Chapter 7

FACULTY-WISE COMPARISON OF STYLES
OF LEARNING, LOCUS OF CONTROL, ACHIEVEMENT MOTIVATION, AND INTELLIGENCE
OF HIGH-, AVERAGE-, AND LOW-ACHIEVERS

 Efforts have been made in this chapter to present an analytical picture of the status of correlates of ACH of the high-, average-, and low-achievers for both Science and Arts Students. It was speculated that faculty, perhaps, might offer an explanation for the differentials in ACH. The following hypotheses were tested:

1. Differentials would exist with regard to the styles of learning of Science and Arts Students belonging to high-, average-, and low-achieving groups.

2. Differentials would exist with regard to the locus of control of Science and Arts Students belonging to high-, average-, and low-achieving groups.

3. Differentials would exist with regard to the achievement motivation of Science and Arts Students belonging to high-, average-, and low-achieving groups.

4. Differentials would exist with regard to the IQ of Science and Arts Students belonging to high-, average-, and low-achieving groups.

These hypotheses were tested by dividing the three discrepant achievement groups (HAs, AAs, & LAs) into two subgroups each, i.e., high-, average-, or low - achievers belonging to Science and Arts groups. The split of these groups on the basis of faculty led to the composition of relatively small subgroups. There was, however, every possibility that these subgroups lose the normality and linearity of the distribution of their scores pertaining to different measures of variables in the context of ACH. Hence, only t test was employed to verify the four hypotheses of this chapter. Results have been given in Table 7.
Results

Table 7 represents 37 sets of t values for all the 37 measures being studied. Related to each of the 37 measures, three t values have been worked out for Science and Arts groups. The first set of t values aimed at finding out the significance of difference between mean scores of Science and Arts students belonging to the high-achieving group (HASC-HA_A). The second set of t values sought to determine the significance of difference between mean scores, on all measures, of Science and Arts students belonging to average-achieving group (AASC-AA_A). The last set of t values sought to explore the significance of difference between mean scores of Science and Arts students belonging to low-achieving group (LASC-LA_A). These three set of t values were calculated to test the four hypotheses given in the present chapter.

High-achievers Belonging to Science and Arts Groups

For partial testing of the hypotheses of this chapter, high-achievers in the groups of Science and Arts students were studied within themselves. The rationale of these hypotheses was that high-achievers were not themselves homogeneous and could be differentiated on the basis of faculty. So, to test this assumption, t value comparing Science high-achievers and Arts high-achievers (HASC-HA_A) was calculated, as represented in Table 7.
Mean, SDs, and t values for Science Students (N=219), and Arts Students (N=516) belonging to High-, Average-, and Low-Achieving Groups on each of the 37 variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Science Students</th>
<th>Arts Students</th>
<th>High Achieving</th>
<th>Average Achieving</th>
<th>Low Achieving</th>
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<tr>
<td>1. N value</td>
<td>219</td>
<td>516</td>
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<td>5. Measures of Learning Styles</td>
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<td>6. Deep Approach</td>
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<td>13. Course Selection</td>
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<td>15. Learning Strategies</td>
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<td>17. Vocabulary Similarities</td>
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<td>18. Vocabulary Opposites</td>
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<td>19. Classification</td>
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<td>21. Intelligence</td>
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<td>22. Verbal Intelligence</td>
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<td>23. Nonverbal Intelligence</td>
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<td>24. General Ability</td>
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<td>25. Total Score</td>
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**Table 67**
Here, means, standard deviations, and t-test comparisons were carried out between Science high-achievers and Arts high-achievers on all measures.

**Academic Achievement**

Table 7 summarizes the results revealing that the mean and standard deviation for the Science high-achievers for ACH were 64.78 and 4.90 respectively. Compared with the mean and standard deviation for the Science high-achievers, the mean achievement score for the high-achievers belonging to the Arts group was 60.40 (SD=5.33), t= 5.87, P<.05. This indicated that the mean achievement score for Science high-achievers was significantly greater than that reported for the high-achievers belonging to Arts group.

**Styles of Learning**

As seen in Table 7, out of the 16 Learning style subvariables, only 7 significant mean differences were observed. The mean score for relating ideas (Rl) for the Science high-achievers was 12.32 (SD=3.11), while that for the high-achievers belonging to the Arts group was 11.29 (SD=3.38), t=2.18, P<.05. This indicated that Science high-achievers had significantly greater scores on RI than did the high-achievers belonging to Arts group.
Average-Achievers Belonging to Science and Arts Groups

For reproducing orientation and holistic orientation, Table 7 indicates that the means for average-achievers of Science group were highly comparable to those of average-achievers of Arts group as there were no statistically significant mean differences reported between the two groups. Regarding meaning orientation, Table 7 shows the mean score for average-achievers of Science group to be 47.55 (SD=9.77), while the mean score for average-achievers belonging to Arts group was 46.31 (SD=9.55), t=1.10, P>.05. This indicated that average-achievers of Science groups achieved greater scores on meaning orientation than did the average-achievers of Arts groups, although the t value did not reach the acceptable level of significance.

However, with reference to "achieving orientation (AO)", Table 7 shows the mean score for average-achievers of Science group to be 42.00 (SD=8.18), while the mean score for average-achievers belonging to Arts group was 44.35 (SD=8.57), t=2.38, P<.05. This suggested that the average-achievers of Science group achieved significantly lower scores on AO than did the average-achievers belonging to Arts group.

Locus of control

Table 7 presents means, standard deviations, and t
values of locus of control for average-achievers belonging to Science group, compared with average-achievers belonging to Arts group.

As seen in Table 7, the mean score for average-achievers belonging to Science group was highly comparable to that of average-achievers belonging to Arts group. There was no statistically significant mean difference reported between Science average-achievers and Arts average-achievers for this variable.

Achievement Motivation

Table 7 presents means, standard deviations, and t values of achievement motivation (n-ACH) for average-achievers belonging to Science group, compared with average-achievers belonging to Arts group.

Table 7 reveals the results of the survey of n-ACH for both faculties, indicating that the mean score for average-achievers of the Science group was highly comparable to that of average-achievers of the Arts group, as there was no statistically significant mean difference reported between these two groups for n-ACH.

Intelligence

Table 7 also presents the means, standard deviations, and t values of Vint and its subvariables, N Vint, DIQ1, DIQ2, and DIQcomb for average-achievers of Science group,
compared with average-achievers of Arts group.

Comparing the average-achievers of Science group and average-achievers of Arts group on the basis of nine subvariables of verbal intelligence, the mean scores for Science average-achievers were found to be significantly above those reported for Arts average-achievers in all but one subvariables, i.e., vocabulary similarities. Their respective mean scores for number series were 7.72 (SD=2.48) compared with 6.86 (SD=2.49), t=2.95, P<.05 for average-achievers of Arts group. For mathematical instruction, their respective mean scores were 3.07 (SD=1.35) compared with 2.51 (SD=1.43), t=3.39, P<.05 for average-achievers of Arts group. In the case of following instruction, their respective mean scores were 5.27 (SD=2.25) compared with 4.45 (SD=2.17), t=3.21, P<.05 for average-achievers of Arts group. Concerning vocabulary opposites, their respective mean scores were 4.63 (SD=1.65) compared with 4.28 (SD=1.22), t=1.28, P<.05 for average-achievers of Arts group. Their respective mean scores for classification were 10.69 (SD=2.89) compared with 9.61 (SD=2.87), t=3.23, P<.05 for average-achievers of Arts group. For analogies, their respective mean scores were 10.06 (SD=2.83) compared with 9.25 (SD=2.99), t=2.33, P<.05 for average-achievers of Arts group. Their respective mean scores for best answers were 3.64 (SD=1.07) compared with 3.19 (SD=.99), t=3.87, P<.05 for
average-achievers of Arts group. For reasoning, their respective mean scores were 4.94 (SD=1.79) compared with 3.91 (SD=1.92), t=4.74, P<.05 for average-achievers belonging to Arts group.

Regarding verbal intelligence, the mean score for average-achievers of Science group was found to be significantly higher than that reported for average-achievers of Arts group as seen in Table 7, 54.09 (SD=12.19) compared with 48.45 (SD=12.56), t=3.88, P<.05. Naturally, the DIQ\textsubscript{1}, which is nothing short of verbal intelligence scores expressed as standard scores, would have the same t value as the verbal intelligence. It was inferred, therefore, that the mean score for DIQ\textsubscript{1} for average-achievers of Science group was significantly higher than that reported for average-achievers of Arts group, as evident from Table 7, 102.09 (SD=13.71) compared with 95.74 (SD=14.12), t=3.88, P<.05.

With reference to "nonverbal intelligence" (\textit{N\textsubscript{Vint}}) and "deviation intelligence quotient-2\textsubscript{(DIQ\textsubscript{2})}, Table 7 reveals the results of the \textit{N\textsubscript{Vint}} and DIQ\textsubscript{2} for average-achievers of both faculties, indicating that average-achievers of Science group seemed to have higher \textit{N\textsubscript{Vint}} and DIQ\textsubscript{2} than average-achievers of Arts group. Their respective mean scores for \textit{N\textsubscript{Vint}} were 39.36 (SD=8.66) compared to 34.55 (SD=11.50), t=3.85, P<.05 for Arts average-achievers. Concerning DIQ\textsubscript{2}, the mean score for
Science average-achievers was 101.94 (SD=11.77) compared with 95.41 (SD=15.62), t=3.85, P<.05 for average-achievers of Arts group.

Low-Achievers Belonging to Science and Arts Groups

The hypothesis of the present chapter was partially tested by the comparison of the two high-achieving groups belonging to Science and Arts faculties, the two average-achieving groups belonging to Science and Arts faculties, and the two low-achieving groups belonging to Science and Arts faculties.

In this section, comparison was made between low-achievers belonging to Science group and low-achievers belonging to Arts group on the basis of means, standard deviations, and t values presented in Table 7. Means, standard deviations and t-test comparisons were carried out between the two groups on all measures.

Academic achievement

Table 7 reveals that the mean and standard deviation for low-achievers belonging to Science group for ACH were 48.25 and 5.75 respectively. Compared with the mean and standard deviation for the low-achievers of Science group, the mean ACH score for low-achievers of Arts group was 41.31 (SD=6.20), t=5.87, P<.05. This finding indicated that the mean achievement score for Science low-achievers was significantly greater than that reported for low-
achievers belonging to Arts group.

**Styles of Learning**

Table 7 reveals that out of the 16 subvariables of learning style, only 4 significant mean differences were observed. The mean score for low-achievers of Science group for IM was 11.55 (SD=3.13), while that for the low-achievers belonging to Arts group was 9.58 (SD=3.43), t=2.97, P<.05. This indicated that low-achievers of Science group had significantly greater scores on IM than did the low-achievers of Arts group.

Regarding DS method, Table 7 shows that the mean score for low-achievers of Science group was 9.45 (SD=3.10), while that for low-achievers of Arts group was 10.87 (SD=3.19), t= 2.29, P<.05. This suggested that low-achievers of Science group achieved significantly lower scores on DS method than did the low-achievers of Arts group.

With respect to negative attitudes (NA). Table 7 shows the mean score for low-achievers of Science group to be 7.71 (SD=2.76), while the mean score for low-achievers of Arts group was 10.57 (SD=3.79), t= 4.01, P<.05. This indicated that Science low-achievers had significantly lower NA scores than did the low-achievers of Arts group.

As seen in Table 7, the mean score for low-achievers of Science group for CL was 11.55 (SD=2.00), while
for low-achievers of Arts group was 10.11 (SD=3.35), \( t=2.32, \ P<.05 \). This indicated that low-achievers of Science group had significantly greater scores on CL than did the low-achievers of the Arts group.

However, for the rest of the learning style subvariables, there were no statistically significant mean differences reported between Science low-achievers and the low-achievers of Arts group.

Out of the four learning style orientations, only achieving orientation (AO) showed significant mean difference between low-achievers of Science group and low-achievers of the Arts group. Their respective mean scores for AO were 41.65 (SD=6.71) compared with 46.92 (SD=7.58), \( t=3.62, \ P<.05 \). This clearly demonstrated that low-achievers of Science group had significantly lower scores on achieving orientation than did the low-achievers of Arts group. For meaning orientation, reproducing orientation, and holistic orientation, Table 7 indicates that the means for low-achievers of Science group were highly comparable to those of Arts low-achievers, as there were no statistically significant mean differences reported between the groups.

**Locus of Control**

Table 7 presents means, standard deviations, and \( t \) values of Locus of Control for low-achievers belonging to Science group, compared with low-achievers belonging to
As seen in Table 7, the mean score for low-achievers belonging to Science group was highly comparable to that of low-achievers belonging to Arts group, as there was no statistically significant mean difference reported between Science low-achievers and Arts low-achievers for this variable.

Achievement Motivation

Table 7 presents means, standard deviations, and t values of achievement motivation for low-achievers of Science group and low-achievers of Arts group on achievement motivation, the mean score for low-achievers of Science group was found to be significantly lower than that reported for the low-achievers of the Arts group, as seen in Table 7, 48.68 (SD=6.54) against 51.98 (SD=5.18), t= 3.12, P<.05.

Intelligence

Table 7 also presents the means, standard deviations, and t values of the verbal intelligence and its subvariables, nonverbal intelligence (NVint), DIQ₁, DIQ₂, and deviation intelligence quotient-combined for low-achievers of Science group compared with low-achievers of Arts group.

Comparing the low-achievers of Science group and the
low-achievers of Arts group on the basis of nine dimensions of verbal intelligence, the mean scores for low-achievers of Science group were found to be significantly higher than those reported for low-achievers of Arts group in the areas of NS, MI, FI, CF, AN, BA, and RS. Significant t values of 3.60, 3.70, 3.59, 3.16, 2.57, 2.06 and 2.66 were found for NS, MI, FI, CF, AN, BA, and RS respectively. But for vocabulary similarities and vocabulary opposites, the mean scores for low-achievers of Science group were highly comparable to those of low-achievers belonging to Arts group, as there were no statistically significant mean differences reported between Science low-achievers and Arts low-achievers for these variables.

Table 7 also reveals the results of the Vint, N-Vint, DIQ, DIQ^2, and DIQ_{comb} for both Science low-achievers and Arts low-achievers, indicating that low-achievers of Science group had significantly higher scores on these variables. Their respective mean scores for Vint were 57.61 (SD=8.54) compared with 48.15 (SD=12.83), t=3.94, P<.05. For N-Vint, their respective mean scores were 40.77 (SD=7.00) compared with 34.35 (SD=11.30), t=3.05, P<.05. Their respective mean scores for DIQ were 106.05 (SD=9.60) compared with 95.41 (SD=14.42) t=3.94, P<.05. For DIQ^2, their respective mean scores were 103.86 (SD=9.52) compared with 95.14 (SD=15.35), t=3.05 P<.05.
Regarding DIQcomb, their respective mean scores were 104.95 (SD=8.65) compared with 95.27 (SD=13.50), t=3.84, P<.05.

Discussion of the Results

Hypothesis 1

Differentials would exist with regard to the styles of learning of Science and Arts students belonging to high-, average-, and low-achieving groups.

The hypothesis assumed that Science students could be distinguished from the Arts students on the basis of their learning styles when they were further grouped into high-, average-, and low-achievers. They were the measures of academic achievement which differentiated high-, average-, and low-achievers in the total sample for both faculties. It was, in essence, an examination of some of the relationships between the criterion and the learning styles on the one hand and between the faculty and learning styles on the other hand.

As seen in Table 7, only two common approaches to studying, namely, DS and AO significantly differentiated Science students from Arts Students at all levels of achievement, i.e., high-, average-, and low-achieving groups. High-achievers belonging to Science group were characterized by better styles of learning (DS- & AO-).
A few specific learning style measures significantly differentiated Science students from the Arts students at one or two levels of achievement only. For instance, higher mean scores on DA, NS, VO, CF, and RS and did go more with Science students as compared to the Arts students belonging to average-achieving group. Similar results were reported by Heikkinen (1985) who found that significant mean differences existed between students in different subject-matter majors on learning style variables. DA and VO did not, however, significantly demarcate the Science and Arts students of high- and low-achieving groups. This means that the average-achievers of the science group were stronger on DA and VO as compared to the high- and low-achievers of the same group.

Besides, styles of learning dimension, NA demarcated significantly the high-achievers of Science and Arts groups as well as the low-achievers of Science and Arts groups. Learning style subvariable, RI differentiated significantly high-achievers of Science group from high-achievers of Arts group. EM, ST, OL, and IP were other learning style subvariables which significantly demarcated the high-achievers of Science and Arts groups. Moreover, HO differentiated significantly high-achievers of Science group from the high-achievers of Arts group. IM and CL differentiated significantly low-achievers of Science group from the low-achievers of the Arts group.
Notwithstanding the number of statistically significant mean differences observed, this hypothesis stands rejected in that out of 60(20x3) t values calculated to test the hypothesis, only 17 t values came out to be significant at .01, or .05 level.

Hypothesis 2

Differentials would exist with regard to the locus of control of Science and Arts students belonging to high-, average-, and low-achieving groups.

Hypothesis 2 of the present chapter assumed that Science students could be distinguished from the Arts students on the basis of their locus of control when they were further grouped into high-, average-, and low-achievers. They were measures of academic achievement which differentiated high-, average-, and low-achievers in the total sample. It was essentially an investigation into some of the relationships between the criterion and the faculty on the one hand and between the criterion and the locus of control on the other.

Table 7 reveals that significant t value for locus of control for the high-achievers of Science group compared with the high-achievers of the Arts group was observed. This result indicated that high-achievers of Science group showed a tendency towards internality while the high-achievers of Arts group could be regarded as tend...
externality. This could, possibly, explain away the greater mean achievement score secured by the high-achievers of Science group as previous studies have shown that internal control is positively and significantly related to better general academic achievement (Liberman, 1973; Caulfield, Daniels, & Sterner, 1976; Stipek, 1980; Allen, 1982; Puri, 1984).

As is evident from the table, the mean scores for the Science average-achievers and Arts average-achievers were highly comparable as there were no statistically significant mean differences between these two groups \( (t=.25, P>.05) \). The same was the case with Science low-achievers and Arts low-achievers. No significant mean differences were observed \( (t=.88, P<.05) \).

On the basis of the foregoing discussion, this hypothesis stands rejected as only one t value out of the three calculated to verify it came out to be significant.

Hypothesis 3

Differentials would exist with regard to the achievement motivation of Science and Arts students belonging to high-, average-, and low-achieving groups.

The hypothesis assumed that Science students could be distinguished from the Arts students on the basis of achievement motivation when they were further categorized into high-, average-, and low-achievers. Measures of
academic achievement had differentiated high-, average-, and low-achievers in the total sample. So, it was essentially an examination of some of the relationships between the criterion and the achievement motivation as well as between the faculty and achievement motivation.

As seen in Table 7, n-Ach scores differentiated significantly between high-achievers of Science group and high-achievers of Arts group ($t=4.00$, $P<.05$) as well as between the low-achievers of the Science group and the low-achievers of the Arts group ($t=3.12$, $P<.05$). However, n-Ach failed to differentiate average-achievers of the Science group from the average-achievers of the Arts group ($t=.27$, $P>.05$).

Notwithstanding the nonsignificant $t$ value of .27 between $AA_{SC}$ and $AA_{A}$, Hypothesis 3 of the present chapter has been accepted with respect to the two $t$ values for the $HA_{SC} - HA_{A}$ and $LA_{SC} - LA_{A}$ which were found to be significant. On the whole, three $t$ values were calculated to verify this hypothesis.

Hypothesis 4

Differentials would exist with regard to the IQ of Science and Arts students belonging to the high-, average-, and low-achieving groups.

This hypothesis assumed that Science students could be distinguished from the Arts students on the basis of their
IQ when they were further grouped into high-, average-, and low-achievers. As measures of academic achievement had differentiated high-, average-, and low-achievers in the total sample for both faculties, it was essentially an examination of some of the relationships between the criterion and the IQ on the one hand and between the faculty and IQ on the other.

The results showed that eight common measures of intelligence significantly differentiated Science students from Arts students of all levels of achievement, i.e., high-, average-, and low-achieving groups. High-achievers belonging to Science group were characterized by higher mathematical ability and logical thinking (MI, FI, & BA), and higher intelligence (V_{int}, \text{NV}_{int}, \text{DIQ}_1, \text{DIQ}_2 \text{ and } \text{DIQ}_{comb}).

A few specific measures of intelligence differentiated Science students from the Arts students at one or two levels of intelligence only. Higher mean scores on NS, VO, CF, and RS did go more with Science students as compared to the Arts students belonging to average-achieving group. VO did not, however, significantly demarcate the Science and Arts students of high-and low-achieving groups, thereby implying that the average-achievers of the Science group were stronger on vocabulary opposites as compared to the high-and low-achievers of the same group.

The above discussion shows that this hypothesis stands accepted. In all the eight common measures of intelligence,
statistically significant mean differences existed between Science and Arts students at all levels of achievement, high-achievers of Science group achieving greater scores on MI, FI, BA, V_int, DIQ_1, DIQ_2 and DIQ_comb. Four measures of intelligence associated significantly more with the Science students at two levels of achievement (NS, CF, AN, & RS). Only one measure of intelligence, namely, VO was found to be specific measure of average-achievers belonging to Science group, as they showed significant mean differences as compared to average-achievers of the Arts group.

On the whole, 32 t values out of the total of 42 t values calculated came out to be significant at .01 or .05 level, thus justifying the acceptance of Hypothesis 4 of this chapter.