DISCUSSION OF RESULTS
AND GENERALISATION
This chapter deals with discussion of results and generalisation with the help of statistical technique. 2x2x2x2 factorial design was the base of the experiment. The academic achievement of the students was studied as dependent variable while other variables such as instructional design, achievement motivation, self-concept and level of aspiration were studied as independent variables. The two levels of the variable of instructional design were called D₁ and D₂, standing for linear and mathematical modes of instruction respectively, whereas two levels of achievement motivation were designated as n-Ach₁ and n-Ach₂, two levels of self-concept as S₁ and S₂ and two levels of aspiration as A₁ and A₂ respectively standing for high and low groups of each variable. Four way analysis of variance was applied to analyse the interaction effects of these variables.

5.1 Main Effects

The mean square of 'D' corresponds to a comparison between the means of gain scores for linear programme (D₁) and mathetics programme of instruction (D₂) averaged over two levels each of achievement motivation, self-concept and level of aspiration. The F-ratio for 'D' is 100.046 which is significant at 0.01 level (df 1/144). It means that the
means of $D_1$ and $D_2$ differ significantly over two levels each of n-Achievement, self-concept and level of aspiration. The mean for $D_1$ is 78.925 and the mean for $D_2$ is 85.95. It shows a difference of 7.025 per subject in favour of $D_2$. So it is concluded that the mathetics programme of instruction is superior to the linear programme of instruction. The first hypothesis of the study which reads as "The achievement of the students through mathetical programme will be significantly better than those receiving instruction through linear programme" is thus accepted.

The main effects of two levels of achievement motivation (n-Ach) were analysed over two levels each of self-concept, level of aspiration and instructional design. The F-value for level of achievement motivation at 1/144 df was 1229.322 and found to be significant at 0.01 level. The mean score for high n-Achievement group (n-Ach$_1$) was found to be 94.75 and for low n-Achievement group (n-Ach$_2$) 70.125, the difference between mean scores of n-Ach$_1$ and n-Ach$_2$ is 24.625. It shows clearly that there is a distinct difference between the scores of two groups of n-Achievement. High n-Achievement group scores more than the low n-Achievement group. Thus, the second hypothesis of the study which stated, "Students with high n-Achievement will achieve higher than those with low n-Achievement", is retained.

This finding is supported by numerous studies. Atkinson (1964) assumed that n-Achievement would be
positively related to the levels of achievement oriented performance. Caplehorh and Sutton (1965), Feather (1966), Heck housen (1967), Tamhankar (1968), Mehta (1969), Sinha (1970) concluded that achievement motivation and academic achievement were significantly related.

Chaudhary (1971), De and Priya (1972), Dutt and Sabharwal (1973), Pathak (1974), Mohan (1975), Parikh (1976), Abrol (1977), Gupta (1978), Singhlanlakh (1979) and Hirunval (1980) also found a positive relationship between n-Achievement and academic achievement. Gordon (1981) found that motivation was significantly correlated with achievement in written English. Singh (1982) concluded that achievement motivation had positive and significant relationship with verbal, non verbal and total creative thinking. Chatterji (1983) found that the scores on achievement motivation of students of science or commerce were significantly higher than those of the other groups. Sween (1984), Kaur (1985) also found positive relationship between the two variables.

Tripathi (1986) conducted a study and found that achievement motivation of boys and girls was highly correlated with intelligence and achievement. Kaur (1987) indicated that significant positive correlation has been found between achievement motivation and academic achievement. Swain (1988) indicated that achievement motivation has positive and significant effect on academic
achievement. These studies corroborate the findings of the present study. Results of researches of Broverman et al. (1960), Sarason (1963), Bhatnager (1969), Gokulnathan (1972), Banerjee (1974), Morgol (1980), Joginder (1984), and Tripathi (1986) are at variance with the findings of the present investigation. The variations may be attributed to the qualitative and quantitative differentia of the sample alongwith the differences in the nature of the subjects studied by these investigators.

The $F$-ratio for the main effects of self-concept is 485.482 which is significant at 0.01 level (df 1/144). This means that difference between mean squares of high self-concept ($S_1$) and low self-concept ($S_2$) groups averaged over two levels of $n$-Achievement, level of aspiration and instructional design each, is highly significant. The mean score for high self-concept group ($S_1$) is 90.175 and for low self-concept group ($S_2$) is 74.7 having a difference of 15.475 per subject in favour of $S_1$. Thus, it can be concluded that high self-concept group has better achievement than low self-concept group as far as their achievement on the criterion test is concerned. The third hypothesis of the study stating as "Students with high self-concept will perform better than students with low self-concept", is therefore retained. These results seem to be in agreement with the results of different studies concerned.

Koelle (1981) concluded that self-concept correlated significantly at 0.01 level with all the sub tests. Sarswat (1982) found that only intellectual self-concept was positively and significantly related to academic achievement. Smith (1983) studied U.K. undergraduate students and his study indicated that self-concept accounted for 36% of the variability in grade point average. Sabri (1986), Batterson (1987) and OjoElizabeth (1988) found a positive significant relationship between self-concept and academic achievement. However, there have been a few studies which did not find any relationship between the two variables.


These variations in results could be, perhaps, attributed to differences in sample structure, tools or different experimental conditions.

The F-value for level of aspiration (3.041 for df 1\&144) is found to be significant at 0.01 level. The difference between the mean scores for high aspiration group ($A_1 = 83.05$) and low aspiration group ($A_2 = 81.885$) is 1.225. Since the mean for $A_1$ is higher than the mean for $A_2$ by 1.225 points, it can be concluded that high aspiration group scores more than the low aspiration group when averaged over two levels each of n-Achievement, self-concept and instructional design. This conclusion leads to the retention of the fourth hypothesis that "Academic achievement of the students with high level of aspiration will be higher than those with low level of aspiration".

These conclusions are in agreement with those of Moss and Kagan (1961), Miller and Hiller (1964), Molton (1965), Sewell and Shah (1968), Brim et al. (1969), Mohanty (1972) and Edwards (1975) who found that a positive relationship was found to exist between attainment and the level of
educational aspiration. Hussain (1977), Pandey (1979), Qureshi (1980) and Prince (1981) found that there was a highly significant relationship between the level of scholastic achievement and level of aspiration for education.

Singh (1983) studied the effect of deprivation and level of aspiration on achievement in science and found a positive correlation between level of aspiration and achievement. Jasuja (1983) found that level of aspiration did effect the achievement. Parkash (1984) Pal, Jain and Tiwari (1985) have found that scholastic achievement significantly interacts and affects the level of aspiration of higher secondary level pupils.

Kumar (1986) assessed the amount of contribution made by level of aspiration and other variables to the academic attainment of the students and found positive correlation.

The results of all the studies mentioned above, fall in line with the findings obtained from the present investigation. However, there have been a few studies which did not find any relationship between the two variables. Muthayya (1961), Sharma (1979) and Madho (1970) found that scholastic achievement was not related to the level of aspiration. The high achievers and low achievers in the scholastic field did not differ significantly in their aspiration patterns. Tara (1980), Dwivedi (1983), Gautam (1986) and Gupta (1987) found that level of aspiration
correlated negatively with academic achievement. The contradictions in the results of these studies with the findings of the present study, might be due to different tasks taken by them in their studies along with the variations in the size and nature of sample.

5.2 Interaction Effects

The n-Achievement and self-concept (n-Ach x S) interaction indicated the F-value of 6.7534 for 1/144 df, which is significant at 0.01 level. It means that the difference between means of $S_1$ and $S_2$ at n-Ach$_1$ level is significantly different from the difference between the means of $S_1$ and $S_2$ at n-Ach$_2$ level. The significance of difference between the mean scores in performance of the four groups, when tested in terms of t-ratios depicted that the performance of high n-Ach x high self-concept group (n-Ach$_1$xS$_1$) was the best with mean equal to 103.4 and the performance of low n-Ach x low self-concept (n-Ach$_2$xS$_2$) was the lowest with the mean of 63.3 among all the four groups. The high n-Ach and high self-concept (n-Ach$_1$xS$_1$) group performed significantly better than the rest of the three groups. This clearly indicates that the interaction of high level of n-Ach with high level of self-concept accounts for the better achievement.

n-Ach and level of aspiration (n-Ach x A) interaction indicated the F-value of 10.4912 for 1/144 df which is significant at 0.01 level of confidence. n-Ach$_1$xA$_1$ group had
the mean score of 96.50 whereas, 93.00, 69.60, 70.65 are the means scores for the other three groups i.e. n-Ach_1xA_2, n-Ach_2xA_1 and n-Ach_2xA_2 groups respectively. When compared in terms of t-ratios, the differences of four groups (I & III, I & IV, II & III and II & IV) emerged to be significant at 0.01 level except groups I & II and III & IV for which the t-values are insignificant. This finding points out to the fact that interaction of high level of n-Ach with the high level of aspiration is the best determinant of the success of the students. It also shows that achievement motivation causes greater difference in achievement than that caused by the level of aspiration.

But the t-value of -0.48 shows that low n-Achxhigh level of aspiration group did not fare significantly better than low n-Achxlow level of aspiration group. This shows that there is no significant difference in the achievement of high and low level of aspiration groups; achievement motivation level being the same i.e. low. This indicates that at a low level of n-Ach, level of aspiration does not interact significantly with it to affect the achievement of the students.

The two-way interaction effect of n-Achievement and instructional design (n-Ach x D), self-concept and level of aspiration (SxA), self-concept and instructional design (SxD) and level of aspiration and instructional design (AxD)
is not significant even at 0.05 level of confidence (with F-values of -0.55, 1.07, 0.28 and 0.10 respectively).

n-Ach x D interaction was found to be non-significant statistically. It indicates that achievement motivation does not interact with any level of instructional design and vice-versa. SxA interaction was also not found to be statistically significant. This points out that the difference between the level of aspiration (high and low) is independent of the level of self-concept. Sharma (1979) found that self-concept did not influence the level of aspiration. Tara (1980), Arora (1981) also found negative correlation between self-concept and level of aspiration.

The interaction effects of SxD (self-concept and instructional design) was not found to be significant. This also points out that the difference between the levels of instructional design (high and low) is independent of the level of 'S' (self-concept). A and D interaction was found to be non-significant statistically. The difference between D$_1$ and D$_2$ is not dependent upon the factor of the level of aspiration.

The main effects showed significant results of n-Ach, self-concept and design of instruction while the result of level of aspiration was insignificant with F-value of 3.04 whereas at two level interaction, the interaction between n-Ach and level of aspiration showed significant F-value of 10.4 and interaction between self-concept and level of
aspiration, instructional design and level of aspiration showed insignificant F-values of 1.0 and 0.1 respectively indicating that level of aspiration did not play any significant role in the achievement of the students. Only n-Ach alongwith self-concept and level of aspiration influence the achievement of the students.

Three level interaction among n-AchxSxA, n-AchxAxD and SxAxD showed F-values of 18.5, 18.4 and 17.8 respectively which were quite significant. In the first interaction, n-Achievement x level of aspiration x self-concept (n-AchxAxS), n-Ach and self-concept together were responsible for better achievement of the students. n-AchxSxD interaction showed insignificant F-value of 0.46 indicating that n-Achievement, level of aspiration and instructional design, together do not interact significantly with each other.

In the interaction of n-Achievement, level of aspiration and instructional design, level of aspiration seemed to play significant role in the achievement of the students whereas at two level interaction n-AchxD and AxD did not support this contention.

The fourth three level interaction of SxAxD indicated significant F-value of 17.8 whereas two level interactions of SxA, AxD and SxD did not show any significance.

At four level interaction, F-value of 36.9 was highly significant. The level of aspiration was found to be mainly
affecting the achievement of the students comparing it with two level and three level interactions.

n-AchxS and n-AchxA were significant whereas n-AchxSxD remained insignificant. The addition of the level of aspiration changed that insignificance into significant F-value at the fourth level thereby showing that it played a major role in the achievement of the students.

The foregoing discussion of results leads to the conclusion that group interactions n-AchxS, n-AchxA, n-AchxSxA, n-AchxAxD, SxAxD and n-AchxSxAxD are significant whereas some other interactions such as n-AchxD, SxA, SxD, AxD, n-AchxSxD are not significant. Thus, the fifth hypothesis of the study which states, "The interaction effects of the variables of instructional design, n-Achievement, self-concept and level of aspiration will have significant impact on the academic achievement of the students" is, partially accepted.

5.3 Generalisations

In view of the foregoing discussion, the following generalisations may be made:

- Mathematical mode of instruction is more effective for teaching the topic of equilibrium in the subject of economics than the linear mode of teaching.
- n-Achievement affects the achievement of the subjects significantly. Achievement of high
achievement motivation group is better than that of the low achievement motivation group.
- The subjects with high self-concept score higher on the criterion test than subjects with low self-concept.
- The achievement of the students with higher level of aspiration is significantly superior to that of the ones with lower level of aspiration.
- The interaction between level of instructional design and n-Achievement is not significant.
- There is no significant interaction between the levels of instructional design employed and those of the self-concept.
- n-Achievement interacts with self-concept to significantly affect the achievement of the students. In this interaction high n-Achxhigh self-concept group (n-Ach\textsubscript{1}xS\textsubscript{1}) achieves more than the group with low n-Achievement and low self-concept (n-Ach\textsubscript{2}xS\textsubscript{2}).
- Level of aspiration also interacts with n-Achievement to affect the achievement of the students significantly. The students with high aspiration and high n-Achievement (A\textsubscript{1}xn-Ach\textsubscript{1}) achieved better than the group of students with low n-Achievement and low level of aspiration (n-Ach\textsubscript{2}xA\textsubscript{2}).
The significant interaction of n-Ach×SxA indicates that the means of SxA interaction differ at the two levels of n-Ach (n-Ach₁ and n-Ach₂); and that the value of Axn-Ach interaction differs at S₁ and S₂ levels and that the magnitude of Sxn-Ach interaction differs at the two levels of aspiration (A₁ and A₂).

The significant n-Ach×AxD interaction shows that the means of AxD interaction differ at the two levels of n-Ach (n-Ach₁ and n-Ach₂); and that the value of Dxn-Ach interaction differs at A₁ and A₂ levels and that the magnitude of Axn-Ach interaction differs at the two levels of instructional design (D₁ and D₂).

The significant interaction of SxAxD indicates that the means of AxD interaction differ at two levels of self-concept (S₁ and S₂) and that the value of DxS interaction differs at A₁ and A₂ levels; and that the magnitude of aspiration and self-concept interaction differs at the two levels of instructional design (D₁ and D₂).

The means of n-Achievement, self-concept and instructional design at A₁ and A₂ levels of aspiration differ significantly. The quadruple interaction between instructional design, n-Achievement, self-concept and level of aspiration is significant. It can be said that the factor of instructional design is dependent on self-concept, n-
Achievement and level of aspiration, and that difference between the two levels of \( n-\text{Ach} \) (\( n-\text{Ach}_1 \) and \( n-\text{Ach}_2 \)) is dependent upon the factors of level of aspiration, instructional design & self-concept and that factor of level of aspiration is dependent on other three factors viz. instructional design, self-concept and \( n-\text{Achievement} \) and that difference between \( S_1 \) and \( S_2 \) is dependent on the factors of instructional design, \( n-\text{Achievement} \) and level of aspiration.