The analysis in this chapter revolved around finding out the analytical picture of the relationships between academic achievement and styles of learning, locus of control, achievement motivation, and intelligence variables. It was observed from the results given in chapter 10 that students belonging to the same level of intelligence still showed wide variations in academic achievement. The reason for this discrepancy in academic achievement is not yet known. Attempts have been made in this chapter to find an explanation for this phenomenon with a clear objective of obtaining analytical picture of the relationships between academic achievement and styles of learning, locus of control, achievement motivation, and intelligence by way of testing the following hypotheses:

1. Certain styles of learning, locus of control, achievement motivation, and intelligence which correlate significantly with academic achievement are common to (a) the total group, high-, average-, and low-achievers or (b) at least two of these groups,

2. Certain learning style correlates of academic achievement are specific to the total group, high-, average-, or low-achievers.
To facilitate ease in examining these data, results of the research hypotheses tested for each of the 36 subscales of the four variables used were analyzed with the help of the statistical technique of Pearsonian bivariate (product moment) correlation. Product moment correlations were based on the scores from the total sample, high-, average-, and low-achievers computed for academic achievement and each of the 36 independent variables. The correlation coefficients obtained for the total sample, high-, average-, and low-achievers were then used as the basis for determining the commonness or specificity of the relationships among academic achievement and each of the 36 independent variables for these groups, as hypothesized.

Results

The correlation coefficients between academic achievement and each of the 36 independent variables for the total sample, high-, average-, and low-achievers have been presented in Table 11.

Table 11 presents four sets of 36 correlations for four groups, i.e. the total sample (TS) representing the total range of academic achievement, the high-achieving group (HA_g) representing one extreme level of discrepant achievement, the average-achieving group (AA_g) representing the middle level of discrepant achievement, and the low-achieving group (LA_g) representing another
Table 11
Correlation Coefficients between Independent Measures and Academic Achievement (CRM) for Total Sample (TS, N=735), High Achievers (HAs, N=198), Average Achievers (AAs, N=339) and Low Achievers (LAs, N=198)

<table>
<thead>
<tr>
<th>Measure of Learning Style</th>
<th>Total Sample (TS)</th>
<th>HA (HAs)</th>
<th>AA (AAs)</th>
<th>LA (LAs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>IA</td>
<td>.14*</td>
<td>.08</td>
<td>.20*</td>
</tr>
<tr>
<td>5</td>
<td>RC</td>
<td>.05</td>
<td>.04</td>
<td>.22</td>
</tr>
<tr>
<td>7</td>
<td>LE</td>
<td>.13</td>
<td>.02</td>
<td>.10</td>
</tr>
<tr>
<td>9</td>
<td>IA</td>
<td>.16</td>
<td>.02</td>
<td>.31</td>
</tr>
<tr>
<td>10</td>
<td>SA</td>
<td>.10</td>
<td>.15</td>
<td>.25</td>
</tr>
<tr>
<td>15</td>
<td>GI</td>
<td>.02</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
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<td>LE</td>
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<td>.02</td>
<td>.09</td>
</tr>
<tr>
<td>17</td>
<td>IA</td>
<td>.02</td>
<td>.13</td>
<td>.23</td>
</tr>
<tr>
<td>18</td>
<td>RC</td>
<td>.10</td>
<td>.08</td>
<td>.10</td>
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<tr>
<td>20</td>
<td>AO</td>
<td>.23*</td>
<td>.21*</td>
<td>.01</td>
</tr>
<tr>
<td>22</td>
<td>MS</td>
<td>.08</td>
<td>.08</td>
<td>.07</td>
</tr>
<tr>
<td>Measure of Locus of Control</td>
<td>22</td>
<td>17</td>
<td>.05</td>
<td>.08</td>
</tr>
<tr>
<td>Measure of Achievement Motivation</td>
<td>22</td>
<td>N-ACH</td>
<td>.05*</td>
<td>.19*</td>
</tr>
<tr>
<td>Measure of Intelligence</td>
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<td>KS</td>
<td>.27*</td>
<td>.12</td>
</tr>
<tr>
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<td>HI</td>
<td>.28</td>
<td>.13</td>
<td>.19</td>
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<tr>
<td>26</td>
<td>TI</td>
<td>.09</td>
<td>.09</td>
<td>.18</td>
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<tr>
<td>27</td>
<td>VS</td>
<td>.14</td>
<td>.29</td>
<td>.22</td>
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<tr>
<td>28</td>
<td>UO</td>
<td>.22</td>
<td>.22</td>
<td>.10</td>
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<tr>
<td>29</td>
<td>C</td>
<td>.27</td>
<td>.18</td>
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<td>NA</td>
<td>.26</td>
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<td>IA</td>
<td>.19</td>
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<td>32</td>
<td>AO</td>
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<td>33</td>
<td>HI</td>
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<td>VS</td>
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<td>35</td>
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<tr>
<td>36</td>
<td>C</td>
<td>.31</td>
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<td>.11</td>
</tr>
<tr>
<td>37</td>
<td>NA</td>
<td>.32</td>
<td>.15</td>
<td>.27</td>
</tr>
</tbody>
</table>
extreme level of discrepant achievement.

**Styles of Learning**

Table 11, which gives the product-moment correlations between academic achievement and the independent variables, indicates that the first 20 row-wise sets of correlations revealed the correlations between academic achievement and the variables of learning styles for the four different groups. Regarding DA, it was found to be positively and significantly correlated with academic achievement of the total sample \((r=0.14, P<.05)\), and the average-achievers \((r=0.20, P<.05)\). However, DA was not significantly related to the academic achievement of the high-and low-achievers.

RI was found to be positively and significantly related to the academic achievement of only low-achievers \((r=0.21, P<.05)\) and was, therefore, a specific correlate of academic achievement of the low-achieving group.

UE was specifically and positively significantly related to the academic achievement of the average-achievers \((r=0.10, P<.05)\).

With respect to IM, the positively significant correlations of \(r=0.16, P<.05\) and \(r=0.21, P<.05\) were found between it and academic achievement of total sample (TS) and low-achievers respectively. This finding indicated that IM was a correlate of achievement of the total sample.
and low-achievers but not a significant correlate of the achievement of high-and average-achievers.

With respect to SA, negatively significant correlations of -0.10, -0.09, and -0.33 were found between it and academic achievement of total sample, average-, and low-achievers respectively (P<.05). This finding suggested that SA was a significant common correlate of academic achievement of the total sample, average-and low-achievers. Significant negative relationships between SA and ACH of these three groups indicated further that SA was inversely related to their academic performance. It was not, however, a significant correlate of ACH of high-achievers.

SB was found to be negatively and significantly related to the academic achievement of the total sample (r=0.09, P<.05) and the average-achievers (r=-0.14, P<.05) but not a significant correlate of the ACH of high-(r=0.08, P>.05) and low-achievers (r=-0.06, P>.05). The results indicated that SB was inversely related to academic performance of the total sample and the average-achievers, that is, students belonging to the total and high-achieving groups who achieved high SB scores would have lower ACH than those in the corresponding groups who attained lower syllabus boundness scores.

DS was negatively significant specific correlate of academic achievement of the total sample only (r=-0.12,
This implied that DS was inversely related to academic performance of the total sample.

ST was found to be negatively and significantly correlated with ACH of the total sample ($r=-0.11$, $P<.05$) and low-achievers ($r=-0.14$, $P<.05$). It was, therefore, inversely related to academic performance of students belonging to these two groups.

NA was a significant correlate of ACH of the total sample ($r=-0.25$, $P<.05$), high- ($r=-0.19$, $P<.05$), and low-achievers ($r=0.21$, $P<.05$) but not a significant correlate of ACH of the average-achievers ($r=0.02$, $P>.05$). Significant negative correlations for the total sample and high-achievers implied that NA was inversely related to their ACH.

AM was another learning style subvariable which was found to be negatively and significantly related to the ACH of the total sample ($r=-0.07$, $P<.05$) and the low-achievers ($r=-0.29$, $P<.05$). It was, therefore, inversely related to the academic performance of these two groups.

Again, CL was a correlate of ACH of the total sample ($r=0.11$, $P<.05$) and low-achievers ($r=0.24$, $P<.05$).

IP was a positively significant correlate of ACH of the high-achievers ($r=-0.23$, $P<.05$) and a negatively significant correlate of ACH of average-achievers ($r=-0.23$, $P<.05$).

Regarding MO, it was found to be positively and
significantly related to ACH of the total sample \( (r=0.11, P<.05) \) and the low-achievers \( (r=0.17, P<.05) \). It was, however, not significantly correlated with the ACH of high- \( (r=0.03, P>.5) \) and average-achievers \( (r=0.08, P>.05) \).

RO was a significant correlate of ACH of the total sample \( (r=-0.10, P<.05) \) and low-achievers \( (r=-0.22, P<.05) \). It was, therefore, inversely related to academic performance of these two groups, i.e., the higher their scores on RO the lower would their ACH be.

AO was found to be negatively and significantly related to the achievement of the total sample \( (r=-0.23, P<.05) \), high-achievers \( (r=-0.21, P<.05) \) and low-achievers \( (r=-0.24, P<.05) \). It was, therefore, inversely related to the academic performance of these three groups but not significantly correlated with the ACH of average-achievers \( (r=-0.01, P>.05) \).

HO was found to be positively and significantly related to the ACH of only the total sample \( (r=0.08, P<.05) \) and was, therefore, a specific correlate of ACH of the total sample.

FF, EM, GT, and OL did not go significantly with any of the four groups studied here.

**Locus of Control**

Table 11 reveals that the correlations between LC and achievement of the total sample, high-, average-, and
low-achievers were \(-0.01, P>.05; -0.08, P>.05; -0.17, P<.05;\) and \(-0.09, P>.05\) respectively. This finding indicated that locus of control (LC) was a specific correlate of ACH of average-achievers. Negative correlation coefficients for all the four groups implied that LC was inversely related to academic performance, i.e., students with high locus of control scores would have lower ACH than those who had lower scores. Put differently, the internal subjects had significantly higher academic achievement than the externals.

It should be noted, however, that other research findings concerning the relation between locus of control and ACH are consistent with the low inverse relationship found in this study. Allen (1982), in a study with adolescents, reported that internal locus of control subjects achieved higher scores on Mathematics and Language than external subjects, while Puri (1984) found a low, but significant negative relationship between locus of control and ACH \((r=-0.34, P<.05)\). These findings served to highlight the consistency of research findings for the relationship between locus of control and academic achievement.

**Need Achievement**

As seen in Table 11, n-Ach was a significant correlate of ACH of high-achievers \((r=0.18, P<.05)\), as
well as average-achievers \( r=-0.12, P<.05 \). It was not, however, significantly correlated with the ACH of the total sample and the low-achievers. Positively significant correlation of .18 indicated that students with high n-ACH scores had higher ACH than those who attained lower scores.

Similar results have been reported by Heckhousen (1967), Khan (1968), and Dutt and Sabharwal (1973) who found correlations of \( r=0.40, P<.05 \), \( r=0.20, P<.05 \), and \( r=0.45, P<.05 \) respectively between need achievement and academic achievement. The low, but significant magnitude of the relation as well as the positive direction found between n-ACH and ACH appeared to be consistent with results of research studies which reported negligible to low correlations ranging from \( r=0.20 \) to \( 0.31, P<.05 \) (Boyle, 1983; Schibeci, 1984), for these variables.

The findings of this present investigation suggested that students tend to achieve optimally when they regard achievement as being worthwhile as a means to a successful career and an avenue of personal satisfaction.

Intelligence

Considering the correlations between ACH and each of the nine subvariable of Vint presented in Table 11, a number of significant specific and common correlates of achievement of these four groups were observed. NS, MI, and AN were found to be positively and significantly
related to the ACH of the total sample (NS, r=0.28, P<.05; MI, r=0.28, P<.05; AN, r=0.26, P<.05), and the low-achievers (NS, r=0.30, P<.05; MI, r=0.14, P<.05; AN, r=0.19, P<.05). None of these variables was a significant correlate of ACH of the high-and average-achievers.

FI and BA were significant common correlates of ACH of the total sample (FI, r=0.29, P<.05; BA, r=0.19, P<.05), average-achievers (FI, r=0.11, P<.05; BA, r=0.11, P<.05), and low-achievers (FI, r=0.18, P<.05; BA, r=0.14, P<.05). These factors did not however, relate significantly to the ACH of high-achievers.

VS was a specific correlate of ACH of total sample only (r=0.14, P<.05).

VO was found to be significantly related to the ACH of the total sample (r=0.22, P<.05), high-achievers (r=0.22, P<.05) and average-achievers (r=0.10, P<.05). It was thus, a significant common correlate of ACH of the total sample, high-, and average-achievers, but not a significant correlate of the ACH of low-achievers (r=0.10, P>.05).

CF and RS were significant correlates of ACH of the total sample (CF, r=0.27, P<.05; RS, r=0.25, P<.05) and the average-achievers (CF, r=0.10, P<.05; RS, r=0.13, P<.05). Both factors did not go significantly with the ACH of the high-and low-achievers.

Now, regarding $V_{\text{int.}}$ and its standard score, the
DIQ₁, Table 11 shows the correlations of $r=0.34$, $P<.05$; $r=0.10$, $P>.05$; $r=0.10$, $P<.05$; and $r=0.25$, $P<.05$ between these factors and the ACH of the total sample, high-, average- and low-achievers respectively. This finding indicated that Vint and DIQ₁ were significant common correlates of achievement of the total sample, average- and low-achievers but did not go significantly with the ACH of high-achievers.

With respect to NVint and its standard score, DIQ₂, Table 11 reveals the correlation of $r=0.36$, $P<.05$; $r=0.16$, $P<.05$; $r=0.13$, $P<.05$; and $r=0.12$, $P>.05$ between them and the ACH of the total sample, high-, average-, and low-achievers respectively. This finding suggested that NVint and DIQ₂ were significantly common correlates of the ACH of total sample, high-, and average-achievers but did not go significantly with the ACH of low-achievers.

Concerning DIQ₃, Table 11 also shows the correlations of $r=0.38$, $P<.05$; $r=0.15$, $P<.05$, $r=0.13$, $P<.05$; and $r=0.21$, $P<.05$ between it and the ACH of the total sample, high-, average-, and low-achievers. This finding indicated that DIQ₃ was a significant common correlate of ACH of the total sample, high-, average-, and low-achievers.
Discussion of Results

Hypothesis 1

Certain styles of learning, locus of control, achievement motivation, and intelligence which correlate significantly with academic achievement were found to be "common" to (a) the total group, high-, average-, and low-achievers, or (b) at least two of these groups.

The results of correlational analysis presented in Table 11 showed that only one independent variable, DIQ\textsubscript{Comb} was found to be the common correlate of ACH of all the four groups (TS, HAs, AAs, & LAs). Direct relationship between intelligence and academic achievement of all the groups implied that students with high intelligence scores would have higher ACH than those who attained lower intelligence scores. This result supports research findings which suggested the superiority of high-achievers over low-achievers with regard to their general intelligence (Seetha, 1975; Sultane, 1983; Sandhu, 1985; Okafor, 1989).

It is clear from the foregoing discussion that only one out of the 36 independent variables, namely DIQ\textsubscript{Comb} was significantly correlated with the academic achievement of all the four groups. Thus, there was, after all, a common correlate of ACH of all these groups, thereby confirming the first part of the first hypothesis in this chapter, which states expressly that 'styles of learning,
locus of control, achievement motivation, and intelligence would be common to the total sample (TS), high-achievers (HAs), average-achievers (AAs), and low-achievers (LAs)...

Another part of the first hypothesis was concerned with the independent variables which were common correlates of academic achievement of at least two of the four groups (TS, HAs, AAs, LAs). The results presented in Table 11 revealed that in the area of learning styles, deep approach (DA+) did go with the total sample as well as average-achievers but not with the high- and low-achievers. Perhaps, better styles of learning were a causal factor of better academic performance when total range of achievement (TS) and average-achievement (AA) were considered. The same was true of syllabus boundness (SB-) which did go negatively and significantly with the total sample as well as average-achievers but not with high- and low-achievers. There was no other learning style subvariable which did go commonly with these two groups. These results lent support to the findings of Aggarwal (1981) and Ramsden and Entwistle (1981) that deep approach is directly related to academic achievement while syllabus boundness is inversely related to academic achievement.

As regards the common correlates of the achievement of the total sample and average-achievers in the area of intelligence, Table 11 shows that CF and RO were
significantly correlated with the achievement of these two groups.

Concerning the common correlates of the ACH of the total sample and low-achievers, Table 11 reveals that in the area of styles of learning, IM, ST, CL, MO, and RO significantly correlated with the ACH of these two groups. There was no other learning style dimension going commonly with these two groups. As regards the common correlates of the achievement of the total sample and low-achievers in the areas of intelligence, Table 11 shows that NS, MI and AN were positively and significantly correlated with the academic achievement of these groups.

With respect to the common correlates of the achievement of high- and average, Table 11 reveals that only two independent variables, namely, IP and n-ACH were found to relate significantly with the ACH of these groups. There was no other independent variable going commonly with these two groups. The low, but significant magnitude of the relationship as well as the positive direction found between n-ACH and ACH added another testimony to the findings by Heckhausen (1967) and Khan (1968).

Regarding the common correlates of the achievement of the total sample, average-, and low-achievers, Table 11 shows that SA, FI, BA, V_{int}, and DIQ correlated significantly with the ACH of these three groups.
Negatively significant correlation between surface approach and ACH implied that students with high surface approach scores would attain lower academic achievement than those with low SA scores. The low, but significant magnitude of the relation as well as the positive direction found between Vint and ACH seemed to be consistent with the findings by Kaur (1983), and Gakhar and Kaile (1983).

Now, concerning the common correlates of the achievement of the total sample, high-, and low-achievers, Table 11 reveals that NA and AO were significantly correlated with the achievement of the students in these three groups. Negative significant correlation between attitude and ACH implied that students with high NA scores would attain lower achievement than those with low NA scores. Similarly, high AO score simply implied low academic achievement and vice-versa.

Besides, Table 11 also shows that VO, NVint and its standard score, DIQ2 were positively and significantly related to the ACH of the students in the total sample, high-achieving and average-achieving groups. There was no other independent variable going with these three groups, and therefore, these could be considered as significant common correlates of the achievements of students within these three groups. Notably, positively significant correlation between NVint and ACH suggested that students
with high NVint scores would attain higher achievement than those with low NVint scores. These results are consistent with those reported by Kaur (1983) and Kaile (1985) alluding to low, but positively significant relationship between NVint and academic achievement. Invariably, NVint was a causal factor of better academic performance for the total sample, high-, and average-achievers.

It is important to note that there was no variable common to only high- and low-achievers did not go with the total sample and average-achievers.

The above discussion shows that the second part of the first hypothesis of this chapter stands confirmed. There were three common correlates of achievement of the total sample and average-achievers (DA+, SB−, & RS+). Eight variables significantly correlated with the achievement of the total sample and low-achievers (IM+, ST−, CL+, MO+, RO−, NS+, MR+, & AN+). Four variables were significant common correlates of the achievement of the total sample, average-, and low-achievers (SA, FI+, BA+, & Vint+), while two variables correlated commonly with the academic achievement of the total sample, high-, and low-achievers (NA− & AO−), and three variables correlated commonly with the achievement of the total sample, high-, and average-achievers.
Hypothesis 2

Certain learning style correlates of ACH... specific to the total group, high-, average-, or low-achievers.

Results of the correlational analyses found in Table 11 indicated that the hypothesized specific relation between certain independent variables and ACH of the total sample, high-, average-, and low-achievers has been confirmed.

Table 11 reveals that there were two learning style variables, namely, DS- and HO+ which significantly and specifically did go with the total sample. Negative DS implied that those students in the total group who had better academic performance were characterized by use of organized study method. Similar results have been reported by Young (1975), Annis (1979), and Watkins and Hattie (1981) who found that organized study methods were significantly related to better academic performance.

Furthermore, it was implied in the positive HO that the high-achievers within the total range of achievement (TS) tended to think divergently, readily jumped to conclusion, laid emphasis on facts and logical analysis, and relied overcautiously on details. These results... consistent with those of Pask (1976).

Table 11 also reveals that one verbal intelligence subvariable, VS was significantly and specifically related
with the academic achievement of the total sample. Again, this could be said to imply that within the total range of achievement, language proficiency was an important factor contributing to high academic attainment. Putting it somewhat differently, the high-achievers within the total group were characterized by high proficiency in English language.

Moreover, Table 11 indicates that two variables, namely, UE and LC did go significantly and specifically with the ACH of the average-achievers. Thus, the factor of UE was a significant positive correlate of ACH of students within the average-achieving group. This implied that within the average-achieving group, those students who had better academic performance employed use of evidence style of learning. Again, putting it differently, average-achievers could achieve much higher by adopting use of evidence learning style. Also, the factor of LC was a significant, though negative correlate of the ACH of students within the average-achieving group. Negative LC meant that those who achieved higher within the average-achieving group were students with internal control. This result is in accord with the finding which suggested that internal subjects have significantly higher academic achievements than the externals (Fry, & Coe, 1980; Bar-Tal, et al, 1980; Allen, 1982; Puri, 1984).
Finally, Table 11 reveals that only one variable, $Rl^+$ did go significantly and specifically with the achievements of low-achievers. Thus, the factor of $Rl$ was a significant positive correlate of ACH of students within the low-achieving group. This implied that within the average-achieving group, those students who had better academic performance employed RI style of learning. In other words, low-achievers could perform much better academically by employing RI approach to studying.

Summing up the discussion of results with respect to the two hypotheses of this chapter, it was stated that DIQcomb was found to be correlated significantly with the ACH of all the four groups. This was the common independent correlate of academic achievement of the total group, high-, average-, and low-achievers. In a way, it could be said to be the correlate of $ACH$, which showed its significant relationship with the ACH in the positive discrepant levels of achievement.

Common to three groups were $SA$, $NA$, $AO$, $FI$, $VO$, $BA$, $Vint$, $NVint$, $DIQ_1$ and $DIQ_2$. $SA$, $FI$, $BA$, $Vint$, and $DIQ_1$ were common correlates of the achievement of the total sample (TS), average-achievers (AAs), and low-achievers (LA's), while $NA$ and $AO$ were common correlates of the ACH of the total sample, high-, and low-achievers, and $VO$, $NVint$ and $DIQ_2$ were the common correlates of the total sample, high-, and average-achievers.
Common to two groups were DA, IM, SB, ST, AM, CL, IP, MO, RO, n-ACH, NS, MI, CF, AN and RS. DA, SB, CF and RS were common to the total sample and average -achievers, while IM, ST, AM, CL, MO, RO, NS, MI, and AN were common correlates of the achievement of the total sample and low-achievers. IP and n-ACH were common correlates of the achievement of the high-and average-achievers.

Now, concerning specific correlates, it is evident from Table 11 that RI approach was a specific correlate of the ACH of low-achievers, MC and LC were specific correlates of ACH of average-achievers and DS, HO, and VS were the specific correlates of the achievement of the total sample.

Apart from the above common and specific correlates of academic achievement of the total sample, high-, average-, and low-achievers, there were a few independent variables which did not significantly correlate with the ACH of any of these groups in both magnitude and direction. These were the styles of learning variables including FF, EM, GT, and OL. Although Table 11 reveals, at a glance, that these variables did not go with ACH of any of the four groups, yet it could just be possible that these variables might contribute, to a great extent, in the explanation of the variance in achievement when they were combined with other variables with the help of multivariate correlational analysis commonly employed in
estimating the contribution of 'suppressor variables' in different combinations (Nunnally, 1967, P.162).