CHAPTER II

REVIEW OF LITERATURE
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In this chapter, the existing knowledge regarding field of work has been presented. Effort was made to search the related literature in books, periodicals, professional journals and internet. A brief view of such survey has been included in this chapter. The purpose was to collect the ideas and the prevailing knowledge and understanding and interpret the present study of the results or findings.

Murphy (1916) investigated a long-term study on throwing javelin for a total of 34 days. The participants practiced 5 days a week for 7 weeks did not increased performance to the same extent as participants who performed the same total of 34 days spread over 12 weeks at a frequency of 3 days a week.

Hull (1943) was the first to formally examine the effect of practice distribution and learning. On the basis of the result obtained, he reported that the distributed practice produce better performance and skill acquisition both for cognitive task and motor activity.

Borne and Archer (1956) conducted an experiment on the effects of practice distribution on a pursuit rotor tracking task. Participants are divided into 5 groups. Each participant performed 21 acquisition trials with work periods of 30 seconds. Participants conditions one through five were given 0, 15, 30, 45, and 60 second of rest between
trials respectively. Result showed that tracking performance among conditions found better for longer rest period.

Fishman, Elizabeth Jane and others (1968) conducted a similar study on Massed vs. distributed practice in spelling drills. They found that, computerized spelling drills were used to study conditions of massed and distributed practices with each of 29 fifth-grade subjects, participating in both condition. In the distributed practice, 2 sets of 3 words each were presented once every other day over a period of 6 days. The drill on 6 other sets of words was massed so that all practice for that set occurred on the same day. Result shows massed practice was better on shorter term performance but more learning occur in the run with distributed practice.

Baddely and Longman (1978) investigated the effect of massed and distributed practice for postal workers, who trained on a keyboard. Participants trained for 60 – 80 hours. Practice was performed once or twice per day for 1 – 2 hours per session. Results indicated that the group that practiced twice a day 2 hour per session, has the poorest performance than the group who practiced twice a day for just 1 hour per session.

Steven K. Wenger (1979) conducted a similar study on the Within-List Distributed Practice Effect. He found that, in a paired-associate memory task, subjects recalled lists containing critical pairs that were repeated twice at lags of 0, 3, and 8 intervening events. For independent groups, the lists were presented visually at either a 1.3-sec or 4-sec rate of presentation. The results indicated a clear Massed practice-distributed practice (MP-DP) effect at the slow presentation
rate, which was eliminated at the faster presentation rate. These data support the prediction from the inattention hypothesis that when subjects are forced to fully attend to both occurrences of a Massed repetition, there will be no attenuation of attention and, therefore, the MP-DP effect will be eliminated. Although previous findings had failed to find an-effect of rate using visual presentation, the results of this experiment suggest they may not have used a sufficiently demanding task.

Kristine C Bloom and Thomas J Shuell – (1981) conducted a similar study on the effects of Massed and Distributed Practice on the learning of second language vocabulary. They found that, high school students enrolled in a French course learned vocabulary words under conditions of either massed or distributed practice as a part of their regular class activities. Distributed practice considered of 3 minute units on each of 3 successive days. Massed practice consisted of all 3 units being completed during a 30 minutes period in a single day. Though the performance of 2 groups was virtually identical immediately after completion of study, the distributed practice group was substantially better by 35% than massed practice group on a second test given 4 days latter.

Lee and Genovese (1988) conducted an initial meta analysis examining the effects of distribution of practice on motor skills. They reported that distributed practice not only enhanced Acquisition of motor skills compared to Massed practice (d = 0.96), but also resulted in greater retention than Massed practice conditions (d = 0.53). However, Newell,
Antoniou, and Carlton (1988) suggested that conclusions drawn from this meta-analysis regarding practice effects on retention are premature due to the ambiguous definitions of Acquisition and retention that were used. Additionally, Lee and Genovese did not examine the effects of potentially important factors (e.g., task type) that may either constrain or magnify the effects of spaced practice. Clearly, an examination of such factors is necessary before conclusive statements can be made. Consequently, the objective of the present meta-analysis was not only to provide an overall meta-analytic examination of the distribution of practice effect, but also to provide estimates of the magnitude of the distribution of practice.

*Frank N. Dempster (1989)* conducted a similar study on Spacing Effects and Their Implications for Theory and Practice. He found that, there is considerable evidence, gathered in a variety of settings and across many different types of materials and procedures, that spaced repetitions regardless of whether they are in the form of additional study opportunities or successful tests-are a highly effective means of promoting learning. Research on spacing effects is reviewed and its theoretical and educational implications are examined. It is concluded that spacing effects can best be understood in terms of the "accessibility" hypothesis, and that spaced repetition have considerable potential for improving classroom learning.

*Zimmer and Hocevar (1994)* conducted a similar study on The effect of massed vs. distributed practice on achievement and test anxiety were investigated using a quasi-experimental design employing 56 college students under two conditions. Test anxiety was assessed using sarason's four dimensional reactions to test, while
classroom achievement was measured on tests using multiple choice applications. Experimental subjects were given four reactions to tests items and 10 items examinations on a weekly basis for 10 weeks while control subjects had only a 100 items final examination. Analysis indicated-

1. Significantly higher final examination performance for the distributed testing condition.

2. A significant reduction in test anxiety between initial sessions and the remainder of the term in the distributed testing condition.

3. No difference in test anxiety between the distributed testing and control conditions when test anxiety was assessed at the end of the term.

4. Non-significant correlations between test anxiety dimensions of the reactions to test and achievement in both the control and distributed testing conditions. Results support the contention that relationship between achievement and test anxiety may be more complex than previous thought.

Hakkinen and Kallien (1994) investigated the effect of distribution of volume on neuromuscular adaptation in 10 athletes. The subjects participated in two 3 weeks conditions. Both the volume was held constant. However, in condition I- the volume was distributed in one session and in condition II- it was divided into two sessions. No significant gain either in strength development or cross sectional area were found in condition I. But in condition II both these factors were found to be increased. They concluded that the
distribution of training into smaller unit might create more conditions not only for muscular hypertrophy but also produce effective stimuli for the nervous system.

Robinson and Colleagues (1995) conducted an experiment with participants performed squats over five weeks periods of time with 3 minutes or 30 seconds rest periods between sets. Result showed a 7% increase in squatting performance in the three minutes rest condition and only a 2% increase in squatting performance in the 30 seconds condition.

Kraemer (1997) investigated the effects of practice distribution on performance for leg press and bench press. Subjects were given 3 versus 1 minute rest periods. Result indicated that participants in distributed group (3 min rest) produced better than the participants with massed practice (1 min rest). This is in support of the findings of Tharion et al. (1991)

Pincivero and colleagues (1997) conducted a similar experiment in weight lifting. They found that the result showed a 5-8% greater increase in weight lifting performance in the criterion task when participants had 3 minutes rest period compared to 40 seconds rest period.

John Donovan and David Radosevich (1999) conducted a similar study on A Meta-Analytic Review of the Distribution of Practice Effects. Their present review examined the relationship between conditions of Massed practice and spaced practice with respect to task performance. A meta-analysis of 63 studies with 112 effect sizes yielded an overall mean weighted effect size of 0.46,
indicating that individuals in spaced practice conditions performed significantly higher than those in Massed practice conditions. Subsequent analyses, however, suggested that the nature of the task-being practiced, the inter-trial time interval, and the interaction between these two variables significantly moderated the relationship between practice conditions and performance. In addition significantly higher effect sizes were found in studies with low methodological rigor as compared with those studies higher in rigor. Directions for future research and applications of the findings are discussed.

Brian A. Jamieson and Wendy A. Rogers (2000) conducted a similar study on Age-Related Effects of Blocked and Random Practice Schedules on Learning a New Technology. They found that, computer technology is pervasive in today's society. Issues of training must be investigated to ensure that older individuals are capable of interacting with such technology. In the present research a simulated automatic teller machine (ATM) served as a prototypical technology for which issues of training and transfer could be investigated. The focus of the study was on the potential benefits of a random practice schedule (wherein trial types are intermixed) relative to a blocked practice schedule (wherein trial types are grouped together). Both younger and older adults benefited from random practice for the Acquisition of the ability to perform transactions on an ATM. Moreover, random practice was beneficial for both age groups in the transfer of learning to novel tasks on a novel ATM. These data have general implications for theories of training and specific implications for the development of training protocols for older adults and new technologies.
**Melester et al. (2000)** conducted a study for one day and three days per week training with equal volume for experienced subjects. The training was continued for 12 weeks. It was found that the higher frequency group gained 38% more strength than the lower frequency group.

**Shea et al. (2000)** conducted experiment with participants following massed and distributed practices. From the basis of the results he concluded that the distributed practice has significantly lower error in acquisition and retention of skill than who performed massed practice.

**Childers and Michael (2002)** conducted a similar study on Two-Year-Olds Learn Novel Nouns, Verbs, and Conventional Actions from Massed or Distributed Exposures. They examined 2-year-olds' comprehension and production of novel nouns, verbs, or actions at 3 intervals after training conducted in Massed or distributed exposures. Found that for comprehension, children learned all item types in all training conditions at all retention intervals. Production was better for nonverbal actions than for either word type or following distributed versus Massed exposure. Children produced more new nouns than verbs. Retention interval did not affect production. (Author/KB)

**James (2000) and Dail et al. (2004)** examined the effects of practice distribution on learning golf putting and the relationship of judgment of learning to the practice protocol and length of retention interval. They have found the learners confidence was enhanced with better performance in acquisition.
Rachel Seabrook 1 *, Gordon D. A. Brown 2, Jonathan E. Solity 2 (2004) conducted a similar study on spacing presentation of material in education. It was a psychological study by Massed and Distributed Practice methods. They found that, the benefit to memory of spacing presentations of material is well established but lacks an adequate explanation and is rarely applied in education. This paper presents three experiments that examined the spacing effect and its application to education. Experiment 1 demonstrated that spacing repeated presentations of items is equally beneficial to memory for a wide range of ages, contrary to some theories. Experiment 2 introduced clustered presentations as a more relevant control than Massed, reflecting the fact that Massed presentation of material is uncommon in education. The scheduling of clustered presentations was intermediate between Massed and distributed, yet recall was no different than for Massed. Experiment 3, a classroom-based study, demonstrated the benefit of distributed over clustered teaching of reading through modification of the scheduling of everyday lessons. Thus, the effectiveness of teaching may be improved by increasing the degree to which lessons are distributed.

Beekhuizen (2005) conducted a similar research to cure paralysis. It was to determine the effect of Massed practice (MP) versus Massed practice combined with somato-sensory stimulation (MP+SS) on cortical plasticity and function in persons with incomplete tetraplegia. Ten subjects were assigned to either MP or MP+SS. Median nerve stimulation (500 ms train, 10 Hz, 1 ms pulse duration) was delivered at the intensity eliciting a motor threshold response. Training sessions were 5 d/week for 3 weeks at 2 h/session. Outcome
measures included 1) motor-evoked potentials (MEPs) elicited via transcranial magnetic stimulation (TMS), motor threshold (MT) and MEP amplitude at 1.2 MT; 2) maximal pinch grip force; 3) Wolf Motor Function Test (WMFT) and Jebsen Hand Function Test. Results. The MP+SS group demonstrated significant improvements ($P < 0.05$) in pinch grip strength (190%), WMFT scores (52%), and Jebsen test scores (33%), whereas the MP group demonstrated significant improvement ($P < 0.05$) only in Jebsen test scores (11%). No significant changes were detected in cortical excitability in the MP+SS or MP group. Conclusions. The findings of this preliminary study suggest that MP+SS results in greater increases in pinch strength and timed functional test scores than MP. Optimal stimulation paradigms and training methods are needed to further test this strategy.

David G. Elmes, William I. Greener and William C. Wilkinson (1972) conducted a similar research on free recall of items presented after Massed and Distributed Practice items. They showed that, when critical items were presented after items receiving either Massed or (at repetition lags of 3 or 10 events) distributed practice, free recall was better on the distributed- than Massed-practice items, but worse on the critical items after distributed- than after Massed-practice items. Differential encoding, rather than consolidation, better accounts for the differences with the two kinds of practice.

This study analyzed the long-term effect of practice schedule on shooting performance in basketball during actual field training. 32 college students (16 female) ages 20 – 29 years completed voluntary basketball training in 1 of 2 equal sized groups employing either constant vs. random training. Constant practice group took 160 shots from free throw line while the variable practice group took 160 shots from different positions around the restricted area. Learning and transfer (variation of throwing distance and size of the ball) performance was assessed with the basketball shooting test before and after training and on a retention test 1 year latter. Significant measures in performance were attributed to learning and transfer in both training groups at all measurement times. Constant training groups had better acquisition and random training groups had better retention. The anticipated transfer effect in random group was not found.

Nicholas J. Cepeda (2006) conducted a similar study on Distributed Practice in verbal Recall tasks. He analysed and examined the joint effects of ISI and retention interval on final-test retention, as well as the effects of Massed versus paced learning. We examined joint effects of ISI and retention interval separately for paired associate and list recall tasks, and reexamined qualitative differences between studies—specifically, the influence of experimental design, relearning method, and expanding study intervals.