Chapter I

INTRODUCTION

Learning is an important process of life. This process starts from the day the individual is born and continues in some degree or more or in some form or the other till his death. From whatever angle we may visualize life, we shall find a stamp of learning on it. Almost every aspect of an individual's development is related to 'learning'. The meaning of learning is generally regarded as reforming the behaviour. Reform in behaviour does not mean only the reform of external behaviour. Learning brings changes in thinking and imagination as well. Thus, any act which develops the individual and modifies his later behaviour and experience can be called learning.

There are many factors/conditions which influence the Learner's speed and efficiency of learning. However, efficiency depends on a number of variables such as kind and extent of material, sense modality, age of the learner, sex of the learner, ability of learner, set and motivation, and the method of practice. So far a number of research studies have been conducted in order to test the effectiveness of a particular method over another,
but results fail to determine the superiority of any method of practice. In fact optimal methods of practice vary from situation to situation and indeed, from individual to individual. On the basis of available experimental evidences, it appears that a fixed amount of time is necessary for learning a fixed amount of material regardless of the method of practice.

Methods of Practice:

Generally, methods of learning are classified in the following manner:

I. Massed Vs. spaced method of practice;

II. Whole Vs. part method of practice.

In the Proceeding section, these methods would be elaborated one by one.

I. Massed Vs. spaced method of practice

In massed method, material is memorised in a single sitting without any rest intervals while in spaced method, material is memorised in many sittings with the rest intervals introduced in between.

Shorter lesson need lesser time if the massed method is used. Lyon (1917) observed that subjects took lesser time to memorize a list of 12 digits in continuous
reading than in one reading per day. With the longer lessons this advantage shifted to one trial daily. Similar results were obtained from animal studies. Rats required lesser massed trials to learn a short maze than widely spaced trials, but a longer maze was learned better by spaced trials one per day than massed [Pechstein (1921); Cook (1928)]

General observations are that a lesson can usually be learned in fewer spaced than massed readings and retention is relatively better with the spaced learning. Hovland, (1940) conducting an experiment on college students using non-sense syllables found that learning (recall) was definitely better under spaced method than under massed method. Also in relearning the subjects under distributed practice required lesser trials than under massed practice.

A spider maze designed by Cook (1944) had six blind alleys at each choice point. His human subjects learned it much more quickly in massed trials than with one trial per day. Similar results were obtained by Garrett (1940) and Ericksen (1942).

Hence from above discussion it appears that, when lessons are too long to be mastered in a single reading or repetition so that the practical question arises whether the repetitions should come without any
intermission or whether some time should elapse between each trial and the next. What has theory to suggest?
There are two well human factors to be considered, and two others that may have some importance.

1. **Forgetting:** If the time between trials is so long that every thing learned is forgotten and has to be relearned from scratch, the procedure is obviously lacking in economy. Even partial forgetting demands some relearning, some surplus work that could be avoided, so it would seem, by closely massed trial.

2. **Recovery:** Closely massed trials are likely to produce fatigue, boredom, work decrement, "reaction inhibition", or whatever it is best called. And performance will slump unless recess periods are provided.

The forgetting curve of barely and partially learned material drops rapidly at first and gradually flattens out. Recovery from moderate work decrement is probably rapid at first, then flattens out and becomes almost complete in a relative short time. The two factors taken together suggest that short pauses between trials will prove most economical. For exact prediction one must know the rate of forgetting and recovery, both of which are likely to differ with the kind of lesson being
learned. Besides there are two other factors to be brought into notice.

3. Warm up and loss of warm-up: Usually you do not "get into the swing" of a certain task until you have worked at it for a while and after a long rest you may have to warm up again before doing your best. Loss of warm-up, like forgetting, suggests that recess periods should not be very lengthy.

4. Beneficial forgetting: There are two ways, in which some forgetting may help towards mastery and permanent retention.

a) Escape from interfering responses: The "remote associations" found in the first reading of a list of nonsense syllables or of a speech or poem interfere with mastery of complete ordered series or passage. They lead to false anticipatory responses when one try to recite what he has read. But they are likely to be weaker than the direct associations and to be forgotten more quickly, so that learner is free from them after a rest pause.

b) Non dependance on primary (or immediate) memory: If you look on a telephone number as "Plaza 4-6315", you can repeat it easily a moment later because it falls within your primary memory span. If you wished
to retain it for later use, you would gain very little by saying it over and over without pause; still depending on primary memory rather than on any durable associations. To recite it after a lapse of five minutes is not so easy, but if you succeed, you are using and reinforcing these more durable associations.

Therefore it can be said that in certain situations spaced practice is beneficial when fatigue is not an adverse factor. For certain activities massing of practice in early stage followed by spaced practice is better while for others the inverse is more optimal.

It has also been observed that the spaced practice is more advantageous for meaningful material while the massed is better for stereotyped, low meaningful material.

This difference may be because of the fact that in case of meaningful material a higher degree of interest can easily be maintained throughout the spaced learning period, but in case of low meaningful material, the learner, readily forgets the wrong and weak associations during the rest period. However, in case of stereotyped, repetitive work rest pauses might cause - loss of warm up and thus, after a long rest period, some time would be
wasted in order to achieve the previous level of performance.

Thus, it seems that the spaced method of practice would be more effective for longer and difficult tasks while for short repetitive tasks the massed method is more economical.

II. Whole Vs part method of practice

This is also very important pair of method of practice. Here, in this pair, instead of the time or the trials (as it was in case of spaced Vs. Massed method of practice), it is the task or the material to be learned which meet the treatment. A task may be learned all at once or part by part, for example, a subject may be asked to learn a stanza of the poem at one time and then next stanza and so on. The process will continue till all stanzas of the poem are given to the subject one by one. At the other hand, subject may be given the whole poem to learn at once. In the same way, a rat may be given a part of the maze to learn at one time and then another part, or it maybe given the whole maze to learn at once. However, a huge amount of research is available to evaluate whole and part methods of practice but because of contradictory results, it is very difficult to determine which method is superior.
Advocating the superiority of the whole method, Crafts (1929) reported that this method was most economical than the part method. Beeby (1930) in his experiment on two hand co-ordination, observed that this method was superior.

A critical review by McGeoch (1931a) indicated that the whole method had certain advantages, though some patience, intelligence and practice were necessary for tackling a long lesson as a whole.

McGeoch (1931b) used the three methods a thorough trial on average and very bright children of 9-10 years. She prepared the booklets in which there were typed poems of 12 lines. One line per page for the strict part method (but with entire poem on the last page). Four lines per page for the progressive part method, and all 12 lines on the same page for the whole method. The material on each page was to be read through & through in the time allotted which totaled six minutes in all cases. At the end of six minutes the children wrote all they could remember. Each of children studied a poem by each method, the order of being balanced with in the group. The bright group reproduced much more than average groups, but the scores were practically the same for every method. Although the whole method was found unfamiliar to the children. However, Brown (1924), Davis and Meens (1932)
and Hanawalt (1934) found the whole method to be more superior.

The same lack of any overall advantage for either whole or part learning of poems was found by Jonchheere (1939) who took special pain to have each part of 2-3 lines make sense by itself. Same results were reported by Cook (1936, 1937) who conducted an experiment on human subjects with mazes of different lengths. He observed no extra advantage of either whole or part method of practice. Thus, it appears that the effectiveness of a particular method can scarcely be predicted.

Since, the whole of any task/material is more meaningful than the part of it and moreover each part has its own place in the structure of the whole, so, when it is isolated from the whole it may make a little sense and which in turn may cause adverse impact on learning. On the other hand, the whole must be read several times before the subject makes any apparent progress. In other words, to learn the whole seems a distant goal, while the parts can be learned easily and quickly. Thus, the principal of reinforcement favours the part method, whereas, meaning and organization take the side of the whole method.

The above cited discussion and contradictory results related to the spaced Vs. massed and whole Vs.
part methods of practice, do not permit the researcher to draw any conclusive and decisive statement either in favour or against any particular method. A number of investigators have reported that the total amount of time required to learn a fixed amount of material remains the same irrespective of the method of practice [Hovland (1938a, 1938b), Melton and Stone(1942)]. This phenomenon is known as total time hypothesis.

Total Time Hypothesis:

The total time hypothesis states that a fixed amount of time is necessary to learn a fixed amount of material regardless of the number of individual trials into which that time is divided, for example, if it takes 10 seconds to learn each of the terms of a given list, the total hypothesis would predict that a subject could reach criterion in either twenty .5-second-per-item trials or ten one-second-per-item trials or five two-second per-item trials or one 10-second-per-item trial.

Generally, two procedures have been used to test the total time hypothesis. In one, different groups are presented the to-be-learned material at different rates, total learning time is held constant, and number of items correct is compared for the various conditions. The performance on the first trial of a group learning at a
four-second rate is compared with the performance on the 2nd trial of a group learning at a 2-second rate. However, in the other procedure, different groups of subject are presented the to-be learned material at different rates, learning is carried to the same criterion is computed.

Support for the total time hypothesis rests on the presence of a statistically non-significant difference among the various groups. In addition to these two procedures, researcher himself can manipulate the experimental conditions in many other ways also.

The total time hypothesis has been tested mainly, in three different learning tasks. These were: (a) paired associated learning, (b) free recall learning, and (c) serial learning. The hypothesis has received wide support from a number of investigations in which paired associate or free recall learning was used (Murdock, 1960; Peters, 1936; Bursfield, Sedgewick and Cohen, 1954). But, the evidence from serial learning studies is less impressive, however, in a study of Keppel and Rehula, (1965), the total time hypothesis held true even for the serial learning tasks.

There is an ample evidence to show that meaningful learning material is easier to learn than non-meaningful material (Newsman, 1939). It is argued that non essential
elements like non-sense syllables are more prone to interfere from intervening activities than the elements that form an integral part of a meaningful whole. Ebbinghaus (1885) introduced the device of non-sense syllables. He used this device not because it is difficult but because it provides a large quantity of material of fairly uniform difficulty. It is uniform because there are no previously established associations between one item and another. In preparation for his experiments, Ebbinghaus constructed 2300 nonsense syllables by a mechanical process. It consists of two consonants with a vowel in between e.g. zoC, MAX, XIJ etc. The total time hypothesis has been tested mainly for above mentioned two kinds of learning material. However, the degree of meaningfulness may vary from very high meaningfulness to very low meaningfulness. It has been observed that the total time hypothesis holds true only for meaningful material (Braun and Heyman, 1958; Muhar and Shrivastava, 1971 and Bhasker and Muhar, 1972). Thus it appears that the total time hypothesis holds only when the task requirements do not exceed simple rehearsal and the effective time bears a linear relationship to nominal time. However, Pradeep and Yadava (1985) reported that the said hypothesis held true even for non-sense syllables of 60 % and 100 % Association value.
There may be an effect of age level on the total time hypothesis. A child because of his limited learning ability and experience will prefer part and spaced methods of practice. Researchers have observed that massed and whole methods of practice seem to be unfamiliar to the children subjects.

We may now pass on to the next chapter dealing with the review of the pertinent literature.