Summary & Conclusions

The experimental work revealed that:

i) Y design of administration was significantly better than X design of administration at both .05 and .01 levels of confidence.

ii) $Y_M$ & $Y_{ME}'$ designs were significantly better than $X_M$ and $X_{ME}$ designs respectively. Under these experimental conditions inter subject differences were significantly larger but not larger than the inter system differences. Inter system differences were significantly larger than the inter subject differences.

Here $M$ stands for manageability and $E'$ stands for opportunity to exert. $Y_M$ stands for the experimental condition where Y design of administration is operating with manageability factor explicitly being manipulated. All other such symbols have a similar kind of interpretation.

iii) $Y_{ME}'R$ design was significantly better than $X_{ME}'R$ design. The explicit manipulation of 'R' factor (immediate reward) coupled with 'M' factor (manageability) and $E'$ factor (opportunity to exert) made the inter subject difference to disappear.
iv) The explicit manipulation of 'A' factor (immediate awareness) in both the systems reduced the system differences & the two systems of administration started tending towards each other in terms of teacher/student achievement.

v) With the explicit manipulation of 'I' factor (interaction within and without) coupled with M, E, R, A factors, systems X & Y became almost identical & inter subject & inter system differences became insignificant.

vi) With the introduction of 'A' factor (autonomy at all levels of administration), the system X^{ME'RAIA} and Y^{ME'RAIA} started diverging, most probably because of the conflict into which the X system entered. X system was originally working under dictatorial set up. With the grant of autonomy there was conflict and inherent contradiction in the system. Autonomy was not meaningful within dictatorial supra structure.

vii) The cumulative explicit introduction of different variables under X design of administration always created significant increase in performance.

viii) Cumulative dropping of different variables from the experimental condition X^{ME'RAIA} always resulted into significant decrease in performance.
ix) Within each experimental condition under X design of administration, the inter subject differences were significant, no matter, whether the different variables, viz. M, E, R, A, I, A were cumulatively introduced or dropped.

x) Within the system Y of administration cumulative explicit introduction of different variables M, E, R, A, I, A did not always make a significant change in the achievement score.

xi) Within the system Y of administrative design, withdrawal of different variables viz. M, E, R, A, I, A almost always made a significant decrease in the achievement score.

xii) Within the Y system of administration the inter subject differences were insignificant irrespective of whether the different variables viz. M, E, R, A, I, A were cumulatively introduced or dropped.

xiii) Y design has in it, implicitly inbuilt such factors as manageability, opportunity to exert, reward, awareness interaction & autonomy. When these factors were cumulatively withdrawn from the Y design it coincided with X design in its effectiveness.
xiv) Such factors as M, E, R, A, I, A with stress of immediacy on R & A acted as the human feedback factors that feed and sustain human activity.

xv) Immediate intangible and tangible rewards were very essential to performance. An individual would not feel like performing unless some reward was in view, whether tangible or intangible. Sometimes achievement itself was the reward. The immediacy of reward was very essential until the stage of commitment was achieved. At the commitment stage there were inbuilt compulsions for performance in the desired direction. The presence of immediate reward coupled with other factors would convert a dull & inactive organisation into very active & enthusiastic system with teacher/student morale at its best.

xvi) Awareness was another factor which when explicitly manipulated got the whole system involved. Explicit manipulation of this factor tried to make motivation inbuilt. The behaving individuals started developing into self-generating, self-directing, self-regulating, self-coordinating, self-controlling mechanisms. Their behaviour started becoming purposeful & goal directed. The element of self-evolution was not very much...
effected by awareness factor. Awareness was of various kinds viz. the systems awareness, reward awareness, goal awareness, correctness awareness, interactional awareness, self-awareness. Under Y system design, awareness factor directed an individual to identify the goal, initiate movement towards the goal, receive the error signals and then redirect its movements till the goal was achieved. Goals were always fixed by the teacher/student according to their own capacities & capabilities under the Y system, but under the X system it was fixed by the administrator. Like air for life, awareness was important for any activity. Besides wanting to be aware about others' performance, the behaving individual wanted to be aware of how he/she was progressing in relation to his/her previous performance. This was called self-awareness. Awareness was effectively operative when fed instantly and continuously and always immediately after the performance.

Autonomy alone without reward was not operative. Decentralisation of administration (autonomy) and centralisation of information (awareness) caused very encouraging results. Under autonomous conditions coupled with other factors people became innovative & the process of involvement and commitment sped up. Autonomy had different dimensions viz. security, stability, sense of responsibility & freedom to perform. It was only under these conditions coupled with reward & awareness that autonomy became operative. Autonomy generated affiliation & identification in an individual towards the organisation.

Security & stability contributed to good mental health & capability of being in control of one's own movements. Freedom to perform was realised by allowing the behaving individuals to perform in their own way according to their own capacities and limitations and in the manner that suited them best.

Autonomy was inbuilt in design Y but it was alien to design X. The design X of administration was working under the autocratic administrative set up. The principle of autonomy could not be compatible to the X design of administration. The introduction of
autonomy factor in the X design put the people under conflict. In general under autonomy the quality of the output improved significantly though the quantity of the output got reduced.

The manageability factor was found to be very important for performance. It granted stability to the system. There were two kinds of stabilities viz. administration controlled stability & self-controlled stability. The administration controlled stability was realised by assigning manageable tasks & self-controlled stability was realised when the behaving individual exercised self control & self direction in making choice of manageable tasks.

Mathematically, manageability is an inverse function of entropy and is represented by $\frac{1}{-\sum p_i \log p_i}$. Under manageability principle it was important that the system as a whole did not get disturbed at any point of time. Thus the majority of the workers in a system had to be kept in good shape for keeping the system going. In a stable system only a finite number of elements are disturbed at one single point of time. A stable system is not everywhere disturbed.
Considering a single individual as a system, at a single moment, entropy introduced was so small that it did not disturb the total mental set up. For larger values of entropy the individual lost control of his/her own activity. Stability was very crucial to the performance of a system. Stability was achieved through ability to perform. When the ability to perform was lost, the system became dull and lost all motivation to work. Limited exposures to entropy ensured ability to perform. Continuous maintenance of stability was found crucial to self regulation, self coordination & self control of a system.

The interaction factor was found to be very important for systems growth. The explicit manipulation of interaction within and without helped the evolutionary forces to develop & keep the entropy forces at bay. Explicit manipulation of interaction made reward & awareness more meaningful. The individuals preferred to be rewarded in the presence of other people & worked hard under awareness that others were also aware about their capabilities.

Interaction was of two types viz. co-operative interaction & competitive interaction. The co-operative interaction made the individuals more relaxed but less productive. The competitive interaction made people more productive but tense, bordering on frustration.
Interaction involved the group dynamic principle & made a system more human, pleasant, creative & interestingly meaningful to administrator, teacher & student alike. Working in a school system became a fun. Under interaction factor, X design lost much of its formalism. Under interaction different ego needs were satisfied & hence performance became highly pleasant & satisfying. During periods of non-interaction, the two school systems did not show a rise in performance. Isolated systems were undertaken by entropy forces. Constant interaction among systems & within system helped them grow.

Performance under public exposure as in science exhibitions & cultural programmes was of the highest quality, full of involvement and commitment. Such performance received feedback from large gatherings watching the programme.

E'factor (opportunity to exert) was an important factor for performance. It tried to develop inbuilt stability mechanisms in a system. Under the E'factor an individual put his/her proprioceptive effort mechanism at work. This effort was directed from within & involved mechanisms of self-direction & self-control. Opportunity to exert was based on need to perform.
Given the proper environment & the opportunity, individuals felt the need to exert in the desired direction. Theory Y design had inbuilt in it all the elements that encouraged the need to exert. Under explicit manipulation of other factors like $M, R,A,I,A'$ this need became further stimulated. Activity was considered to be the real state of a living being. When activity was made compatible to the individual there was no end to involvement, provided the $E'$ factor was coupled with other factors like $M, R,A,I,A'$.

The $E'$ factor provided the individual with self-controlled stability which was the index of control. When teacher/student was left to his own resources, he worked according to his own limitations & potentialities. This took care of individual differences.

Punishment as a form of control was found to be aversive & non-compatible to human design. Punishment created personality problems & aversion for work. The ideal work situation was such where the work was motivated on the job itself. Such situation was realised by treating human beings not as serve systems, as simple set of muscles and bones to put things together or as complex sensory-neuro-motor structures capable of handling the
environment and solving problems but as a set of varied emotions knit together in complex structures to live an intelligent, involved human life, full of dignity and love. Y design created such organisational conditions that would satisfy various human needs on the job itself. It considered human beings as psychologically homeodynamic & to be active & to perform was considered to be its natural design.

Punishment at best produced poor quality of work, increased absences, made the individuals rebellious and mentally unhealthy. Punishment created negative attitude towards work.

xxii) The experiments revealed that reward was one of the factors that feeds human activity. Reward alone was meaningless. Reward coupled with interaction & awareness became more effective & meaningful. All the different human feedback factors viz. M.E; R, A, I, A when manipulated together, enhanced human activity to surprising extents. The Y design of administration tried to achieve the growth of unconscious structure that direct & control human activity. The extrinsic reward mechanisms served as an aid to the growth of such structure, but once such inbuilt control mechanisms had grown & been stabilized, the behaving individual became independent of extrinsic rewards or reinforcements.

...189
xxiii) The different factors viz. M, E, R, A, I, A' when cumulatively introduced in a system made the system self-generating, self-directing, self-regulating, self-coordinating, self-controlling & self-evolving. When these factors were cumulatively withdrawn from a system, the system no longer behaved like a self-managing system. This clearly revealed that necessary & sufficient conditions for making a system committed are job manageability, opportunity to exert, immediate reward, immediate awareness, interaction within & without the system and autonomy.

xxiv) Extensive experimentation lead to the conclusion that:

a) Human performance is directly proportional to the manageable effort one puts & the feedback one gets for that effort.

b) The feedback is directly proportional to such factors as opportunity to exert, immediate reward, immediate awareness, interaction & autonomy. These factors are the human feedback factors that feed and sustain human activity.

c) The Y design of administration with explicit manipulation of such human factors as M, E, R, A, I, A' generates commitment of the highest possible order and makes the system highly effective.
If Manageability be expressed as inverse function of $D$, where $D$ represents the difficulty value of an act, then:

i) From (a) above we have $P \propto \left( \frac{E}{D} \right) F$, $D \neq 0$ where $P$, $(E)$ & $F$ respectively stand for Performance, Effort & Feedback. $D \neq 0 \Rightarrow$ the act needs to have some challenge in it. Thus $\frac{E}{D} \Rightarrow D \neq 0 \Rightarrow$ that the act should need manageable effort and yet should offer some challenge for the individual.

ii) From (b) above we have $F \propto E A A^* I R$. $F$ as inverse function of $T$(Time) indicates need for immediate feedback and stresses immediacy of Reward & Awareness.

iii) (a) (b) together give the Z-theory of administration as $P \propto \left( \frac{E}{D} \right) F$, $D \neq 0$ where further $F \propto \frac{E A A^* I R}{T}$

The different symbols $E$, $A$, $A^*$, $I R$ are the human feedback factors that feed & sustain human activity as explained already. $E$ stands for Effort and $E'$ stands for opportunity to exert.
Graphical Representation of Table 2

- Performance under $X_1$ - system of administration
- Performance under $X_2$ - system of administration
Details in the Text.
Graphical representation of Table 4

Performance under a $A_{KL}$ system of administration
Performance under a $Y_{KL}$ system of administration
Details in the text

Score Scale: 1 small square = 1 score point
Graphical Representation of Table 1.5

Performance under $X_{MRA}$ administration
Performance under $Y_{MRA}$ administration
Details in the Text
Graphical Representation of Table - E

- Performance under $Y_{\text{RL}}$
- Performance under $Y_{\text{LRA}}$

Details in the Text.
Graphical Representation of Table 7

X Performance under MERAIA

\( u \) Performance under MERAIA

Details in the Text
SCALE: 1 SCALE SQUARE = 1 SCORE

X - SYSTEM OF ADMINISTRATION

XN - SYSTEM

XME - SYSTEM

XMER - SYSTEM

XMERAI - SYSTEM
SCALE: 1 SMALL SQUARE = 1 SCORE

Experiments - Details in the table - I
Experiments

Details in the Text
## F-Table - I

**INTER COMPARISON OF SYSTEMS X & Y WITH DIFFERENT EXPERIMENTAL VARIABLES**

### A. OBTAINED F VALUES

<table>
<thead>
<tr>
<th>SYSTEMS</th>
<th>F SYSTEMS</th>
<th>F SUBJECTS</th>
<th>F SYSTEMS/SUBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X &amp; Y</td>
<td>207.68</td>
<td>13.92</td>
<td>14.91</td>
</tr>
<tr>
<td>X_M &amp; Y_M</td>
<td>720.69</td>
<td>470.51</td>
<td>10.72</td>
</tr>
<tr>
<td>X_ME &amp; Y_ME</td>
<td>123.53</td>
<td>20.48</td>
<td>6.03</td>
</tr>
<tr>
<td>X_MER &amp; Y_MER</td>
<td>34.18</td>
<td>2.92</td>
<td>11.68</td>
</tr>
<tr>
<td>X_MERA &amp; Y_MERA</td>
<td>22.47</td>
<td>6.08</td>
<td>3.69</td>
</tr>
<tr>
<td>X_MERAI &amp; Y_MERAI</td>
<td>0.72</td>
<td>1.25</td>
<td>1.38</td>
</tr>
<tr>
<td>X_MERAIA &amp; Y_MERAIA</td>
<td>50.56</td>
<td>2.30</td>
<td>21.97</td>
</tr>
<tr>
<td>DEGREES OF FREEDOM</td>
<td>1/7</td>
<td>7/7</td>
<td>1/7</td>
</tr>
</tbody>
</table>

### B. TABLE VALUES OF F

<table>
<thead>
<tr>
<th>df</th>
<th>F.05</th>
<th>F.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/7</td>
<td>5.59</td>
<td>12.25</td>
</tr>
<tr>
<td>7/7</td>
<td>3.80</td>
<td>7.02</td>
</tr>
</tbody>
</table>
F-TABLE - II

INTER COMPARISON OF THE IMPACT OF DIFFERENT EXPERIMENTAL VARIABLES AS THEY ARE CUMULATIVELY INTRODUCED OR WITHDRAWN FROM THE SAME SYSTEM

A. OBTAINED F VALUES

<table>
<thead>
<tr>
<th>EXPERIMENTAL CONDITIONS</th>
<th>F CONDITIONS</th>
<th>F SUBJECTS</th>
<th>F CONDITIONS/ SUBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CUMULATIVE INTRODUCTION OF DIFFERENT VARIABLES WITHIN SYSTEM X</td>
<td>242.15</td>
<td>23.27</td>
<td>10.42</td>
</tr>
<tr>
<td>2. CUMULATIVE WITHDRAWAL OF DIFFERENT VARIABLES WITHIN SYSTEM X</td>
<td>209.75</td>
<td>11.32</td>
<td>18.53</td>
</tr>
<tr>
<td>3. CUMULATIVE INTRODUCTION OF DIFFERENT VARIABLES WITHIN SYSTEM Y</td>
<td>4.43</td>
<td>0.47</td>
<td>9.42</td>
</tr>
<tr>
<td>4. CUMULATIVE WITHDRAWAL OF DIFFERENT VARIABLES WITHIN SYSTEM Y</td>
<td>107.61</td>
<td>0.82</td>
<td>131</td>
</tr>
</tbody>
</table>

DEGREES OF FREEDOM 6/18 3/18 6/3

B. TABLE VALUES OF F

<table>
<thead>
<tr>
<th>df</th>
<th>F.05</th>
<th>F.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/81</td>
<td>2.66</td>
<td>4.01</td>
</tr>
<tr>
<td>3/18</td>
<td>3.16</td>
<td>5.09</td>
</tr>
<tr>
<td>6/3</td>
<td>8.94</td>
<td>27.91</td>
</tr>
</tbody>
</table>
OBSERVATION SCHEDULE

(TO BE FILLED AT THE END OF EACH EXPERIMENT)

1. Percent of times a teacher/student came late during a particular experiment.

2. Percent of times a teacher/student remained absent during a particular experiment.

3. Percent of times a teacher was willing to attend a teachers' meeting which was not compulsory.

4. Percent of times a teacher/student came earlier than schedule.

5. Percent of times a teacher/student stayed late.

6. Percent of times a teacher/student performed a non-scheduled duty.

7. Percent of times a teacher/student desired to help the other person in completing his work.

8. General willingness to work and co-operate with the system to be marked on five point scale.

9. General teacher/student morale to be marked on five point scale.

10. The desire to self-regulate, self-co-ordinate, self-control and self-evolve a teaching-learning activity to be marked on five point scale.