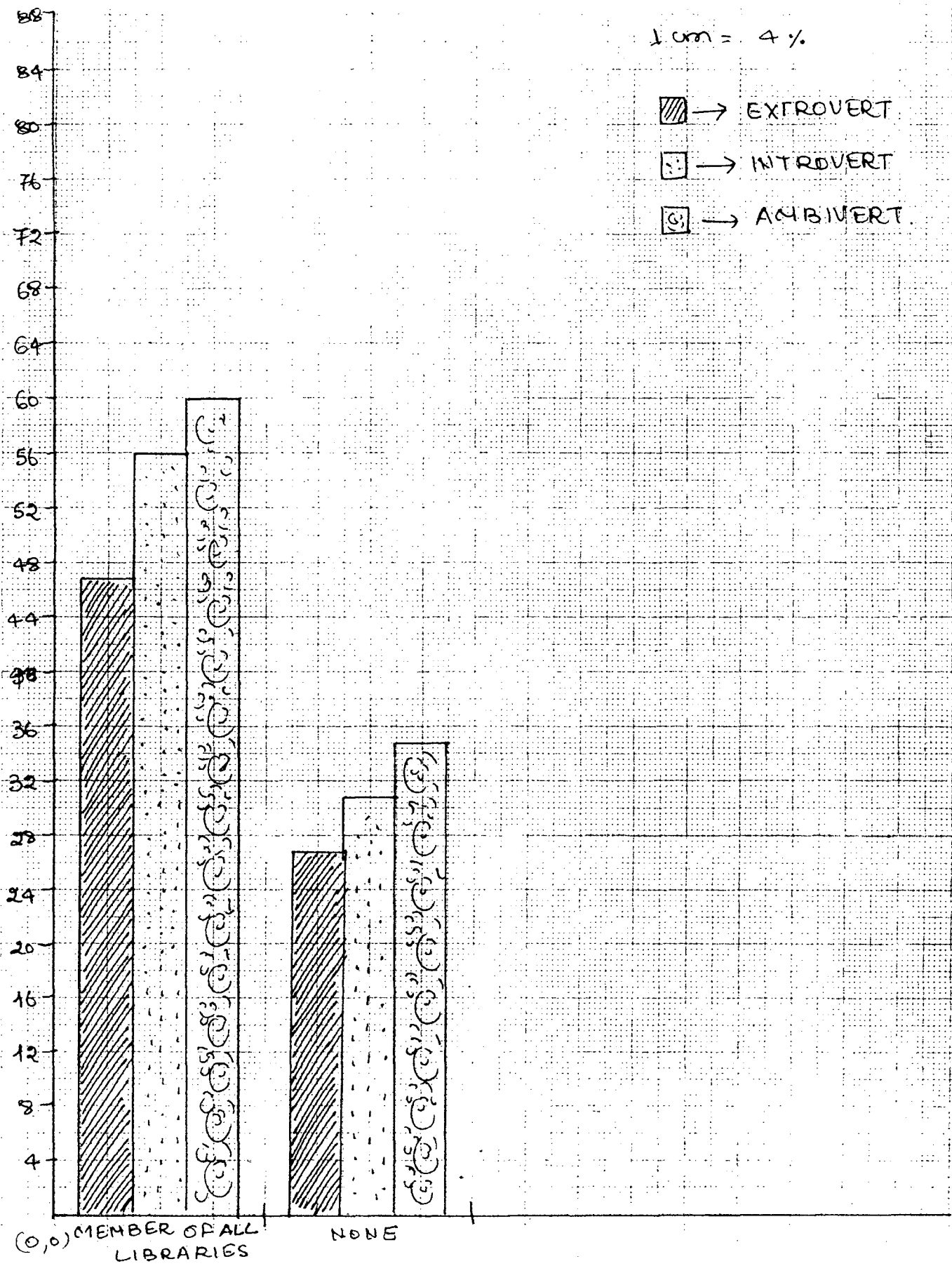
NOTHING SPECIFIC

## GRAPH VI

Books read by parents - whether extroverts, introverts and ambiverts had different parent with different choice of reading books or not.

### Inference from Graph VI

1. More parents of ambiverts were found to be reading books on fiction, literature, scientific inventions, technical and creative ideas in comparison to parents of extroverts and introverts.





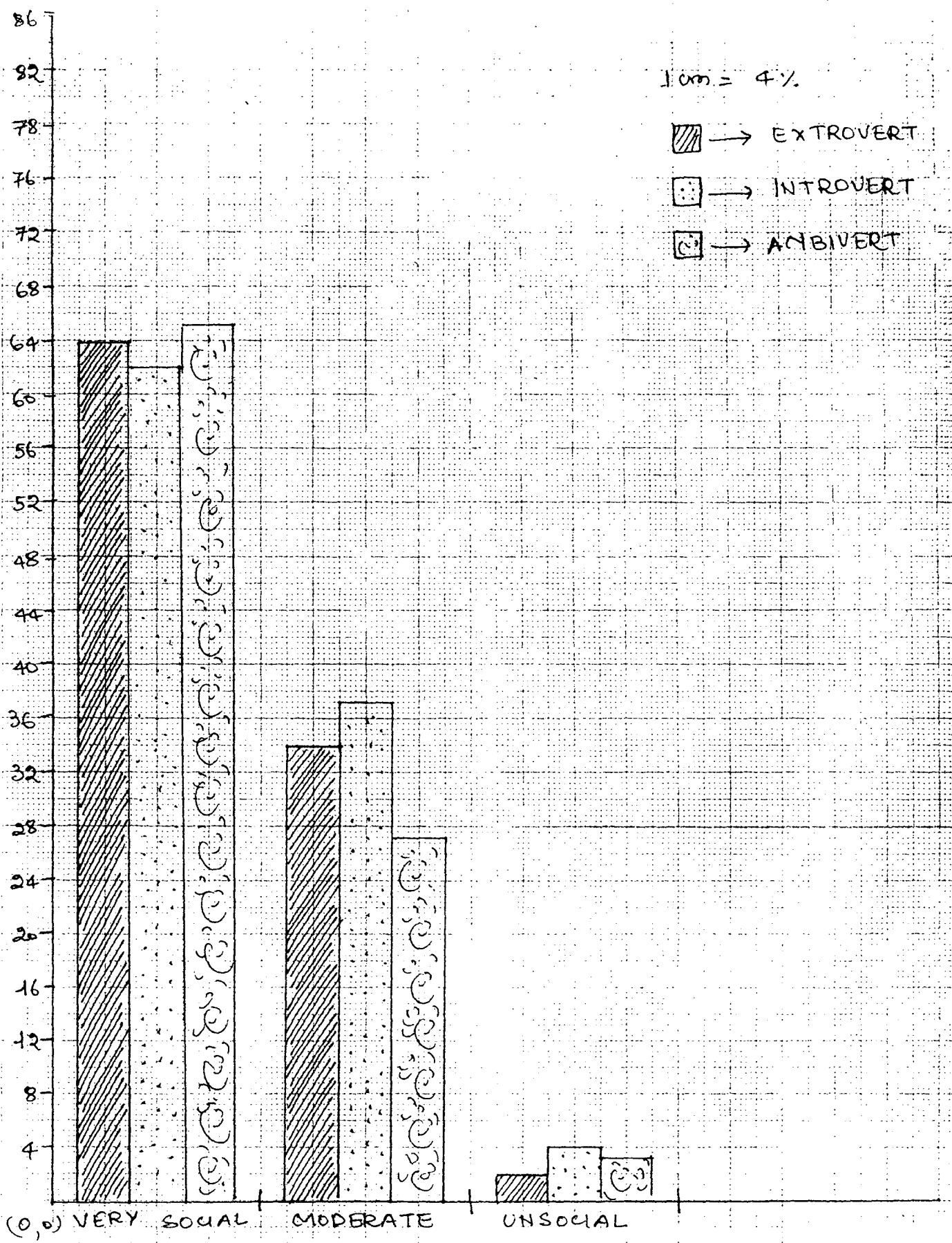
## GRAPH VII

Parents' Membership of libraries - It was found whether different libraries were used by parents of different students or whether they were not keen in going to libraries and reading books.

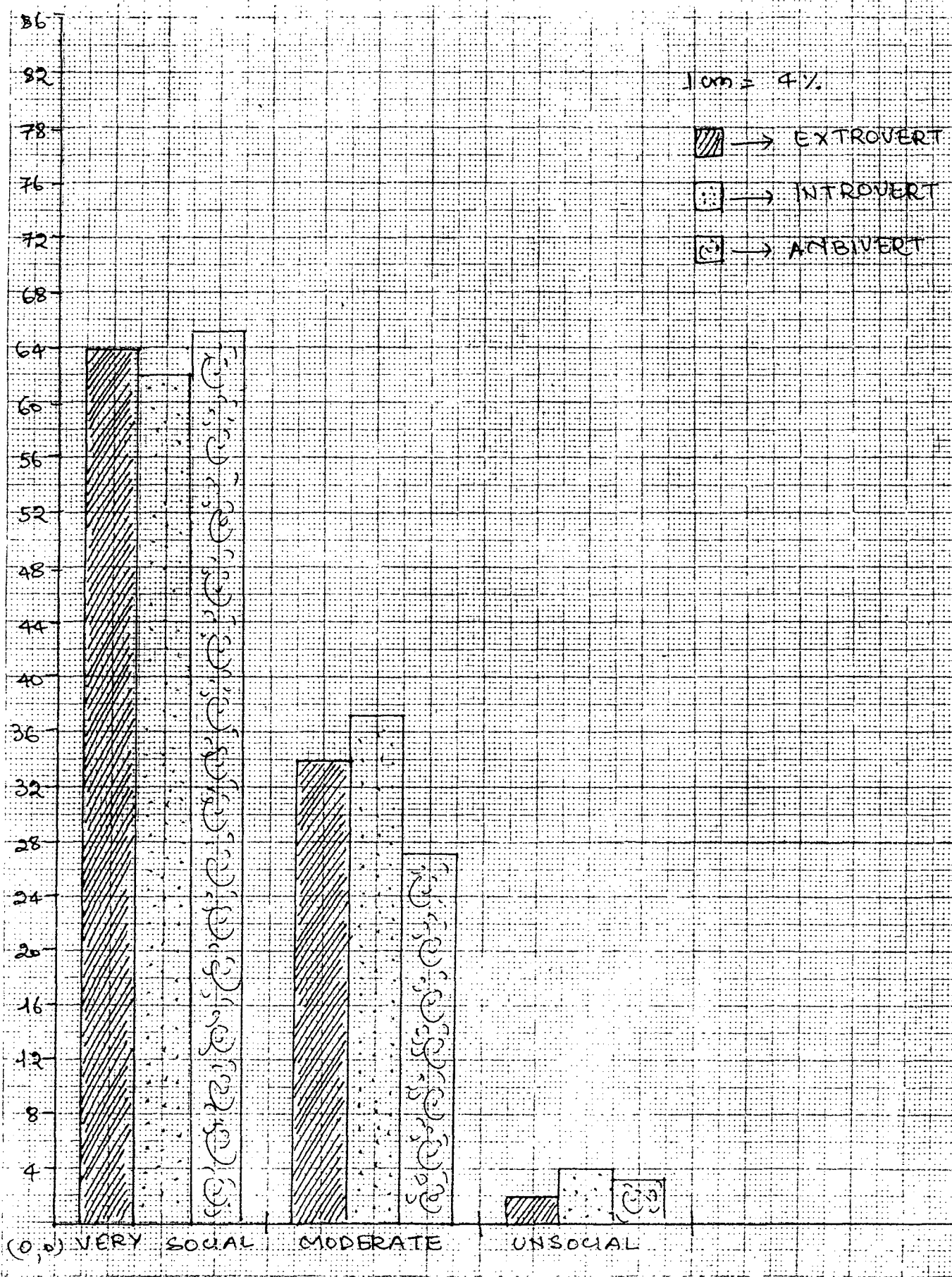
### Inferences of graph VII

1. The graphical presentation of the parents being member of which library indicates that more parents of ambiverts were members of all libraries in comparison to extroverts and introverts.

Similar trend was seen when it concerned they not being the member of any libraries but in general more parents were the member of some or the other library and only a few of them were not keen in going to the library.



"SOCIAL LIFE OF PARENTS"



"SOCIAL LIFE OF PARENTS"

## GRAPH VIII

Social life of Parents - Parents can belong to social, moderately social and very unsocial categories and thus it was tried to acquire the information regarding their social life.

### Inference from Graph VIII

1. Social activities of parents play an important role in case of either of the type of students. After observing the graph it was seen that generally (more than 60%) were very social and had many friends.
2. Slightly less member of parents of ambiverts were moderately social and had limited friends.
3. Very few or negligible parents were unsocial and had no friends.

88  
84  
80  
76  
72  
68  
64  
60  
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4

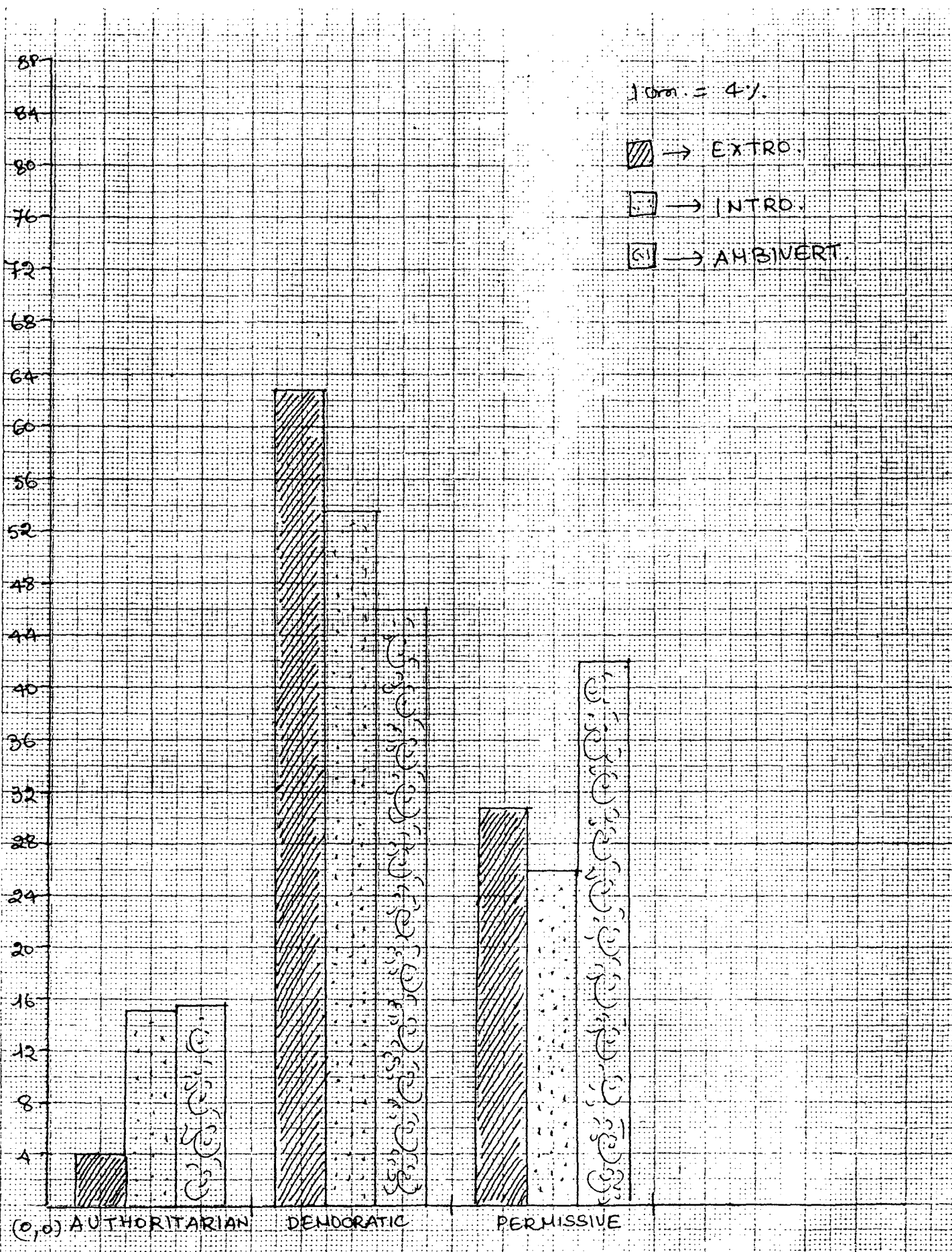
10mm = 4%

▨ → EXTRO.

□ → INTRO.

◻ → AMBIVERT

(0,0) AUTHORITARIAN      DEMOCRATIC      PERMISSIVE



"BRINGING UP TECHNIQUE"

## GRAPH IX

Parents adoption of different techniques of upbringing - To know whether the parent differed in connection to their adoption to either of the techniques like authoritarian, democratic and permissive etc. or not.

### Inference from Graph IX

1. More than 75% of the parents adopted democratic attitude. But more parents of extroverts were of this type than introverts and then ambiverts.
2. It clearly indicates that extroverts had very few parents adopting authoritarian technique of upbringing.
3. More parents of ambiverts were those who gave permissive environment to children in comparison to parents of introverts and extroverts.
4. Over all it was seen that very few parents adopted authoritarian attitude.

**CHAPTER 5**

**DISCUSSION**

## CHAPTER V

### "Discussion"

The present chapter indicates a discussion of the findings in this study. The discussion has been organised around the major hypotheses tested in this study.

#### 1. Creativity in students and their parental background

Hypothesis No.1 was laid to ascertain whether there were differences concerning parental background of high & low creative students. The findings indicated that there are significant differences between high & low creative students. For instance as compared to low creative students,

- (a) the parents of high creative students participated in creative activities.
- (b) they had friends who were also involved in creative activities.
- (c) parents of high creative students showed attainment of reward in creative activities such as fame, awards & certificates.
- (d) parents of high creative students were those who indulged in reading books and were members of different libraries in comparison to parents of low creative students.



- (e) More parents of high creative students show greater social participation and were more social in comparison to parents of low creative students.

The above findings of the present study support those of Weisberg and Springer (1961) who found that the parents of creative children showed expressiveness together with a lack of domination over their children. They demonstrated that there was a significant association between parental variables and creativity. The present study has also shown similar findings.

This finding goes in line with that of Getzel and Jackson (1962) classic study which demonstrated that the parents' attitude towards their children to significant extent contributed to creativity in children. In a more recent study in India Singh (1982) however contradicted the above contention and showed that attitude of parents did not affect creativity in anyway. Considering the fact that proper attitude towards anything develops as a result of parental effort and their attitude towards certain aspects of the environment, one may tend to agree with Getzel & Jackson and the present study rather than with that of Singh's study.

## 2. Attitude of parents & creative interest.

The present study showed that more parents of high creative students had significantly good & encouraging attitude towards their children as compared to parents of low creative

students. Also it is evident from the present findings that favourable attitude, proper love and affection might be responsible for fostering creativity which refutes the finding by Singh who says that all children get almost the same environment at home and do not generally differ on this particular area.

### 3. Creativity and Stimulating Environment.

Another finding of the study reveals the fact that creative children are exposed to creative instruments at home from their childhood. The creative instruments which were found significantly higher were paint brushes, blank sheets, colour pencils, books on craft and puzzle and creative works of parents and grand parents. This in other words indicates a stimulating environment at home.

This finding supports that of Harvey (1966) who pointed out that creative children had more freedom to explore their physical and social aspects of their environment as compared to non-creative children.

The general rationale for providing such a stimulating environment is based on the notion that enrichment of environmental stimulation will lead to greater intellectual competence - that is, thinking abilities including convergent & divergent abilities will be enhanced.

4. Interest of Creative Students

- (a) Significant difference was seen in high & low creative students concerning their choice of books. More high creative students read books on fiction, literature, science and creative ideas and their implications. In a study by Mackinmon(1962) it was found that creative people were open to complex experiences, in that they had a preference for perceptual complexity. They appeared to accept the perceptual complexity without being disturbed by them and most times actually prefer the richness of the complexity. The findings of the present study support that of Mackinmon where it says that creative students show keen interest in going deep into things and add complexity to their knowledge.
- (b) While considering students' membership of different libraries significantly more of high creative students were members of their own institute library and many other libraries in comparison to low creative students. This finding also supports that of Mackinmon where he finds creative architect to be more analytical & curious and so one may expect them to look for varied information from books, journals & magazines.

(c) Significantly very high percentage of high creative students indulged in creative activities like painting, music, scientific inventions, maths, puzzles, dance, drama, writing and poetical in comparison to low creative students. The IPAR (1962) study in this context had shown that the creative architect were significantly more creative and productive than the average architect. It also found that these architects to be more imaginative and who enjoyed artistic impressions and aesthetic sensibilities more than the average architect.

5. Friends of Creative Students -

In case of high creative students they chose friends who participated in creative activities. On the contrary significantly more of low creative students showed friends who never participated in such activities. These findings appear to be in disagreement with the findings of Cattell (1965) who found the creative students to be unsocial, reserved and cool and not having friends; he found them loners. The present finding however supports Mackinmon's views where he finds creative architects to be capable of interacting more effectively in social settings.

## 6. Activities in Isolation

The present study has shown significant difference in regard to student's participation in different activities in isolation. Much more of high creative students indulged in activity where they wanted to make something on their own and solving puzzles in comparison to low creative students. Even case of their indulgence in reading books and playing computer games in isolation high creative students significantly participated more in comparison to low creative students. Earlier studies done in the area of creativity do show evidence of revealing one's participation in activities in isolation (Cattell 1955, Mackinmon (1962), Harvey (1966) and Veeraraghavan (1988).)

## 7. Attainment of Rewards -

The study revealed that significantly more of high creative students indulged in activities which resulted in their acquiring more prizes and certificates in comparison to low creative students. This finding goes in line with that of Taytton (1966) who said that creative people prefer complex to simple stimulations, display relatively more feminine interests, humour and playfulness.

## 8. Problem Solving

Another finding of the present research was the significant difference between high and low creatives concerning their

problem solving attitude. More of high creative students were found either engrossed in solving the problem or forgot about the problem and started thinking on other issues in comparison to low creative students.

#### 9. Income Group

While considering the income group of parents it was found out that though there is no significant difference between high and low creative students concerning the income of their parents, it was yet observed that relatively larger percentage of low creative students were from higher income group in comparison to high creative students. A study done by Haley (1984) also suggests similar finding and says that socio-economic status have nothing much to do with creativity. Another study done by Singh (1981) gave conflicting results. It said that socio-economic status has definite effect on creative thinking abilities of children. Many other studies show controversial results; like studies by Ogletree (1971), Raina (1968), Singh (1972) and Pareek (1966) showed significant difference between socio-economic status and creativity of students. Where as some scientists support the results of the present study like Lalitha (1957), Das (1959) etc. who say that there is no influence of economic status on the imagination of students.

#### 10. Education of Parents

Education of parents was another factor which did not show significant differences between high and low creative students. But more of high creative students had parents who had education till post-graduation and above in comparison to parents of low creative students. A study done by Singh (1972) supports this finding and says that educational status of parents of high creative students was higher than the parents of low creative students. This study supports the present finding to that extent where it adds up that more parents of high creative students show education till post-graduation in comparison to parents of low creative students.

When one talks of reading habits and educational qualification, one also becomes interested in finding out whether those people are also the member of libraries. It was interesting to note that parents of high creative students were found to be members of international forums in much higher rate than parents of low creative students. More parents of low creative students showed membership of libraries limited to their own institute library in comparison to high creative students. When it concerned the mothers of students, the mothers of high creative students were the members of many libraries in a muc higher rate than the mothers of low creative

students. A study by Singh (1982) only studied some characteristics of mothers of high and low creative children but does not show any results concerning their membership of libraries.

No significant difference was seen concerning parent's choice of journals. It was found that parents of high creative students were highly interested in reading books and journals on science, music, maths, quiz, general knowledge etc. in comparison to parents of low creative students.

#### 11. Parent's Initiative

When parent's responsibility for encouraging children to participate in creative activities has studies, it was observed that more parents of creative students were found taking personal initiative in case of high creative students in comparison to low creative children. A study by Schwarcz & Barinbaum (1984) showed that children who come from less aesthetic environment and where there is less attention paid to art show low level of creativity; thus the present study supports the findings of present study.

Adaptation of bringing up technique by parents also showed some difference with regard to their children's creative potentials. While comparing the two groups it was found that more parents of high creative students showed democratic



techniques of upbringing in comparison to parents of low creative students. In the broad general trend it showed no significant difference regarding these techniques and indicated that probably adaptation of either of these techniques have nothing to do with creativity. These results contradict to Getzel & Jackson (1962) who showed that the way in which one is born and brought up contributes to creativity.

#### 12. Ordinal Position

Generally more of low creative students belonged to youngest position in the family in comparison to high creative students. A study by Garial (1985) revealed a significant superiority of first born students over the last born in case of creativity. This finding is supported by the findings of the present researcher; where she also found last borns to be less creative than first borns. Another study by Geeta & Shrivastava (1983) shows contrasting results and says that there is no relationship between creativity and birth order.

#### 13. Parent's Expressiveness

No significant difference was found concerning parent's expressiveness in case of high and low creative students. It indicated that in general both the groups did not differ in regard to both the parents being expressive. In a study by Weisberg (1961) it was also evident that parents of high divergers were expressive.

#### 14. Decision Making

Decision making is one of the major factors, which shows the overall setting of students home background, while comparing two groups with regard to their decision making in case of parents, it was found out that more mothers of high creative students showed decision making capability in comparison to mothers of low creative students.

#### 15. Accomplishment of Household Responsibilities

Responsibility of household being accomplished by either of parents in case of high and low creative students. In case of mothers of low and high creative students more mothers of low creative students performed the daily responsibilities than the mothers of high creative. When it concerned both the parents taking equal initiative while accomplishing household responsibilities it was more in case of high creative students. Low creative students show such responsibility being accomplished by servants more in comparison to high creative students.

#### 16. Schedule of the Day

Hours of study was also one of factors where the significant differences were found amongst creative and non-creative students. But high creative students had much higher hours of study in comparison to low creative students.

#### 17. Reading Habits

When student's hours of study and being member of different libraries is studied, their everyday schedule needs to be understood. though there is no significant difference found concerning their schedule but still more of high creative students show balanced schedule of everyday where they have time equally allotted to studies, recreation and creative activities. It was also interesting to note that none of the high creative students devoted all the time for studies.

While understanding the choice of journals on the part of students, it was found that more of high creative students involved themselves in reading journals on science, music, quiz and general knowlege in comparison to low creative students. More of low creative students read journals on maths which as their study subject also.

#### 18. Attitude Towards Extra-curricular Activities

Considering the attitude of students regarding their participation in extra-curricular activities, it was found that low creative students showed much positive attitude towards indulging in extra-curricular activities in comparison to high creative students.

19. Professor's Attitude

Attitude of professors towards these two groups did not differ on this aspect was however found that more high creative students were considered highly creative, most obedient and good at studies in comparison to low creative students.

20. Recreational Interests

While considering their participation in games and attainment of prizes and awards in games some differences were found out. More of high creative students participated in outdoor games and acquired prizes - awards in games in comparison to low creative students. No students were found which could relate games with creativity.

While studying their interest in visiting science and creative exhibition, it was seen that much more low creative students felt uninterested in visiting such exhibitions in comparison to high creative students.

21. Thought Process

No significant difference was found in case of high and low creative students in regard to their thought process. But much more of high creative students were found to be providing unusual solutions to problems in comparison to low creative students. More of high creative students indulged in thinking

divergently. A study by Young (1981) showed that a creative person is prove to think divergently on an issue and has conflicting solutions for one problem. In other study by Bachtold & P. Warley (1986) it was found out that divergent thinking has less to do with creativity and imaginativeness which is controversial to the findings of the present study.

## 22. Creativity and Personality Factors

Hypothesis 2 was laid down to ascertain whether there was any correlation between creativity and personality factors, creativity and academic achievement and academic achievement and personality factors. The following findings emerge -

No negative correlation was found between creativity and academic achievement. A study by B. Prasad (1977) found results which were contrasting to this finding; it said that academic achievement of the subject was related to social reinforcement to creative achievement. The present finding supports the finding by Passi (1972). There were some rsearchers ((for e.g. Singh (1977) and Chadha & Mehta (1982)) who gave contrasting results and said that creativity & scholarstic achievement are positively related. Researchers like Paramesh(1973), Goyal (1974) and Badrinath & Satyanarayan (1978) who found no correlation between the two.

Another finding was that creativity and personality factors (extroversion-intraversion) are positively correlated but on lower level. A study by Kumar (1981) and Bhargava (1979) gave similar findings. Mallappa and Upadhyay (1977) had also found similar results in their studies earlier. Some studies have shown that creativity and personality do not correlate (for e.g. Ahmad (1969) and Pathak (1969)).

No correlation was found between personality factors and academic achievement. In a study by N. Hota (1986) he showed contrasting results and said that both these are positively correlated. The findings of the present study support the views of Jindal (1984) who stated that personality factors do not influence academic achievement.

Hypothesis there was laid down to ascertain if personality types namely extroverts, introverts and ambiverts in anyway differed concerning their creative talent and parental background. It was found out that relatively more creative students are extroverts as compared to those who are non creative.

### 23. Academic Achievement and Parental Background

The present study also had its aim to find out the background of high academic achievers so as to ascertain their parental background. The following findings emerge -

Significantly more number of parents of high academic achievers were found to be highly educated in comparison to low academic achievers. In her study Vijay Laxmi (1981) showed similar findings and said that there exists a positive relationship between socio-economic status and academic achievement. In another supportive finding Chat (1981) stated that academic achievement was directly related to father's educational background.

More of high academic achievers showed parents who were professionally qualified and were at higher jobs in comparison to low academic achievers. In a study by Salunke (1979) it was said similarly that academic achievement is related to home environment, socio-economic status and economic management.

None of high academic achievers were found having favourable attitude of their professor towards them in comparison to low academic achievers. The study by Mc Donald (1976) showed similar findings and pointed out that teacher attitude affects the achievement of the child in a highly influential and positive way. But in another earlier study by Stephens (1967) he had given contrasting results when he said that teachers had no effect whatsoever on academic achievement of the pupil.

More of high academic achievers were found to be having more hours of study in their daily schedule in comparison to low academic achievers. In a study by Christie (1970) it became evident when he said that one's need for achievement and interest in activities is related to one's academic performance and creativity.

To conclude this chapter one may state that the results of the present study had been able to find considerable support in the researches conducted by experts in the area of creativity. In fact the findings, namely, the parental background, the stimulating envt. exposure to diff. creative activities and the modelling role of parents contribute to the enhancement of creativity potential in children is a significant contribution made by this study. These findings also find considerable support in the study of Mackinmon, Harvey etc., who had done research in creativity using highly scientific techniques nearly two decades ago. However some of the findings of present research such as attitude of parents towards children contributing to creativity did not find agreement in the earlier study such as Singh (1982). Similarly the findings in regard to academic qualification and the factors contributing the same, found considerable support in the earlier researches. The explored in the present study in addition to the other findings,



for e.g. friends' participation in creative activities, attainment of rewards in creative activities by parents, creativity related to membership of libraries, parents' professional qualification related to creativity etc. etc. Also most of the earlier studies have been carried on school children or people also had already acquired name and fame in creativity. But this study has considered an area totally unexplored, that is students of Indian Institute of Technology who are supposed to be among the top ten percent in the field of educational achievement and highly talented in our country. From this point of view the present study may be considered as a pioneering effort to understand the existence of creativity amongst IIT students and its contributing factors viz. the home background, parental back and stimulating environment. It is hoped that the findings of the present research has thrown light on issues related to but unexplored area of creativity in the field of higher education.

## **CHAPTER 6**

### **SUMMARY, CONCLUSION & IMPLICATIONS**

## CHAPTER VI .

### "SUMMARY, CONCLUSION, IMPLICATION"

#### 1. Summary -

The present study was undertaken to ascertain the existence of personalities factors, academic achievement and psychosocial factors amongst creative and non-creative students of IIT.

The objectives of the study were the following --

To ascertain the creativity level of IIT students and to see if the same varied amongst them.

To ascertain if the parental background of high and low creative students varies in anyway.

To ascertain if extroversion - introversion dimension varied amongst these students and whether they belonged to differential parental background.

To find out the academic achievement of students and studying the differential parental background of high and low academic achievers.

To find out the correlation between creativity - academic achievement, creativity - extroversion-introversion and academic achievement - personality factors.

Some testable hypothesis were laid down for the present study -

The high creative students may vary from that of low creative students in regard to their parental background.

There may be a correlation between creativity - academic achievement, creativity - personality factors and academic achievement - personality factors.

The personality traits may vary in terms of parental background.

The academic achievement may vary amongst IIT students, in terms of their creativity level, differential parental background and socio-economic status.

150 students of IIT Delhi were chosen as the sample subjects. 75 students from IIIrd year and 75 from IV year were chosen irrespective of their subject choice and area of study. Students of these years were chosen because it was considered that their motivational level was stable in these two years.

The instruments which were used are - Torrance Tests of creative thinking figural part A, Neymann Kholstad test for extroversion-intraversion, academic records of students and self designed questionnaire for ascertaining parental background.

Following an ex post facto design, the data were collected and then codified. The data were analysed by using, chi square

test, t-test, Carl Pearsons coefficient of correlation and partial correlation test.

It is observed that -

#### Creative Participation of Parents

Students of IIT Delhi differ with regard to their creative scores. Out of 150 students 57 came under the category of high creative and 93 under the category of low creatives.

While comparing the parental background of these groups it was found out that significantly more parents of high creative students participate in creative activities in comparison to parents of low creative students.

Significant differences were seen when parents attainment of rewards in creative activities was given emphasis. It was found out that significantly more parents of high creative students showed this kind of attainment in case of awards, certificates and fame in comparison to parents of low creative students.

#### Reading Habits of Parents and Membership of Libraries

The choice of books was also one of the area which was studied in this research endeavour. Parents of high creative students showed much more interest and indulgence in reading books on fiction, literature, science, creative ideas and technical in comparison to parents of low creative students.

While finding out the parents' choice of journals, it was felt that though there is no significant difference seen concerning this aspect of parents with regard to high and low creative students but still more parents of high creative students showed interest in reading journals on music, to parents of low creative students.

Considering the parents membership of different libraries and international forums, it was understood that though parents of both high and low creative do not differ significantly they do differ to some extent. More parents of high creative students were found the member of different libraries and internaional forums in comparison to parents of low creative students.

#### Parents' Income, Education, Professional Qualification & Type of Job

It was also desired to know the income group of students. No significant difference was found concerning financial position of parents but within this broad trend it is observed that larger percentage of low creative students come from higher income group than the high creative students.

No significant differences were found while ascertaining were found while ascertaining the educational level of high and low creative students. But more of high creative students have parents having education till post-graduation and above in comparison to parents of low creative students.

The parents of high and low creative students did not significantly differ in regard to their professional qualification and type of job. But more parents of high creative students were such that they had professional qualification and were at higher in comparison to parents of low creative students.

#### Social Life of Parents

Significant differences were found with regard to father's participation in social activities. Significantly more fathers of high creative students were found to be interested in participating in social activities in comparison to fathers of low creative students.

#### Friends of Parents - participation in creative activities

While finding out the friends of parents and their participation in creative activities, it was found out that significantly more of such friends were found in case of parents of low creative students in comparison to parents of high creative students.

#### Fostering Creative Potential

No significant difference was found while understanding the responsibility of parents for encouraging children to participate in creative activities. But more parents of high creative students were found taking personal initiative in comparison to parents of low creative students.

### Bringing up Techniques

When the adaptation of different bringing up techniques was used it was revealed that though no significant differences are seen amongst high & low creative students, low creative students show higher percentage on adaptation of democratic way of up bringing by parents in comparison to high creative students.

### Ordinal Position & Parental Attitude

While ascertaining the ordinal position of high & low creative students, no significant differences were found but more of low creative students were found either at eldest or youngest ordinal positions in the family in comparison to high creative students.

Significant difference as found in case of parental attitude at particular ordinal position of student in case of high and low creative students. Much more parents adopted favourable towards their children irrespective of their ordinal position in case of high creative students in comparison to low creative students.

### Parents' Expressiveness

Considering parent's capability of expressing themselves, no significant difference was seen but generally parents of both the groups expressed themselves with their children and no parents had no communication with children.



### Decision Making of Parents

While considering the decision making phenomenon on the part of parents, it was observed that more percentage of mothers of high creative students took decisions in their houses in comparison to mothers of low creative students. Generally in both the groups most decisions were taken by father.

### Accomplishment of Household Responsibility

The accomplishment of household responsibilities was also one of the factors which was studied. More mothers of low creative students accomplished household responsibilities in comparison to high creative students. More high creative students showed these responsibilities being shared between father and mother both in comparison to parents of low creative students.

### Occurrence of Creative Instrument at Home

While studying the occurrence of creative instruments lying at homes of high & low creative students at their childhood & early childhood, it was found that significantly none of high creative students showed occurrence of paint brushes, blank sheets, colour pencils, books on craft & puzzles and creative work of parents & grand parents at their childhood or early childhood at their homes in comparison to low creative students.

### Hours of Study & Daily Routine

The hours of study put in by a student plays quite an important role. In this study it was found that high & low creative students did not differ in the number of hours out into study. But more of high creative students showed higher hours of study in comparison to low creative students.

While investigating on everyday schedule of students, it was found that more of high creative students showed schedule which had time for studies, recreation & creative activities in comparison to scheduled of low creative students.

### Student's Reading Habits & Membership of Libraries

The choice of books were found to be significantly different in case of high & low creative students. More of high

creative students were found interested in indulging in reading books on fiction, literature, science, creative ideas and their implications in comparison to low creative students.

Significant differences were found regarding membership of different libraries and international forums. More of high creative students were found to be the members of different libraries in comparison to low creative students.

While studying upon students' choice of journals, it was found out that though there are no significant differences seen, it is observed that more of high creative students read journals of different types where as low creative students showed indulgence in reading journals only on their subject - Maths.

Significant differences were observed concerning their participation in creative activities. Significantly more of high creative students indulged in painting, music, scientific inventions, maths puzzles, dance, drama, writing and poetical in comparison to low creative students.

#### Extra curricular Activities

When the two groups were compared on the basis of their attitude towards participating in extra curricular activities it was found out that though these two groups did not differ significantly show positive attitude towards indulging in such activities.

When details of their participation in extra curricular, activities was studied that significantly more of high creative students acquire prizes and certificates in extra-curricular activities in comparison to low creative students.

#### Attitude of Professor

While studying the professor's attitude towards students, it was understood that though no significant difference is observed that still much more high creative students were considered to be highly creative, most obedient and good at studies in comparison to low creative students.

#### Social Life of Students

Though no significant difference was observed regarding their social participation but more of high creative students were found to be very social in comparison to low creative students.

#### Age & Sex of Friends

While understanding the age of friends in case of high & low creative students, it was seen that age of friends do not differ significantly in case of high & low creative students.

Though no significant difference was found regarding the sex of friends of such students but more of high creative students had friends who were of opposite sex also in comparison to friends of low creative students.

Significantly more friends of high creative students showed participation in creative activities in comparison to friends of low creative students.

High creative students entertained more guests' like writers and artists in comparison to low creative students.

#### Games

No significant difference was found concerning students' interest and participation in games amongst high & low creative students. But more of high creative students participated in outdoor games in comparison to low creative students.

Concerning attainment of awards and prizes in games, it was seen that more percentage of high creative students acquired these in case of both indoor and outdoor games.

#### Inspiration for Creative Participation

No significant difference was seen amongst high & low creative students concerning their inspiration to indulge in creative activities. But much more percentage of high creative students got inspiration from friends and books in comparison to low creative students.

#### Visit to Exhibitions

While investigating their interest in visiting exhibitions, it was found out that more of high creative students were interested in visiting science and creative exhibitions in comparison to low creative students.

### Interest for Isolation

The interest for going in isolation was also studied and no significant difference was found among high & low creative students. More of high creative students were found being interested in indulging in isolation in comparison to low creative students.

Significantly more of high creative students indulged in activities where they wanted to make something on their own in isolation in comparison to low creative students.

### Expression of views

While exploring one's capability of expressing one's views and being outspoken, bold and enterprising, more students who were low creative fall in this category in comparison to high creative students.

### Thought Process

The thought process of students showed no significant differences in case of high & low creative students. But more of high creative students found unusual solutions of the same problem & also indulged in divergent thinking in comparison to low creative students.

### Decision Making

Concerning type of decisions taken by students no significant difference was found amongst high & low creatives.

More of low creatives students showed decisions being centred around themselves in comparison to high creative students. More of high creative students showed decisions taken after the fruitful results of discussion with parents in comparison to low creative students.

#### Centre of Ideas

While understanding the thoughts, emotions and ideas being entered around someone, more of low creative students showed these to be centred around their own self in comparison to high creative students.

#### Problem Solving

Concerning problem solving attitude of students, significant differences were found. More of high creative students were found to be indulging in problem solving activity with fluctuating solutions and are also more prone to forget the problem in comparison to low creative students.

#### Academic Achievement

No significant differences were found concerning academic achievement of high & low creative students. But more of high creative students obtained marks above 75% in comparison to low creative students.

A low negative correlation was found between creativity and academic achievement.

A low positive correlation was found between creativity & personality factors.

Almost no correlation was found amongst academic achievement and personality factors.

While comparing high and low academic achievers, significantly more parents show higher level of education; high creative students in comparison to parents of low achievers.

While ascertaining parents' participation in creative activities and their friends' participation in such activities show significantly higher occurrence these two in case of high academic achievers in comparison to low academic achievers.

While finding the occurrence of creative instruments at home was given consideration, more of high academic achievers show occurrence of these instruments at home in comparison to low achievers.

Significantly more of high academic achievers were found having professor's favourable attitude towards them in comparison to low academic achievers.

More of high academic achievers showed artists & writers being entertained as guests in their houses in comparison to low achievers.

Concerning visiting science and creative exhibitions, it was found out that significantly higher number of high achievers showed interest in the same in comparison to low achievers.



More parents of high academic achievers had professional qualification & were at higher jobs in comparison to low achievers.

More parents of high academic achievers showed attainment of rewards in creative activities in comparison to parents of low achievers.

Concerning students' hours of study a high academic achiever showed higher hours of study than low achievers.

Concerning their indulgence in reading books & journals more of high achievers were seen than low achievers.

While investigating their creative participation, it was found out that more high achievers indulged in such activities in comparison to low achievers.

Though no significant difference was seen among high & low achievers concerning their indulgence in problem solving but still more number of high achievers found unusual solutions of problems in comparison to low achievers.

More parents of extroverts participated in creative activities in comparison to introverts & ambiverts.

More parents of extroverts and ambiverts were highly educated, had professional qualification and were at higher jobs in comparison to parents of introverts.

Concerning income of parents, extroverts & ambiverts fall under higher income levels in comparison to introverts.

More parents of extroverts and ambiverts showed difference in their reading habits and membership of different libraries than introverts.

More parents of extroverts and ambiverts indulged in social activities in comparison to parents of introverts.

### Conclusion

From the above findings the present researcher could conclude that parental background, academic achievement and personality factors are definitely related to one's creativity parents who participate in creative activities & also acquire rewards in such activities are likely to encourage their children in such participation. Thus it may be stated that though this high level of giftedness is of course hereditary, most of it gets enhanced in a nurturing and conducive environment.

It is evident from the results of the study that parents who are highly educated, professionally qualified and who are interested in reading and going to the libraries contribute a great deal towards enhancing the creative potentials in children and perhaps help in making the high academic achievement. Parents who belong to high income groups are at higher jobs are also likely to encourage their children to participate in such activities.

Positive and favourable attitude of teachers as well as parents can be a great tool in improving students' creativity.

It was also evident the negative correlation between creativity & academic achievement that more indulgence and concentration in academic activities provide less time for creative activities which ultimately brings down one's level of creativity to some extent.

So while exploring different dimensions of creativity it was understood that parental background, socio economic status and school atmosphere play key role in the development of student's creativity. This creativity can be further developed, nurtured and improved by providing favourable environment. The present school environment and also the attitude of professors are not such that it could initiate such activities. Education is thus an important factor when one talks of enhancing and fostering creativity. And so improvements should be made in study schedules, attitude of teachers and over all atmosphere of the class; only then creativity can be enhanced and innovativeness be modified.

#### Implications

The above written findings indicate that measures can be taken to foster creativity. Improvement in home environments should be made and parents should realize their responsibility of encouraging children to participate in creative activities.

Concerning educational environment teachers are expected to develop that attitude where there is scope for them to develop creative aptitude and where there is possibility for the students to express themselves. The schedule in the class should also be improved so that students may not only have time for studies but also have enough provision for involving themselves in creative activities.

#### Limitations of the Study

Despite many conclusive findings, the present study suffers from certain limitation. First of all to test creativity of IIT students Torrance Test of creative thinking was used which is not standardized in Indian condition. Despite this fact present researcher had to take up this because <sup>no</sup> other test was so comprehensive and reliable while finding out creativity level of higher education students.

Neymann-Kholstadt test of extroversion-intraversion was also not modified to be applied on Indian children but since it is supposed to be one of the best tests of extroversion-intraversion, it was chosen to ascertain these personality factors of IIT students.

The questionnaire designed to ascertain parental background of the students suffered from certain limitations such as when the desired information was to be acquired regarding parents, it would have been ideal to have had direct contact with the

parents and interview them regarding their creative participation etc., instead of collecting the same indirectly through students. But because of difficulties in contacting parents as most of the IIT students live in the hostels, it was decided to find out the same through students only.

Students could have also been taken from other disciplines, but due to non-availability of time and students in the morning hours, this had to be abandoned.

While analysing the data  $\chi^2$  test was applied which has its limitations. In its place sign test or Fisher's exact probability test could have been used. However, since the information desired was more of associating one variable with another and merely compare, it was felt that this was a more suitable.

The present study is to an extent ex-post facto study which studies facts which are not present now. It would have been better to analyse two groups of students; one being exposed to creative environment and the other not being so; in that case facts about enhancement of creativity could have been revealed and type of home environment which could foster the same could have been delineated. However due to time limit this could not be carried out.

Despite the above limitations the present study has been able to throw light on a topic which has not been covered

comprehensively earlier. It has revealed some of the important factors contributing to creativity. To this extent one may say that the study has been able to make a contribution meaningful to the findings in areas of education and psychology.

#### RECOMMENDATIONS

1. Direct contact with parents of students should be made so that facts regarding parental background are revealed more.
2. Study should be done in two groups where one of them is given fostering environment and other kept as controlled group so that influences of creative environment are revealed and their influence on creativity understood.
3. A more specific study should be done to differentiate students on the basis of their choice of different disciplines of study and ascertain whether students differed in concerning area of different subject stream in their institute and study their differential creativity scores.

#### Suggestions

1. Pamphlets should be printed and distributed to parents regarding enhancement of creativity and their responsibility in doing so.

2. Children should be encouraged by providing different creative instruments at home like paint brush, blank sheets, colour pencils and books on creativity.
3. Children are advised to be sent to artists and writers so that their creative bend of mind is revealed.
4. Teachers should be trained to provide enhancement techniques for creativity and should be given one period in the schedule for the improvements of such activities.
5. The daily schedule of school should not be that taxing and should also be modified keeping in mind the students' creative aptitude and talent.
6. Films and experts should be shown to students where they see people indulging in creative activities so that they get encouraged.
7. Artists, writers and painters should be invited to the schools and institutes who demonstrate some creative products and thus help students to also indulge in such activities.
8. Programmes on television and radio should be shown which have talks with artists etc.
9. Over all a free environment should be provided in their classes of handicraft, painting and drawing.
10. Anything unusual either made or any unusual decision taken by the student should not be discouraged or else his innovativeness and creativity will get disheartened because a conformer to conventional way of life is not the one who is creative.

## BIBLIOGRAPHY



## BIBLIOGRAPHY

- Akinboye J.O., Journal of Creative Behaviour, 1981, Vol. 15, No. 1, p. 67.
- Amos S.P., Journal of Creative Behaviour 1981, Vol. 15, No. 4, p. 266.
- Acharyulu S.T.V.G., Journal of Creative Behaviour 1984, Vol. 18, No. 4, p. 273.
- Anderson, H.H. (Ed)., (1969), Creativity and Its Cultivation, Harper & Row, New York.
- Anderson R.E., Journal of Creative Behaviour. 1985, Vol. 19, No. 2, p. 137.
- Bachtold L., Journal of Creative Behaviour, 1986, Vol. 20, no.1, p. 141.
- Bleedorn B.D., Journal of Creative Behaviour. 1983, Vol. 17, No. 4, p. 268.
- Balakrishnan R, Ibrid, Indian Journal of psychology. 1980, 55, p. 33.
- Bernice D, Psychological Abstract March, 1988. Vol. 75, No.3.
- Burus, Creative Child and Adult Quarterly 1986, Vol 2 (4), p. 234 - 240.
- Bruen H, Schwarcz J.H, Barinbaum L, Journal of Creative Behaviour, 1984, Vol. 18, No.1, p. 41.
- Bruner, J.S. (1962), The Condition of Creativity in Gruber, H.E., Terrell, G & Wertheimer, M (Eds)., Contemporary Approaches to Creative Thinking, Atherton Press, New York.
- Butcher, H.J. (1968), Human Intelligence Its Nature and Assessment, Methuen, London.
- Christie T, Journal of Creative Behaviour, 1970, Vol 4, No. 1, p. 13.
- Cornelius G.M., and Yawkey T.D., Journal of Creative Behaviour 1985, Vol. 19, No. 1, P. 56.
- Chadha, N.K. (1964), Perspective in Creativity, ESS Publications, New Delhi.

- Covington, M.V., Crutchfield, R.S. and Davies, L.B. (1969), The Productive Thinking Program, Columbus, Ohio, Charles & Merrill.
- Davis G.A., Journal of Creative Behaviour, 1969, Vol 3, No. 2, p. 95.
- Farabangh N.F., Journal of Creative Behaviour. 1985, Vol 19, No. 2, p. 138.
- Fasig C and Dawling W.D., Journal of Creative behaviour, 1984, Vol. 18, No. 1, p. 62.
- Frend, S.C., (1970), Creative Writers and Daydreaming in P.E. Vernon (Ed)., Creativity, Penguin, London.
- Gupta A.K., journal of Creative Behaviour, 1981. Vol. 15, no. 4, p. 268.
- Gakhar s, journal of Education & Psychology. 1982, p. 32.
- Gootman H.E., Steg DR, Journal of Creative Behaviour, 1984, Vol. 18, No. 4, p. 274.
- Gakkhar, S., (1984), Identification of Creative Talents, New Delhi, NIPCCD.
- Gatzels, J.W. & Jackson, P.W. (1962), Creativity & Intelligence, New York, Wiley.
- Gough, H.G., (1961), "Techniques for identifying the Creative Research Scientist" Conference on Creative Person, Barkeley, University of California.
- Golub S, Journal of Creative Behaviour 1983, Vol. 17, no. 3, p. 217.
- Geeta E., Indian Journal of Psychology 1983, 58, p. 69.
- Henegar L.E., Journal of Creative Behaviour, 1984, Vol. 18, No. 2, p. 109.
- Harrington R.G., Journal of Creative Behaviour, 1984, Vol. 18, No. 2, p. 143.
- Hughes H.K., Journal of Creative Behaviour 1969, Vol. 3, No. 2, p. 73.
- Halley G.L., journal of Creative Behaviour 1984, No. 1. Vol. 18, No.1, p. 25.

- Hooda R.C., Journal of Creative Behaviour. 1986, Vol. 20, No. 2, p. 143.
- Hattie j., journal of Creative Behaviour. 1983, Vol: 17, No. 4, p. 269.
- Hota N., Indian Journal of Psychology. 1986, 61, p. 42.
- Haddon, F.A. & Lytton, H (1968), "Teaching Approach and the Development of Divergent Thinking Abilities in Primary Schools", British journals of Educational Psychology, 38, 171 - 180. Hudson, L. (1966), Contrary Imagination, Methuen, London.
- Hudson, L (1968), Frames Ofmind, Ability, Perception and Self Perception In the Arts And Sciences, Methuen, London.
- Isaken G., & Parnes S.J., journal of Creative Behaviour. 1985, Vol. 19, No. 1, p. 1.
- Jackson, P.W., and Messick, S (1965), "Creativity" in P. London and D. Roseham (Ed). Foundations of Abnorma Psychology, Holt, New York.
- Jedrczak A., Journal of Creative Behaviour 1985, Vol. 19, no.2, p. 270.
- Jarial G.S., Indian Journal of Psychology 1981, 56, p. 155.
- Jarial, G.S., journal of Creative Behaviour 1985, Vol. 19, No. 2, p. 139.
- Jarial, G.S., Journal of Cretive Behaviour 1985, Vol. 19, no. 2, p. 139.
- Jarial G.S., Journal of Creative Behaviour. 1981, vol. 15, No. 1, p. 72.
- Katiyar P.C., Journal of Creative Behaviour. 1985, Vol. 19, No.2, p. 219.
- Kundu D., The Education Quarturly 1985, Vol. 37, No. 3, p. 6.
- Kumar A., Journal of Creative Behaviour 1981, Vol. 15, No. 1 p. 73.
- Kumar A., Journal of Creative Behaviour. 1981, Vol 15, No 4, p. 270.

- Kumar, G & Raina, M.K. (1976), "Creative Behaviour and Achievement Motivation", Psychological Reports, 39 (1) p. 76.
- Lytton, H. & Cotton, A.C. (1966), "Divergent Thinking Abilities in Secondary Schools" British Journal of Educational Psychology, 39, 188-190.
- Long & Shirley, National Reading Conference Year Book 1985, No. 34, p. 381 - 385.
- Mackinnon, D.W. (1962), "The nature and Nurture of Creative Talent", American Psychologist, 17, 484 - 490.
- Mehdi, b. (1972), "Noverbal Test of Creative Training", Journal of Psychology, 58 (40), 205 - 214.
- Mathew S.T., journal of Creative Behaviour,. 1984, Vol. 18, No. 4, p. 278.
- Moses M., journal of Creative Behaviour. 1985, Vol. 19, No. 2, p. 113.
- Noppe L.D., Journal of Creative Behaviour. 1985, Vol. 19, no. 2, p. 88.
- Pestonjee, Journal of Education & Psychology 1982, p. 29.
- Patel M.M., Indian Journal of Psychology Vol. 59, No. 1, p. 41.
- Richardson A.G., Journal of Creative Behaviour. 1986, Vol. 20, No.2, p. 147.
- Rhodes J.W., Journal of Creative Behaviour, 1981, Vol 15, No. 2, p. 99.
- Rose L.H., and Haitin H, Journal of Creative Behaviour. 1984, Vol. 18, No. 1, p. 62.
- Ribrier S., Journal of Creative Behaviour. 1985, Vol. 19, No. 2, P. 145.
- Roach, Creative Child and Adult Quarterly 1986, Vol. 2 (4), p. 205 - 211.
- Reddy, A. and Reddy, B.B. (1963), "Creativity and Intelligence", Psychological Studies, 1, pp. 64 - 67.
- Somers J.U. and Yawkey T.D., Journal of Creative Behaviour, 1984. Vol. 18, No. 2, p. 77.

- Sladczek I and Domino G., Journal of Creative Behaviour. 1985, Vol. 19, No 1. p. 38.
- Solomon R., Journal of Creative Behaviour, 1985, Vol. 19, No. 1, p. 47. 70. Singh A.K., Indian Journal of Psychology 1981, 56, p. 165.
- Singh R.B., Indian journal of Psychology, 1982, 57 p. 173.
- Singh b, Indian Journal of Applied Psychology 1985, Vol. 22, No. 1, p. 31.
- Sharma M.K., Indian Journal of Psychology. 1984, Vol. 59, No. 1, p. 33.
- Singh R.P., Indian Psychological Abstracts, Vol. 25, no. 3, Sept. 1982.
- Sherill & Cloudine, Adapted Physical Activity Quarterly 1986, Vol 3 (3) p. 236, 249.
- Schaffer, C.E., & Anastasi, A. (1968), "A Biographical Inventory for Identifying Creativity in Adolescent Boys", Journal of Applied Psychology, 52, 42 - 48.
- Trollinger L.H., Journal of Creative Behaviour. 1981, Vol. 15, no. 4, p. 257.
- Torrance E.P., & Aliotti N.C., Journal of Creative Behaviour. 1969, Vol. 3, No. 1, p. 52.
- Tweet C.C., Journal of Creative Behaviour. 1981, Vol. 15, no. 1, p. 70.
- Tisone J.M., and Wisniew B.L., journal of Creative Behaviour. 1985, Vol. 19, No. 2, p. 97.
- Torrance, E.P., (1963), "Education & Creativity in C.W.", Taylor (Ed), Creativity, Progress & Potential, New York, McGraw Hill.
- Trostle S.L., Journal of Creative Behaviour 1983, Vol. 17, no. 3, p. 181.
- Thandani B, Indian Journal of Psychology 1983, 58, p. 65.
- Verma L.K., Journal of Creative Behaviour. Vol. 15, No. 4, p. 271.

- Wade S., Journal of Creative Behaviour. 1968, Vol. 2, no. 2, p. 97.
- Wells D.H., Journal of Creative Behaviour. 1986, Vol. 20, no. 1, p. 61.
- Wallach, M.A., & Kogan, N. (1965), Modes of Thinking In Young Children: A Study of Creativity - Intelligence Distinction, New York, Holt.
- Yawkey T.D., Journal of Creative Behaviour, 1986, Vol. 20, no.1, p.52.
- Young J.G., Journal of Creative Behaviour, 1981, Vol. 15, No. 2, p. 99.
- Zarnegar Z, Education and Psychological Measurement 1988, p. 48.

