Chapter 10
STYLES OF LEARNING, LOCUS OF CONTROL, ACHIEVEMENT MOTIVATION, AND INTELLIGENCE IN RELATION TO HIGH-, AVERAGE-, AND LOW-ACHIEVERS AT THE SAME AS WELL AS AT DIFFERENT LEVELS OF INTELLIGENCE.

In continuation with the analysis of data in the preceding chapter, efforts in the present chapter have been directed towards presenting an analytical picture of status of correlates of high-, average-, and low-achievers at three levels of intelligence. It was envisaged that different levels of intelligence within the same group of high-, average-, and low-achievers might, perhaps, lead to the explanation of differentials in styles of learning, locus of control, and achievement motivation with respect to academic achievement. The following hypotheses were tested:

1. Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of styles of learning.

2. Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of locus of control.

3. Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of achievement motivation.

4. Significant mean differences would exist among high-, average-, and low-achievers when compared at different levels of intelligence in respect of styles of learning.

5. Significant mean differences would exist among high-, average-, and low-achievers when compared at different levels of intelligence in respect of locus of control

6. Significant mean differences would exist among high-, average-, and low-achievers when compared at different levels of intelligence in respect of achievement motivation.

These hypotheses were tested by breaking up the three main discrepant academic achievement groups (HAs, AAs, & LAs) into three subgroups each, i.e., high-, average-, or
low-achievers belonging to high, average, and low levels of intelligence (nine groups). As was earlier reasoned during the analysis of data in chapter 6, 7, 8, and 9 the split of groups on the basis of levels of intelligence led to the composition of relatively small subgroups. Under the prevailing conditions, there was a possibility that these subgroups lose the normality and linearity of their score distributions on the different measures being studied in the context of academic achievement. Hence, data were subjected to a t test to establish whether the mean differences observed among these subgroups were statistically significant. Table 10 summarizes the means, standard deviations, and t values for these subgroups at the same level and also at different levels of intelligence.

**Results**

Table 10 presents 37 sets of t values for all the 37 measures being studied here. Related to each of the 37 measures, 18 t values have been calculated. Out of these, the first set of three aimed at finding out the significance of difference among mean scores of the different measures for low-, average-, and high-achievers at the high level of intelligence (LA_h – AA_h; LA_h – HA_h; AA_h – HA_h). The second set of three t values aimed at finding out the significance of difference among the mean scores
Table 10

r High-, Average-, and Low-Achievers on 37 measures
I at the same level as well as at different levels of intelligence.

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<tr>
<th></th>
<th>t-values for HA at low level of intelligence</th>
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Notes: df = 109
Table 10

Mean Differentials for High-, Average-, and Low-Achievers on 37 measures

Compared at the same level as well as at different levels of intelligence.

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Note: The table includes means and standard deviations for each level of intelligence.
of the different measures for low-, average-, and high-achieving groups at the average level of intelligence (LA_a - AA_a; LA_a - HA_a; AA_a - HA_a).

The third three t values aimed at finding out the significance of difference among the mean scores of the different measures for low-, average-, and high-achievers at the low level of intelligence (LA_1 - AA_1; LA_1 - HA_1; AA_1 - HA_1). These nine t values were worked out to test the first hypotheses given in this chapter.

The remaining nine sets of t values aimed at testing the second hypotheses. Here, t-test comparisons were carried out to find out the significance of difference among mean scores of the different measures for high-, average-, and low-achievers when these three groups were further categorized into three levels of intelligence. Nine sets of t values represented the comparison of mean scores of high-achievers of high- and average-levels of intelligence (HA_h - HA_a), the high-achievers of high- and low- levels of intelligence (HA_h - HA_l), the high-achievers of average- and low-level of intelligence (HA_a - HA_l); the comparison of mean scores of average-achievers of high and average-levels of intelligence (AA_h - AA_a),

the average-achievers of high- and low-levels of intelligence the average-achievers of average- and low-levels of intelligence (AA_a - AA_l); the comparison of mean scores of low-achievers of high- and average-levels of
intelligence ($L_{Ah}$-$L_{Aa}$); the low-achievers of high- and low levels of intelligence ($L_{Ah}$-$L_{Ai}$); and the low-achievers of average- and low-levels of intelligence ($L_{Aa}$-$L_{Ai}$).

### High-, Average-, and Low-Achievers at the High Level of Intelligence

#### Styles of Learning

Table 10 summarizes the results that for learning style measure of deep approach (DA), high-achievers achieved significantly greater scores than did the average- and low-achievers at high level of intelligence, as seen in the table, 13.31 (SD=2.51) compared to 11.49 (SD=3.18), $t=4.18$, $P<.05$, and 11.89 (SD=3.18), $t=2.46$, $P<.05$. This trend could also be observed for the learning style measures, operation learning (OL) and meaning orientation (MO) in which cases, significant $t$ values of 2.23 and 2.74 respectively for these areas showed the superiority of the high-achievers as compared to the average-achievers. Significant $t$ values in the areas of extrinsic motivation (EM), disorganized study method (DS), negative attitudes (NA), and achieving orientation (AO) showed that high-achievers achieved significantly lesser scores on these measures than did the average- and low-achievers at high level of intelligence. Their respective mean scores for EM were 8.65 (SD=4.34) compared to 10.37 (SD=3.55), $t=2.78$, $P<.05$ for average-
achievers, and 10.54 (SD=4.15), t=2.04, P<.05 for low-achievers. Concerning DS method, the mean score for high-achievers was 9.59 (SD=3.38) compared with 11.14 (SD=3.42), t=2.98, P<.05 for average-achievers and 11.04 (SD=3.57), t=1.97, P<.05 for low-achievers. For NA, the mean score for high-achievers was 6.39 (SD=4.30) compared with 9.18 (SD=4.26), t=4.23, P<.05 for average-achievers and 9.61 (SD=4.21), t=3.49, P<.05 for low-achievers. For AO, the mean score for high-achievers was 39.86 (SD=8.25) compared with 45.63 (SD=8.66), t=4.43, P<.05 for average-achievers and 45.18 (SD=8.67), t=2.96, P<.05 for low-achievers. The differences observed here were statistically significant and consistent with findings from previous studies. It was indicated that high-achievers showed a greater interest in deep approach to studying, operation learning, and meaning orientation than did the low-achievers (Aggarwal, 1981; Miller, 1987).

Locus of Control

Table 10 also presents the means, standard deviations, and t values for the LC measure for the high-, average-, and low-achievers at high level of intelligence. Table 10 indicates that the LC mean for high-achievers was highly comparable to those reported for the average- and low-achievers at this level of intelligence.
Need Achievement

Table 10 also presents the means, standard deviations, and t values for need achievement for the high-, average-, and low-achievers at high level of intelligence. Table 10 reveals that the mean and standard deviation for the high-achievers for N-ACH were 52.43 and 4.92 respectively. Compared with the mean and standard deviation for the high-achievers, the mean N-ACH score for average-achievers was 51.21 (SD=5.48), t = 1.52, P > .05, while that for low-achievers was 48.71 (SD=9.01), t = 2.83, P < .05. This finding indicated that high-achievers achieved significantly greater scores on N-ACH than did the low-achievers at high level of intelligence. It also indicated that high-achievers had greater N-ACH scores than did the average-achievers, although the mean difference between these two groups was not statistically significant. As can also be seen from this table, the mean N-ACH score for average-achievers was above that reported for low-achievers, 51.21 (SD=5.48) compared to 48.71 (SD=9.01), t = 1.71, P > .05. These results tend to support research findings which suggested that high-achievers are generally more highly motivated than low-achievers (Atkinson, & Reitman, 1956).

Intelligence

Table 10 summarizes the result that out of nine
areas of verbal intelligence, only one area, namely, following instruction (FI) differentiated all the three achievement groups at high level of intelligence. As can be seen from the table, the mean score for high-achievers for FI was 7.31 (SD=1.80) compared with 6.74 (SD=1.59), \( t = 2.17, \; P < .05 \) for average-achievers and 5.75 (SD=2.46), \( t = 3.68, \; P < .05 \) for low-achievers. Compared with the mean and standard deviation for the average-achievers, the mean score for low-achievers for FI was 5.75 (SD=2.46), \( t = 2.40, \; P < .05 \). This finding indicated that the mean score for high-achievers for FI was significantly greater than those found for average- and low-achievers, while that for average-achievers was greater than the mean score for low-achievers of high level of intelligence. For the areas of vocabulary similarities (VS) and classification (CF), low-achievers scored significantly higher than did the average-achievers of high level of intelligence. Their respective mean scores for VS were 5.71 (SD=1.18) compared to 6.29 (SD=1.05), \( t = 2.28 \) for low-achievers. Concerning CF, the mean score for low-achievers was 13.64 (SD = 1.42), compared with 12.89 (SD = 1.55), \( t = 2.23, \; P < .05 \) for average-achievers.

Table 10 reveals the results of nonverbal intelligence (NV
\_\_int) and deviation intelligence quotient -2 (DIQ\_2) for all achievement groups indicating that high-
achievers seemed to have higher $N_{\text{int}}$ and DIQ$_2$ than did the average-achievers at high-level of intelligence. Their respective mean scores for $N_{\text{int}}$ were 48.53 (SD=4.89) compared to 50.47 (SD=4.53), $t = 2.68$, $P<.05$ for high-achievers. As expected, DIQ$_2$, which was the standard score of $N_{\text{int}}$, differentiated between high- and average-achievers in exactly the same manner and degree.

Regarding DIQ$_{\text{comb}}$, the mean score for high-achievers was found to be significantly greater than that reported for the average-achievers at high level of intelligence as seen in Table 10, 115.40 (SD=5.33) compared to 117.30 (SD=5.84), $t= 2.19$, $P<.05$ for high-achievers. The superiority of the high-achievers in nonverbal intelligence, deviation intelligence quotient-2, and deviation intelligence quotient-combined appeared to be paradoxical in view of the fact that intelligence was partialled out while breaking up the sample into different discrepant groups.

**High-, Average-, and Low-Achievers at the Average Level of Intelligence**

Still, for the partial testing of the hypotheses, high-, average-, and low-achievers were studied among their groups at the average level of intelligence. The rationale of the hypotheses was that differentiation could be made among high-, average-, and low-achievers belonging to average level of intelligence.
So, to test this assumption, three t-test comparisons were made between low-and average-achievers of average level of intelligence \( (L_{AA} - A_{AA}) \), and between average-and high-achievers of average level of intelligence \( (A_{AA} - H_{AA}) \). These are represented in Table 10.

**Styles of Learning**

Table 10 summarizes the results indicating that for the learning style measure, deep approach, high-achievers of the average level of intelligence showed superiority as compared to the average-achievers of the same level of intelligence as seen in the table, 12.10 (SD=2.73) compared with 12.86 (SD=2.84), \( t=2.07, P<.05 \). But for the learning style dimensions of use of evidence (UE) and the negative attitudes (NA), the mean score for low-achievers were found to be greater than those reported for average- and high-achievers of the average level of intelligence. Their respective mean scores for UE were 12.79 (SD=3.34), compared to 11.76 (SD=3.33), \( t=2.34, P<.05 \) for average-achievers and 11.42 (SD=3.33), \( t=2.71, P<.05 \) for high-achievers. For the NA, their respective mean scores were 10.04 (SD=4.60) compared to 8.35 (SD=4.10), \( t=3.01, P<.05 \) for average-achievers and 9.02 (SD=3.63), \( t=1.63, P>.05 \) for high-achievers. However, the mean difference between low- and high-achievers for negative attitudes was not statistically significant.
Regarding the learning style measure, achieving orientation, the mean score for low-achievers of average level of intelligence was found to be greater than those reported for the average-and high-achievers of the same level of intelligence. Their respective mean scores for AO were 45.64 (SD=9.55) compared to 43.12 (SD=8.41), t=2.17, P<.05 and 43.20 (SD=7.44), t=1.88, P>.05. However, there was no statistically significant mean difference between low-and high-achievers at average level of intelligence.

Locus of Control

Table 10 reveals the results of the locus of control for all the achievement groups, indicating that the mean score for high-achievers of average level of intelligence was greater than those reported for the low-and average-achievers of the same level of intelligence as seen in Table 10, 9.33 (SD=2.47) compared to 9.85 (SD=3.10), t=1.24, P>.05 for high-achievers, and 9.23 (SD=3.03), t=1.53, P>.05 for average-achievers. However, neither difference was statistically significant.

Need Achievement

Table 10 shows that the mean and standard deviation for the low-achievers of average level of intelligence for n-ACH were 52.31 and 5.51 respectively. The mean n-ACH scores for the average-and high-achievers were found to be less than that reported for the low-achievers of the same
level of intelligence, 52.31 (SD=5.51) compared with 51.45 (SD=5.77), t=1.18, p>.05 for average-achievers, and 52.31 (SD=5.51) compared with 52.00 (SD=5.78), t=.38, P>.05 for high-achievers.

Intelligence

Table 10 presents the means, standard deviation, and t-test comparisons among high-, average-, and low-achieving groups for intelligence measures at the average level of intelligence. This table summarizes the results that out of nine areas of verbal intelligence, only five areas, namely, number series (NS), vocabulary similarities (VS), classification (CF), analogies (AN), and reasoning (Ro), differentiated one or two pairs of high-, average-, and low-achievers at the average level of intelligence (none differentiating all three pairs at this level of intelligence). NS differentiated between low- and average achievers at this level of intelligence, average-achievers showing higher mathematical ability than the low-achievers, 6.88 (SD=2.19) compared to 7.58 (SD=2.13), t=2.48, P<.05 for average-achievers. VS differentiated between low- and high-achievers of average level of intelligence, the high-achievers achieving significantly lower scores than did the low-achievers, 4.87 (SD=1.27) compared to 4.15 (SD=1.32), t=3.64, P<.05 for high-achievers. CF also differentiated low- and average-achievers of average level of intelligence, low-achievers
securing significantly lower scores than did the average-achievers, 9.72 (SD=2.13) compared to 10.31 (SD=2.20), t= 2.07, P<.05 for average-achievers. AN differentiated between average-and high-achievers of average level of intelligence, but failed to differentiate between low-and high-achievers as seen in the table, 10.30 (SD=2.47) compared to 9.62 (SD=1.87), t=2.24, P<.05 for high-achievers, and 9.71 (SD=2.40) compared to 9.62 (SD=1.87), t=.28, P>.05. This finding indicated that average-achievers of average level of intelligence had significantly greater AN scores than did the high-achievers of the same level of intelligence, while the AN mean for low-achievers of average level of intelligence was highly comparable to that of high-achievers of the same level of intelligence. Moreover, RS differentiated between low-and high-achievers of average level of intelligence as well as between average-and high-achievers of the same level of intelligence, high-achievers showing higher reasoning abilities than the low-and average-achievers at this level of intelligence. The mean scores for low-and average-achievers for RS were 4.30 (SD=1.38) and 4.28 (SD=1.61) respectively. Compared with the means and standard deviations for low-and average-achievers, the mean reasoning score for high-achievers was 5.00 (SD=1.52), t= 3.18 and 3.43, P<.05 respectively.
Regarding $V_{int}$, the mean score for low-achievers of the average level of intelligence was found to be significantly lower than that reported for the average-achievers of the same level of intelligence as seen in Table 10, 51.06 (SD=6.67) compared to 52.96 (SD=6.97, $t=2.10$, $P<.05$. The same trend was observed between low-and high-achievers with $t$ value of 1.29, $P>.05$, indicating that high-achievers of this level of intelligence had higher mental ability than the low-achievers of the same level, although the mean difference did not reach the acceptable level of significance. Identical results were obtained for $DIQ_1$, which was the standard score of the verbal intelligence.

Concerning $DIQ_{comb}$, the mean scores for low-achievers of average level of intelligence showed 99.54 (SD=4.22), compared with 100.49 (SD=4.26), $t=1.71$, $P>.05$ for average-achievers of the same level of intelligence, and 99.54 (SD=4.22), compared with 100.73 (SD=3.77), $t=2.19$, $P<.05$ for high-achievers of the same level of intelligence. This finding indicated that both average-and high-achievers achieved greater intelligence scores than did the low-achievers of the same level of intelligence. While the mean difference between low-and high-achievers was statistically significant, that between low-and average-achievers failed to reach the acceptable level of significance.
Furthermore, for the partial testing of the first three hypotheses, high-, average-, and low-achievers were studied among their groups at the low level of intelligence. The rationale of this aspect of the hypotheses was that high-, average-, and low-achieving groups of low level of intelligence could be distinguished from one another. To test this assumption, three t-test comparisons were carried out between low- and average-achievers of low level of intelligence (LA₁-AA₁), low and high-achievers of low level of intelligence (LA₁-HA₁), and between average- and high-achievers of low level of intelligence (AA₁-HA₁). Table 10 presents the means, standard deviations, and t values for the high-, average-, and low-achievers.

**Styles of Learning**

Table 10 summarizes the results which revealed that out of 16 learning style subvariables, 3 subvariables, namely, intrinsic motivation (IM), negative attitudes (NA), and improvidence (IP) differentiated one or two pairs of low-, average-, and high-achievers at low level of intelligence. As seen in Table 10, the mean score for low-achievers for IM was 9.11 (SD=3.44), while that for the average-achievers was 11.65 (SD=3.43), t= 4.97, P<.05 and that for high-achievers of low level of intelligence
was 10.59 (SD=3.28), t= 1.63, P>.05. This suggested that average-achievers of low level of intelligence achieved significantly greater scores on IM than did the low-achievers of the same level of intelligence. This finding also indicated that the high-achievers of low level of intelligence achieved greater scores on IM than did the low-achievers of the same level of intelligence, although the mean difference was not statistically significant.

Concerning NA, Table 10 shows the mean score for low-achievers of low level of intelligence to be 10.57 (SD=3.69), while that for the average-achievers of the same level of intelligence was 9.42 (SD=3.68), t=2.10, P<.05 and that for high-achievers of the same level of intelligence was 8.24 (SD=3.21), t=2.44, P<.05. This finding indicated that low-achievers of low level of intelligence achieved significantly greater scores on NA than did the average-and high-achievers of the same level of intelligence. Improvidence (IP) also differentiated between low- and average-achievers of low level of intelligence on the one hand, and between low- and high-achievers of the same level of intelligence on the other hand, low-achievers achieving significantly lower IP scores than did the average- and high-achievers as seen in Table 10, 9.21 (SD=3.28) compared to 10.25 (SD=3.08), t=2.19, P<.05 for average-achievers, and 9.21 (SD=3.28)
compared to 10.94 (SD=2.75), t= 2.04, P<.05 for high-achievers.

Regarding MO, the mean score for low-achievers of low level of intelligence was found to be significantly lower than that reported for the average-achievers of the same level of intelligence, as seen in Table 10, 44.12 (SD=7.97) compared to 47.09 (SD=10.23), t= 2.17, P<.05. The mean score for the high-achievers, however, was seen to be less than the observed mean for low-achievers, 44.12 (SD=7.97) compared to 43.88 (SD=9.65), t=.11, P>.05, although this difference was not statistically significant.

With respect to AO, the mean score for low-achievers of low level of intelligence was found to be greater than those reported for average- and high-achievers of the same level of intelligence as seen in Table 10, 46.26 (SD=8.33) compared to 43.79 (SD=7.98), t=2.03, P<.05 for average-achievers and 46.26 (SD=8.33) compared to 44.00 (SD=5.14), t=1.08, P>.05 for high-achievers, although this difference was not statistically significant.

Locus of Control

Table 10 presents the means, standard deviations, and t values of locus of control for the high-, average-, and low-achievers of low level of intelligence.

As seen in Table 10, the locus of control means for
average-and high-achievers were highly comparable to that of the low-achievers at low level of intelligence. There were no statistically significant mean differences reported among these groups.

Need Achievement

Table 10 also presents the means, standard deviations, and t values of need achievement for the high-, average-, and low-achievers at the low level of intelligence.

As seen in Table 10, the mean score for low-achievers at this level of intelligence was 50.58 (SD=5.33), while those for average- and high-achievers were 48.79 (SD=5.18), t=2.29, P<.05 and 50.88 (SD=5.83), t=.21, P>.05 respectively. Compared with the mean and standard deviation for the average-achievers of low-intelligence group, the mean n-ACH score for the high-achievers of the same level of intelligence was 50.88 (SD=5.83), t=1.50, P>.05. This finding indicated that the mean n-ACH score for low-achievers was significantly greater than that reported for the average-achievers but highly comparable to that of the high-achievers, while that for average-achievers of low-intelligence group was less than the high-achievers' n-ACH mean, although this difference was not statistically significant.
Table 10 summarizes the results showing that out of the nine subvariables of Vint, only one subvariable, namely, mathematical instruction (MI) differentiated significantly between average- and high-achievers at the low level of intelligence. This table shows the mean and standard deviation for average achievers of low-intelligence group to be 1.61 (SD=1.09) compared with 2.18 (SD=.88), t= 2.03, P<.05 for high-achievers of the same intelligence group. This finding indicated that the high-achievers of low-intelligence group seemed to have higher basic mathematical skills than did the average-achievers of the same intelligence group. Verbal intelligence (V_int) failed to differentiate among these groups at a low level of intelligence.

Regarding NV_int, Table 10 shows the mean score for the low-achievers of low-intelligence group to be 24.09 (SD=9.86), while the mean score for the average-achievers of the same level of intelligence was 25.89 (SD=9.65), t= 1.24, P>.05 and the mean score for the high-achievers of the same level of was 32.29 (SD=9.79), t= 3.15, P<.05. The mean score for the average-achievers for NV_int was also found to be significantly below that reported for the high-achievers at low level of intelligence, 25.89 (SD=9.65) compared with 32.29 (SD=9.79), t= 2.51, P<.05. It was indicated above that high-achievers of the low-
intelligence group seemed to possess higher intellectual capacity than did the low- and high-achievers of the same intelligence group. The same trend was observed for DIQ, which was nothing short of the standard score of nonverbal intelligence.

With reference to the DIQ_comb, Table 10 shows the mean score for the low-achievers of low level of intelligence to be 81.93 (SD=9.18), while those for average- and high-achievers of the same intelligence group were 83.17 (SD=8.05), t= .97, P>.05 and 87.87 (SD=6.89), t= 2.53, P<.05 respectively. Compared with the mean and standard deviation for the average-achievers of low-intelligence group, the mean score for high-achievers of the same intelligence group for DIQ_comb was 87.87 (SD=6.89), t= 2.26, P<.05. This finding indicated that high-achievers of low-intelligence group achieved significantly greater scores on DIQ_comb than did the low- and average-achievers of the same intelligence group. But suffice it here to drop the important hint that the finding in this particular analysis gave rise to a paradox in the sense that intelligence was partialled out while dividing the sample into different discrepant achievement groups.

High-Achievers at Different Levels of Intelligence

For the partial testing of the hypotheses of this chapter, high-achieving groups at three different levels
of intelligence were studied among themselves. The rationale behind the formulation of these hypotheses was that even among the high-achievers themselves, differentiation on the basis of levels of intelligence was possible since they did not constitute a homogeneous group. Therefore, in order to test this assumption, three t values comparing high-achievers of high-and average-levels of intelligence (HA_h-HA_a), and high-achievers of average-and low-intelligence groups (HA_a-HA_l) were calculated and presented in Table 10.

**Academic Achievement**

Table 10 reveals that high-achievers of superior level of intelligence, i.e., high-intelligence level, had greater achievement scores than did the high-achievers of average level of intelligence, as seen in the table, 63.95 (SD=4.58) compared to 62.99 (SD=3.94), t=1.50, P>.05, although this difference was not statistically significant. High-achievers of high-and low-intelligence groups were highly comparable, and so were the high-achievers of average-intelligence group highly comparable to the high-achievers of low level of intelligence. There were no statistically significant mean differences reported between these groups.

**Styles of learning**

Table 10 summarizes the results which revealed that
out of the 16 learning style subvariables, only five measures, namely, DA, extrinsic motivation (EM), strategic approach (ST), negative attitudes (NA), and globetrotting (GT) differentiated significantly one or two pairs of high-achievers. As can be seen from this table, the mean DA score for high-achievers of high-intelligence group was significantly above that found for high-achievers of low level of intelligence, 13.31 (SD=2.51) compared to 11.82 (SD=3.00), t=2.18, P<.05. Concerning EM, the mean score for high-achievers of high level of intelligence was found to be significantly lower than that reported for high-achievers of low-intelligence group as seen in Table 10, 8.65 (SD=4.34) compared to 11.00 (SD=2.35), t=2.17, P<.05. For ST, the mean scores for high-achievers of high and average levels of intelligence were found to be below those reported for the high-achievers of low level of intelligence, 11.50 (SD=3.38) compared to 13.06 (SD=1.82), t=1.85, P>.05 and 11.47 (SD=1.09) compared to 13.06 (SD=1.82), t=2.05, P<.05 respectively.

Regarding RO, the mean score for the high-achievers of high-intelligence group was found to be below those reported for the high-achievers of average-intelligence group and the high-achievers of the low-intelligence group, while the mean score for the high-achievers of average-intelligence group was less than that found for
the high-achievers of low-intelligence group, 36.60 (SD=9.65) compared to 38.84 (SD=7.06), t= 1.76, P>.05. Also compared with the mean and standard deviation for the high-achievers of the average-intelligence group, the mean RO score for the high-achievers of low-intelligence group was 41.41 (SD=5.94), t= 1.41, P>.05. However, only the mean difference between the high-achievers of high-intelligence group and the high-achievers of the low-intelligence group was statistically significant.

With reference to "AO", the mean score for the high-achievers of high-intelligence group was found to be significantly below those reported for the high-achievers of average-intelligence group and the high-achievers of low-intelligence group, 39.86 (SD=8.25) compared to 43.20 (SD=7.44), t= 2.84, P<.05. and 39.86 (SD=8.25) compared to 43.20 (SD=7.44), t= 2.84, P<.05 and 39.86 (SD=8.25) compared to 44.00 (SD=5.14), t= 1.99, P<.05.

**Intelligence**

Table 10 reveals the results for the survey of intelligence for all the three pairs, indicating that high-achievers of high-intelligence group seemed to have higher intellectual capacity than the high-achievers of both the average-and low-intelligence groups as was clearly manifested by the significant t values for all intelligence measures for all pairs. Inferably, all these
measures of intelligence also differentiated significantly between the high-achievers of average-intelligence group and the high-achievers of low level of intelligence.

Average-Achievers at Different Levels of Intelligence

The hypotheses of the present chapter were also partially tested by the comparison of three average-achieving groups belonging to different levels of intelligence. More specifically, average-achievers of high-intelligence group were compared to average-achievers of average-intelligence group (AAₕ-AAₐ), average-achievers of high level of intelligence were compared to average-achievers of low level of intelligence (AAₕ-AA₁), and average-achievers of average level of intelligence were compared to average-achievers of low level of intelligence (AAₐ-AA₁). Table 10 presents the means, standard deviations, and t values for average-achievers of all levels of intelligence for all measures.

Academic Achievement

Table 10 reveals that average-achievers of high level of intelligence had greater ACH scores than did the average-achievers of average-intelligence group and the average-achievers of low-intelligence group as seen in the table, 53.62 (SD=3.05) compared to 52.95 (SD=3.03), t=1.58, P>.05 for average-achievers of average-
intelligence group and 53.62 (SD=3.05) compared to 52.78 (SD=2.82), t=1.84, P>.05 for average-achievers of low-intelligence group. However, neither difference was statistically significant.

**Style of Learning**

Table 10 shows that 5 of the 16 learning style subvariables, namely, IM, SA, SB, DS, and NA differentiated significantly one or two pairs of average-achievers. As can be seen from this table, the mean IM score for average-achievers of high level of intelligence was significantly below that reported for average-achievers of low level of intelligence, 10.04 (SD=3.44) compared to 10.77 (SD=3.48), t=3.03, P<.05, while the average-achievers of average-intelligence group achieved significantly lower IM scores than did those of low-intelligence group, 10.77 (SD=3.48), compared to 11.65 (SD=3.43), t=1.96, P<.05. Concerning SA, the mean score for average-achievers of high level of intelligence was found to be significantly below that reported for the high-achievers of low level of intelligence, 12.66 (SD=4.31) compared to 13.97 (SD=4.03), t=2.03, P<.05. For SB, significant mean differences were observed for two pairs of average-achievers. The mean score for average-achievers of high-intelligence group was found to be significantly lower than that reported for the average-achievers of low-intelligence group, 7.24 (SD=3.04)
compared to 8.28 (SD=2.59), t= 2.41, P<.05, while the average-achievers of average level of intelligence achieved significantly lower scores than did the average-achievers of low level of intelligence, 7.36 (SD=2.40) compared to 8.28 (SD=2.59), t= 2.87, P<.05. With respect to DS, the mean score for average-achievers of high level of intelligence was found to be significantly greater than that reported for average-achievers of average level of intelligence, 11.14 (SD=3.42) compared to 10.24 (SD=3.20), t=2.00, P<.05. For NA, the mean score for average-achievers of average-intelligence group was found to be significantly less than that reported for the average-achievers of low-intelligence group, 8.35 (SD=4.10) compared to 9.42 (SD=3.68), t= 2.09, P<.05.

Regarding MO, the mean score for the average-achievers of high-intelligence group was found to be lower than those reported for average-achievers of average-intelligence group and the average-achievers of low-intelligence group, 43.96 (SD=10.22) compared to 46.52 (SD=9.30), t= 1.92, P>.05, and 43.96 (SD=10.22) compared to 47.09 (SD=10.23), t= 1.97, P<.05 for average-achievers of low-intelligence group.

With reference to "AO," the mean score for the average-achievers of high level of intelligence was found to be significantly greater than that reported for the average-achievers of average level of intelligence, 45.63
Locus of Control

Table 10 reveals that average-achievers of high level of intelligence achieved lower LC scores than did the average-achievers of low level of intelligence, 9.39, (SD=2.93) compared to 10.09 (SD=2.55), t= 1.64, P>.05, while the average-achievers of average level of intelligence achieved significantly lower LC scores than did the average-achievers of low level of intelligence, 9.23 (SD=3.03) compared to 10.09 (SD= 2.55), t= 2.31, P<.05.

Need Achievement

Table 10 reveals that average-achievers of high level of intelligence achieved significantly greater n-ACH scores than did the average-achievers of low level of intelligence, 51.21 (SD=5.48) compared to 48.79 (SD=5.18), t=2.93, P<.05, while average-achievers of average level of intelligence had significantly greater achievement scores than did the average-achievers of low level of intelligence, 51.45 (SD=5.77) compared to 48.79 (SD=5.18), t=3.66, P<.05.

Intelligence

Table 10 summarizes the results for the survey of intelligence for all the three pairs, indicating that
average-achievers of high level of intelligence had higher mental ability than the average-achievers of average level of intelligence and the average-achievers of low level of intelligence. This was clearly evident from the significant high t values for all intelligence measures for all pairs of average-achievers. Also clearly manifested in Table 10 was the superiority of average-achievers of average-intelligence group to average-achievers of low-intelligence group.

**Low-Achievers at Different Levels of Intelligence**

Hypotheses of the present chapter were partially tested by comparing high-achievers at different levels of intelligence, partially by comparing average-achievers at different levels of intelligence, and partially by comparing low-achievers at different levels of intelligence. For the latter, low-achievers of high level of intelligence were compared to low-achievers of average level of intelligence (LAh-LAa), low-achievers of high level of intelligence compared to low-achievers of low level of intelligence (LAh-LA1), and low-achievers of average level of intelligence were compared to low-achievers of low level of intelligence (LAa-LA1). Table 10 presents the means, standard deviations, and t values for low-achievers of all levels of intelligence for all measures.
Academic Achievement

Table 10 reveals that low-achievers of high level of intelligence had greater achievement scores than did the low-achievers of low-intelligence group as seen in the table, 43.68 (SD=4.88) compared to 40.02 (SD=5.76), t=3.03, P<.05, while the low-achievers of average level of intelligence achieved significantly greater scores than did the low-achievers of low level of intelligence, 42.56 (SD=4.99) compared to 40.02 (SD=5.76), t=3.14, P<.05.

Styles of Learning

Table 10 summarizes the results of survey of styles of learning, indicating that out of the 16 learning style dimensions, 4 areas, namely, deep approach (DA), use of evidence (UE), intrinsic motivation (IM), and improvidence (IP) differentiated significantly one or two pairs of low-achievers. As could be seen from this table, the mean DA score of low-achievers of average-intelligence group was found to be significantly greater than that reported for low-achievers of low-intelligence group, 12.57 (SD=3.01) compared to 11.63 (SD=3.12), t=2.05, P<.05. Concerning UE, the mean score for low-achievers of average level of intelligence was found to be significantly above that reported for low-achievers of low level of intelligence, 12.79 (SD=3.34) compared to 11.53 (SD=3.48), t=2.46, P<.05. For IM, the mean score for low-achievers of average-intelligence group was found to be
significantly higher than that reported for the low-achievers of low-intelligence group, 10.18 (SD=3.65) compared to 9.11 (SD=3.44), t=2.01, P<.05. With respect to IP, the mean score for the low-achievers of average-intelligence group was found to be significantly greater than that reported for low-achievers of low-intelligence group, 10.55 (SD=2.80) compared to 9.21 (SD=3.28), t=2.93, P<.05.

Regarding MO, the mean score for low-achievers of average-intelligence group was found to be significantly higher than that reported for low-achievers of low-intelligence group, 47.85 (SD=8.64) compared to 44.12 (SD=7.97), t=2.99, P<.05.

Locus of Control

Table 10 reveals that low-achievers of average-intelligence group achieved below that reported for the low-achievers of low-intelligence group, as seen in the table, 9.33 (SD=2.47) compared to 9.90 (SD=2.46), t=1.55, P>.05. However, this difference was not statistically significant.

Need-Achievement

Table 10 reveals that low-achievers of high level of intelligence achieved significantly lower n-AC scores than did the low-achievers of average level of intelligence, 48.71 (SD=9.01) compared to 52.33 (SD=5.51),
t= 2.56, P<.05, while the low-achievers of average level of intelligence achieved significantly greater scores on n-ACH than did the low-achievers of low level of intelligence, 52.33 (SD=5.51) compared to 50.58 (SD=5.33), t=2.14, P<.05. Compared with the mean and standard deviation for low-achievers of high-intelligence group, the mean score for low-achievers of low-intelligence group for n-NCH was 50.58 (SD=5.33, t= 1.35, P>.05. This suggested that the mean n-ACH score for low-achievers of high-intelligence group was less than mean n-ACH for the low-achievers of low-intelligence group, although this difference was not statistically significant.

Intelligence

Table 10 summarizes the results for the survey of intelligence of all three pairs of low-achievers. It was clearly evident from this table that low-achievers of high-intelligence level displayed higher mental ability than the low-achievers of low-intelligence group, the paradox discussed earlier notwithstanding. Also revealed by this table was the superiority of low-achievers of average level of intelligence to the low-achievers of low level of intelligence.
Fig. 10

MEAN PROFILES OF $H_{A_1}$, $A_{A_1}$, $L_{A_1}$, $H_{A_1}$, $A_{A_1}$, $L_{A_1}$, $H_{A_1}$, $A_{A_1}$, $L_{A_1}$ FOR ALL INDEPENDENT MEASURES
CL

GT
Discussion of Results

The six hypotheses of the present chapter assumed that there were certain measures of styles of learning, locus of control, and achievement motivation which would go more with high-, average-, or low-achievers when they were divided into three subgroups on the basis of three levels of intelligence. They were, in a way, the measures of academic achievement which differentiated high-, average-, and low-achievers in the total sample at different levels of intelligence. So, it was, in essence, an examination of some of the relationships between the criterion and the independent variables taken separately at the same level of intelligence as well as at different levels of intelligence.

Hypothesis 1

Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of styles of learning.

Some specific learning style measures differentiated low-achievers from average-achievers, low-achievers from high-achievers, and average-achievers from high-achievers at one or two levels of intelligence only. For instance, deep approach to studying did go more with high-achievers of high-intelligence group as compared to the average-and low-achievers of the same level of intelligence. This measure did not, however, demarcate significantly high-and low-
achieves of the average-and low-intelligence group. This indicated that the high-achievers of high level of intelligence had better learning styles as compared to high-achievers of average-and low-intelligence groups.

Besides, other learning style dimensions which significantly demarcated among high-, average-, and low-achievers at one or two levels of intelligence include the following: UE, IM, FF, EM, DS, NA, OL, and IP. MO also differentiated significantly average-achievers of high-intelligence group from high-achievers of the same level of intelligence, as well as distinguishing between low-and average-achievers of low-intelligence group. AO has distinguished significantly between low-and high-achievers of high level of intelligence, low-and average-achievers of average level of intelligence, and low-and average-achievers of low-intelligence group.

Notwithstanding the fascinating results reported in the preceding paragraphs, this hypothesis still failed to gain acceptance as only 25 out of 180 t values calculated for its verification came out to be significant at .01 or .05 level. Hypothesis 1 of the present chapter, therefore, stands rejected. Thus, it would seem as if the effects of styles of learning on academic achievement would be same for high-, average-, and low-achievers at the same level of intelligence.
Hypothesis 2

Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of locus of control.

As seen in Table 10, this hypothesis is not confirmed in that none of the nine t values calculated for its verification came out to be significant at .01 or .05 level. For the Panjab University College sample, locus of control did not seem to be a factor influencing high academic achievement, and more to it, its impact on academic achievement appeared to be same for the high-, average-, and low-achievers when intelligence was partialled out. Similar results were reported by Clinger (1980) who found that locus of control was not a significant contributive factor of academic achievement when intelligence was controlled.

Hypothesis 3

Significant mean differences would exist among high-, average-, and low-achievers when compared at the same level of intelligence in respect of achievement motivation.

Table 10 reveals that n-Ach scores differentiated significantly the low-achievers from the high-achievers, high-achievers of high level of intelligence achieving higher scores than did the low-achievers of the same level of intelligence. Also, it differentiated significantly low-achievers from average-achievers, low-achievers of low level
of intelligence achieving higher scores than did the average-achievers of the corresponding level of intelligence.

Apart from the significant mean differences reported above for the groups LA\textsubscript{h}-HA\textsubscript{h} (t=2.83, P<.05) and LA\textsubscript{1}-AA\textsubscript{1} (t=2.39, P<.05), no other significant mean differences were observed. Only two out of nine t values calculated for the verification of the third hypothesis of this chapter came out to be significant at .01 or .05 level. No justification could, therefore, be established for the acceptance of this hypothesis. It stands rejected. It would thus appear that the effects of achievement motivation on academic achievements of the Panjab University College sample were the same for high-, average-, and low-, achievers when intelligence was controlled.

Hypothesis 4

Significant mean differences would exist among high-average, and low-achievers when compared at different levels of intelligence in respect of styles of learning.

Table 10 reveals the results which indicated that high-achievers of average level of intelligence were found to be significantly better (P<.05) than the high-achievers of high level of intelligence in learning style measures of NA, GT, and AO.

However, high-achievers of high level of intelligence
tended to show superiority over high-achievers of low level of intelligence in learning style measures of DA and RO. On the other hand, high-achievers of low level of intelligence had higher scores on EM, GT, RO and AO than did the high-achievers of high level of intelligence (P>.05).

Moreover, comparison between high-achievers of average level of intelligence and high-achievers of low level of intelligence yielded results which indicated that high-achievers of low level of intelligence had an edge over high-achievers of average level of intelligence in the area of ST (t=2.05, P<.05).

Scrutinizing the results of t-test comparisons between average-achievers of high-intelligence group and average-achievers of average-intelligence group, it was found that average-achievers of high-intelligence group showed superiority (P<.05) over the average-achievers of average-intelligence group in DS, AO, and RO.

Significant mean differences were observed between the average-achievers of low level of intelligence and the average-achievers of high level of intelligence in the areas of IM, SA, SB, and MO.

Furthermore, t-test comparisons between average-achievers of average level of intelligence and average-achievers of low level of intelligence revealed that the latter showed superiority over the former in the areas of IM, SB, and NA.
t-test comparisons between low-achievers of high level of intelligence and low-achievers of average level of intelligence revealed that the former were found to be superior (P<.05) to the latter in the area of RO.

Significant mean differences were observed between low-achievers of high-intelligence group and low-achievers of low-intelligence group, the former showing superiority over the latter in the area of RO.

Finally, comparing the last pair of low-achieving group of average and low levels of intelligence, the low-achievers of average level of intelligence showed superiority (P<.05) over the low-achievers of low level of intelligence in the areas of DA, UE, IM, IP, MO, and RO.

The results revealed by Table 10 indicated that out of the 180 (20x9) t values calculated for the testing of the fourth hypothesis of this chapter, 23 t values came out to be statistically significant (P<.05). The number of significant mean differences did not justify the confirmation and subsequent adoption of this hypothesis. So, Hypothesis 4 of the present chapter stands rejected. It would seem that the effects of styles of learning on academic achievements of the Panjab University College sample were the same for high-, average-, and low-achievers when intelligence was taken into consideration. In other words, high-, average-, and low-achievers did not show heterogeneity in their styles of learning at different
level of intelligence.

Hypothesis 5

Significant mean differences would exist among high-, average-, and low-achievers when compared at different levels of intelligence in respect of locus of control.

This hypothesis stands rejected with reference to the number of t values which came out to be significant at .01 or .05 level. Out of the nine t values calculated for its verification, only one t value was found to be significant. Significant mean difference was found only between the average-achievers of low-intelligence group (AA₂ - AA₁, t=2.31, P<.05). It would thus appear that the effects of locus of control on academic achievements of the Panjab University College sample were the same for high-, average-, and low-achievers when intelligence was taken into consideration. This implied that the high-, average-, and low-achievers did not show heterogeneity in their locus of control at different levels of intelligence.

Similar results were reported by Vogel (1976) who concluded that the effects of locus of control on academic achievements were the same for various levels of intelligence.

Hypothesis 6

Significant mean differences would exist among high-,
average-, and low-achievers when compared at different levels of intelligence in respect of achievement motivation.

This hypothesis stands confirmed with reference to the number and degree of significance of mean differences observed in that n-Ach has differentiated between AA_h and AA_l (t=2.93, P<.05), AA_a and AA_l (t=3.66, P<.05), LA_h and LA_a (t=2.56, P<.05), and between LA_a and LA_l (t=2.14, P<.05). Thus, it would seem that the effects of achievement motivation on academic achievement of the Panjab University College sample were different for high-, average-, and low-achievers when intelligence was taken into consideration. This implied that the high-, average-, and low-achievers showed heterogeneity in their achievement motivation at different levels of intelligence.

Similar findings were reported by Entwistle and Welsh (1969) who concluded that achievement motivation was significantly higher for the high-ability groups of both gender.