THE EFFECT OF THE TIME OF DAY OF LEARNING SHORTHAND ON STUDENTS' PERFORMANCE IN AKWA IBOM STATE POLYTECHNIC

BY

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph.D) DEGREE IN BUSINESS EDUCATION

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Declaration

I hereby declare that this Dissertation has been written by me and it is true record of my own research work. It has not been presented in any previous application for any higher degree.

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C e r t i f i c a t i o n

This thesis titled **"THE EFFECT OF THE TIME OF DAY OF LEARNING SHORTHAND ON STUDENTS' PERFORMANCE IN AKWA IBOM STATE POLYTECHNIC"** by **AKPAN, EZEKIEL OKON**, meets the regulations governing the award of the Degree of Ph.D. (Business Education) of Ahmadu Bello University, and is approved for its contribution to knowledge and literacy presentation.

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D e d i c a t i o n

This work is dedicated to my dear wife:

- Mrs. Angela Ezekiel Akpan

and

My beloved children:

Ofon-Mbuk Ezekiel Akpan

Uduak-Obong Ezekiel Akpan

Imedo-Mfon Ezekiel Akpan

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A b s t r a c t

Teaching and learning of Shorthand pose problems to both teachers and students in the school system. Good performance in the subject is usually rare. It appears that out of the numerous problems encouraged in teaching and learning the subject, varied teaching periods seem to be too pronounced. It was therefore thought necessary to determine empirically their effects on Students' performance in the subject. The study was then undertaken with the following purposes in mind: (1) to determine whether there are differences in performances in Shorthand Speed Writing and Transcription of two groups of students exposed to two different teaching periods; (2) to determine the difference in Shorthand Theory performances between the two groups so exposed; and (3) to determine the relationship between Understanding Theory and Speed Writing in Shorthand learning. Eighty 1994/95 first-year Ordinary National Diploma students of Secretarial Studies from Akwa Ibom State, formed the population for this study. The sample for the study was the 80 students since the population was not too larage.

An experimental study was carried out in three weeks' internal and was spread over fifteen weeks. Analysis of Variance, Pearson's Product Correlation, t-test and Mean were the statistical instruments used for analysis of data. The results showed that: (1) Morning periods were more conducive

than afternoon periods for learning and teaching Shorthand; (2) Morning and Afternoon students performed better in Theory-Tests than Speed Tests; and (3) Morning students performed better than afternoon students both in Speed and Theory Tests.

Based on these findings, it was concluded that morning periods are more conducive than the afternoon periods for the learning and teaching of Shorthand. Based on the findings and conclusions drawn, it was recommended that:

Teachers and students alike should be made by school authorities to make good use of the morning periods in learning and teaching Shorthand. This should be done by reflecting the subject for the morning periods in the school on departmental time-table.

Teachers should look into the causes of students' poor performance in Shorthand Speed Tests, and also design appropriate teaching strategies to get rid of such causes.

There is need to find out other causes apart from conducive period for students' good performance in Theory Tests in order to improve upon the students' level of performance and the teachers' teaching inputs.

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Definition of Terms

The following terms are defined as they are used in the context of this study:

Shorthand:

Isaac Pitman's System of Shorthand.

Outlines:

Shorthand symbols in Pitman's Shorthand.

Transcriptions:

The production of mailable copies from Shorthand outlines.

Phrases:

The art of writing two or more words in Shorthand without lifting pen from paper.

Intersection:

The art of writing one or more strokes through another in Shorthand phrasing.

Concentrated Practice:

The practice of teaching for long hours of about one to two as against short periods of about thirty to forty-five minutes.

Varied Teaching Period:

Different periods of the day and duration in hours for effective study of Shorthand.

Mastery of Speed:

Spontaneous writing of dictation in Shorthand without any element of hesitation.

Mastery of Theory:

Thorough understanding of the principles, rules and concepts that aid in writing Shorthand at reasonable speed

Chapter 1

INTRODUCTION

1.1 Background to the Study

Shorthand is a skill subject. It is a key subject in Office Education and Secretarial Studies. It is very demanding in terms of time and difficulty of understanding hence efforts should be made to have its learning and teaching interesting and fascinating.

From the researcher's experience, there are many nagging issues surrounding the learning and teaching of Shorthand. Prominent among these issues are curriculum planning and development as well as the proper application of instructional techniques or methods. Teaching job is based on sound instructional principles and this is the area that every committed teacher should strive to improve upon as often as necessary. It should be the desire of those who teach to make learning more interesting and efficient for their students by seeking for new and better instructional methods or modifying the ones already in existence. This is an important and necessary concern of a teacher with occupational interest.

There is the need for better understanding of how people learn and the strategies or learning and teaching situations under which more effective learning can take place. In most institutions, Shorthand is taught for long but irregular hours

while in some, the periods for Shorthand are short and also irregular (Banes, 1962). As stated also by Tuckan (1975), some institutions allocate to Shorthand maximum periods of two, three, five or six hours per week while very few allocate between seven and eight periods per week. The acquisition of effective teaching procedures and the ability and capability to manage the usual scarce educational inputs or resources depend solely on one's thorough perception and study of learning. Perception and study of learning call for environment changes to be examined, as well as the determination of how impeding or facilitating they might be in the learning process with the consideration to goals attainment.

Learning of Shorthand is behavioural and is based on the relationship existing between the knowing domain (cognitive), feeling domain (affective) and the doing domain (psychomotor). Finch et. al. (1971) developed a behavioural analysis of Shorthand as a learning activity showing the relationships existing between the above mentioned domains. Bloom (1969) gave no thought to subjects overlap across the three domains while Singer (1975) stated that classifications or distinctions between the domains are by no means pure. Considerable overlapping is often exhibited among behaviours, but he stressed that such distinctions are primarily for the sake of convenience.

However, in a subject like Shorthand, the three domains are essential and the overlap across them is necessary. According to Taba (1962), one must take into account all that is known about the nature of man and the nature of learning process in settling issues or methodology in teaching and learning.

1.2 Statement of the Problem

Shorthand is taught for long but irregular hours in many tertiary institutions while in some the periods for Shorthand are short and also irregular (Leo, 1991). Depending on the type of institution, Shorthand is at times taught either in the morning, afternoon or evening. While some institutions allocate to Shorthand one hour, others allocate thirty, forty-five minutes or two-hour period, either in the morning or in the afternoon (Myrtle, 1973). The individuals mostly affected by these varied periods are the students (Mbabeh, 1982).

These varied teaching periods have been observed in higher institutions by the researcher, especially in Akwa Ibom State Polytechnic. The researcher also observed that those affected by varied teaching periods were usually the students, no matter the levels. The researcher's observations were confirmed by other teachers of Shorthand that were interviewed.

In order to minimize the learning and teaching difficulties caused by varied teaching periods, the researcher

intends to find out which among the above mentioned modalities is best suited for the learning and teaching of Shorthand for improved performance by Shorthand learners and teachers.

1.3 Research Questions

The following Research Questions were drawn for the study:

(1) What is the difference between the performances in Shorthand Speed of morning and afternoon students?

(2) What is the difference between the performances in Shorthand Theory of the morning and afternoon students?

(3) What is the relationship between the performances in Speed Test and Theory Test of the afternoon students?

(4) What relationship exists between performances in Speed Writing and Transcription skills and mastering of Shorthand Theories by the morning and afternoon students?

1.4 Null Hypotheses

The following null hypotheses, based on the research questions were formulated for the study:

H_0 1: There is no significant difference in the mean scores of the morning and afternoon students in Shorthand Speed;

H_0 2: There is not significant difference in the mean scores of the morning and afternoon students in Shorthand Theory;

H_0 3: There is no significant relationship between the Speed Test Performance and the Theory Test Performance of the morning student;

H_0 4: There is no significant relationship between the Speed Test Performance and Theory Test Performance of the afternoon students.

1.5 Objectives of the Study

The major objective of this study is to find out whether morning or afternoon period is more conducive for the learning and teaching of Shorthand. Specifically, the study:

(a) Determined whether there are differences in performances in Shorthand Speed Writing and Transcription or two groups of students exposed to two different teaching periods;

(b) Determined the difference in Shorthand Theory performances between the two groups exposed;

(c) Determined the relationship between Understanding of Theory and Speed Writing in Shorthand learning.

1.6 Significance of the Study

This study is significant in the sense that its findings would provide information on the appropriate teaching periods as they affect students' performance in Shorthand Speed and Theory. Attendant problems in teaching period variation would be identified and some feasible solutions proffered. The recommendations made would enable other Polytechnics in the country to benefit from the experiences and expertise of professionals in this area of study. Students and teachers of Shorthand, and other researchers would find it equally useful

as a source document. Above all, the study would be a helpful contribution to the design and development of a workable teaching methodology for the study of Shorthand in Nigerian Polytechnics.

1.7 Basic Assumptions for the Study

Singer (1975) recognised personality, age, experience, fears, motor abilities, skills, body build, physical measures, sense acuity, perception, intelligence, emotions, level of aspiration, attitude and sex as those factors that may lead to proficiency in skill learning. Based on the above mentioned factors, the researcher assumes that:

(a) Students' performances generally in Shorthand can be affected by varied Teaching Periods;

(b) The students to be used in this study possess the above named factors and characteristics which can ensure achievement in Shorthand learning;

(c) Members of the two groups of students to be used in this study have the same or about the same motivation which will ensure success during the investigation. Singer (1975) supported this assumption by stating that "Performance is equal to learning plus motivation".

(d) Due to the basic fact that it will not be possible to monitor and control the private studies of the students after normal class sessions, on the average, all the students for this study have the same amount of private practice and personal private studies of Shorthand.

1.8 Scope of the Study

The study is concerned with the effects of two different teaching periods on the performance of Shorthand students. These teaching periods are independent of any other possible teaching periods that could be designed for research work. They are:

(a) Teaching period of one hour a day in the morning from three days in a week; and

(b) Teaching period of one hour a day in the afternoon for three days in a week.

In conducting this study, the researcher focussed attention on the entire First-year Ordinary National Diploma Students of Secretarial Administration, Akwa Ibom State Polytechnic, Ikot Ekpene.

The system of Shorthand for the Study was the Pitman's Shorthand. The choice of the system was based on the fact that it is the system best understood by the researcher. Moreso, the system was chosen because it is the most commonly used system in Nigeria as a whole, and the only one used in Akwa Ibom State Polytechnic, Ikot Ekpene where the research was conducted.

The duration for this research was one semester (15 weeks), a period adjudged would ensure sufficient academic work coverage and a condusive classroom setting for an experimental study of this nature.

1.9 Limitations

The study had some limitations in the areas of findings and sources of information.

The study was conducted in a Polytechnic, and had focus on two groups of students in relation to performance in Shorthand. The performances of students outside the two groups in the Polytechnic in the subject were not covered by the findings of this study. This therefore poses a serious limitation.

The dearth of sources for current information on the study constituted another major limitation.

Chapter 2

REVIEW OF RELATED LITERATURE

2.1 Introduction

Most of the professional literature that was reviewed by the researcher and used in this study was within the context of varied teaching periods and their effects on Shorthand learning. An extensive search was made to obtain materials which were suitable in developing skills as they related to Shorthand learning. The literature review represented some of the views expressed by experts concerning the application of varied teaching periods in developing Shorthand skills. These views related to drills in classroom situation which serve as skill building strategies on theory mastery and speed writing in Shorthand.

The review of related literature was done under the following classified areas and the summary presented in the same sequence:

1. Learning
2. Skill Learning
3. Varied Teaching Periods.
4. Mastery of Shorthand Principles and Skills Learning.
5. Varied Teaching Periods and Shorthand Learning.
6. Summary of Related Literature.

2.2 Learning

Learning is the totality of the acquisition of skill to aid further understanding, Callaway (1968). Shorthand is a skill subject. Its teaching and learning are different from those of non-skill subjects. The need to probe into the theoretical and conceptual framework of learning in general and skill learning in particular therefore arises.

According to Canning (1977), learning is a continuous process. Canning (1977), also observed that general theories of learning and the conditions under which learning takes place most effectively and economically form a study that is clearly vital for any teacher.

Travers (1973), citing Posner and Kneele (1977) realised that laboratory studios often do not in themselves provide an obvious or ready-made means of generalization to the myriad of situations in which skill is important.

It takes a long period of time to produce or effect important changes in human behaviour. Learning experiences are not static. They frequently undergo the process of modification or up-dating and Callaway (1968) supported these assertions by stating that learning is a complex and dynamic process.

Since learning is complex, continuous and dynamic, theories and concepts affecting the activities of the learning have been revealed by the findings of most of the researcher ever conducted in the field of learning. As a result of the

complex nature and various types of learning, research findings are often seen to differ in one thing or the other, though still serving useful purposes.

Learning theories are of significant importance. They could be used at specific teaching situations by the teachers and other categories of educators. Recognising the valuable contributions of learning theories, Singer (1975) postulated that familiarity with learning theories should encourage intellectual stimulation and thought, promote better understanding of learning phenomena and the laws regulating them, as well as promote a method of teaching consistent with scientific evidence.

Learning is of various types Melton (1964) identified seven of them, namely:

1. Operant conditioning
2. Skill learning
3. Probability learning
4. Concept learning
5. Rote verbal learning
6. Incidental learning; and
7. Problem solving learning

Similarities among these different types of learning are identified and he argued that the identification of these different categories of learning was necessary for integration and more precise understanding of each. He concluded that no purported conclusion on the taxonomy of human learning was sure to be conclusive.

Bloom (1957) classified the behaviour of human beings into three domains: the psychomotor (doing domain), the cognitive (knowledge domain), and the affective (feeling or attitude domain).

Contrary to Melton's views, Gagne (1973) classified learning into five segments: cognitive strategies, psychomotor, verbal information, attitudes and affective behaviours as well as intellectuals skills.

Singer (1975) advised that the convenience in categorizing behaviour according to the main type of most behaviour involved an interaction of all components. He argued that more information guaranteed only when research findings were more closely allied to a particular domain. On the issue of the types of learning or instructional processes in existence, he concluded that no agreement had been reached so far by the researchers.

2.3 Skill Learning

Skill learning is classified into 'gross motor skills' and 'fine motor skills', Postner et. al. (1973). Gross motor skill involves contractions and the application of muscular parts of the body. When performing such skills, the whole body is usually in action. Skills that are demonstrated by sportsmen in various areas of sporting events are typical examples of gross motor skills. Fine motor skills connote a delicate or sensitive quality with fine and precise

neuromuscular coordination of the senses.

Baines (1962) observed that some of the school subjects which are regarded as skill and so classified as psychomotor or motor skill also have in them some large elements which could make them be classified as cognitive through content analysis. Shorthand is among such subjects. It is a real life skill which requires fine physical movement. It is a complex subject and is characterized by a reasonable level of cue detection, understanding of principles, mastery of concepts and theories as well as involvements in decision making. Motor response in Shorthand learning is just a feature in the whole process.

It is observed that subjects have areas of peculiarities and differences despite the fact that they may be categorized as skill. While some skills are associated with knowing, others are associated with the doing aspect. In cognisance of these peculiar differences, Cobane (1960) asked whether the teaching of the principles underlying a time skill subject facilitates learning of the skills or will the knowledge of general principles and an understanding of their application facilitate the learning and improved performance of students in skill subjects?

Howland (1973) argued that too little attention has been paid to the cognitive aspects of typewriting, for instance, which has not come to be measured in terms of output requiring the application of typewriting knowledge and

typewriting skill in typewriting problems.

In the same vein, Mbabah (1982) observed that too little attention has been paid to the cognitive aspect of Shorthand learning in terms of assessing its value as a constituent in the skill performance. Further, he explained that Shorthand writing is a perceptual motor skill involving both perceptions of the Shorthand outline forms and their execution in patterns of motor behaviours. He further stressed that these two aspects of Shorthand writing are ordinarily learned simultaneously as interrelated processes; the movement patterns are dependent on perception of the outline forms and the feedback from executed movements leads to more precisely differentiated perception of outline forms.

Taba (1962) made a serious point when she stated that those who work on curriculum development should look closely at the path they are following to be sure that they are not going towards the unwanted destination. She further opined that in a research study of this nature and in real life, an almost unlimited number of combinations of massed versus varied practice schedules are possible.

The learning of all kinds of skills depends on one sensory organ or another for inputs which are sequentially arranged for sound perceptual responses. Canning (1976) stated that one of the factors in the nature of skills was the coordination required between the mind and physical action. Most skills are simple while some are complex. Their

simplicity or complexity notwithstanding, all skills require movements that need be welded into a unit that is characterized by coherency and integration. All unnecessary actions are done away with and the necessary ones that are left are refined to an acceptable level of perfection.

Welford (1968) defined skills to include the study of those processes that produce expert, rapid and accurate performance. Fitts and Posner (1967) stressed that this definition may be applied not only to tasks which involve manual activity, but also to tasks which require internal manipulation of symbols as in language.

Ragsdale (1950) categorized activities and skills into three major groups: object-motor activities, language-motor activities and feeling-motor activities. Manipulation of materials and the use of equipment in household and industrial undertakings exemplifies the object-motor activities. Language-motor activities are concerned with movements of the speech organs, movements in handwriting, art and mechanical works. Manual esthetics coordination is experienced in the feeling-motor activities.

The learning of motor skills is done in phases. In describing the course of learning motor skills in mature individuals, Fitts and Posner further suggested that it could be done in three phases: the early or cognitive phase, the elimination phase and the control phase.

The cognitive phase deals with the important cues that have to be learnt. This is simply the perceptual phase of learning. It is a common learning phase to all skill activities. The learner learns the various instruments and all the intricacies about the entire task. The perceptual familiarity with the controls, rules, principles and gadgetry characterize this phase of skills learning. The learner does not yet learn how to make response appropriately, but learns responses that can be made. He only knows of the initial responses necessary for the performance of a given task.

The elimination phase deals with the extermination of wrong habits that are brought to the skill from past experiences. For an example, a Shorthand student of the Pitman's Shorthand System must learn how to spell words according to consonant strokes that represent them when writing but not according to the normal alphabets since Shorthand writing is based on sound.

The third phase which is the control stage is the phase in which the lower centres of the brain exert control on skill performance and make it more automatic. AT this stage, the skill performance is more or less involuntary since the performer's attention can be divided without any adverse effect while engaging on the skill. For instance, a person can be writing while at the same time responding to questions asked by his inquisitive children. However, this cannot be applied to all skills. There are some skills that are more

difficult to perform and such skills rarely give room for any distraction of attention.

The word skill is a conglomeration of various elements. Singer (1975) opined that the word skill might itself imply an art in writing, memorizing, acting, painting, talking or playing. Muscular movement of the body required for the successful execution of a given act is termed motor skill. However, motor does not necessarily imply movement per se but various processes of interaction between cognitive or perceptual and affective and psychomotor domains in order to get an integrated, meaningful and successful outcome.

The components of a skill can be improved upon. In doing this, Travers (1973) citing Posner and Kelle (1977) noted that there appeared to be two ways: (1) reducing reaction time and movement time or increasing the precision of movements as reproduced from memory; (2) reducing the attention required and leaving the person at least partly free to perform other tasks simultaneously.

Instruction and practice have to be adjusted according time, space and equipment availability and to the learners' capacities and task characteristics. It is in this connection that Singer (1975) noted that instructional and training procedures have many trade-off possibilities to offer in psychomotor performance. He recognized the pragmatic interplay of practice procedural variable, task dimensions, learning process constraints and individual differences as

influential motor behaviour manipulators. Singer further inferred that variables that account for individual differences in motor performance suggest expectations of varied behaviour in association with proper instructional and training strategies.

2.4 Varied Teaching Periods

Time schedule that is believed to be efficient for the purpose of achieving programme objectives is usually planned to fit almost every educational programme. Planning and schedules often take cognisance of the operational system which the administration of the institution prescribes. Many educators are of the belief that some schedules are more efficient than others for learning particular subjects or units of a subject matter. In courses that are assumed difficult, a considerable length of time is usually needed. Such course are usually spread to cover a reasonable time frame instead of squeezing or compressing them into short learning durations. Shorthand is in such categories. The idea of massed or concentrated practice arises when learning is scheduled for a single or few long periods until what are to be learnt are presumably learnt. When teaching periods are varied or learning is carried out within short periods which are punctuated either with other activities or with periods or rests, the practice is said to be distributed or the learning periods tagged varied.

Learning and teaching would be very fruitful if the actual length of learning periods could be ascertained, how far apart from the periods of practice should be spaced, determined, and the appropriate period of the day for the teaching of 'difficult' subjects clearly stated.

Travers (1977) agreed that many researches have been conducted on relative efficiency of learning when the intervals between trials are varied. Consistency in the results and consensus on conclusions therefrom have not been met due to conflicts in results. The results of such investigations are often conflicting since various and diverse tasks are bound to be learned or carried out.

Child (1968) stated that no satisfactory solution has been found to the problem of determining the appropriate length of rest periods; or how long is a reasonable stint of work in particular subject areas at school. He noted that it is a matter of a rule-of-thumb as against that of scientific analysis for choosing periods used for learning in schools. Choosing periods of 35 or 40 minutes in secondary schools for example is entirely a matter of intuition. The notion that infants of school age can take only 20 minutes of narration from a teacher has very little if any, experimental proof.

Knowledge of timing lessons by teachers is based on observations and experiences in handling learners. Although such observations may be of help, it may not as of necessity be the most suitable. Signs of fatigue, boredom or work

decrement may be so apparent in some subjects and some learners while the situation may be quite different in others.

Harms and Stehr (1963) opined that the more difficult and complex skills are, practice should be liberally varied. The duration of practice should be short when motor tasks particularly new ones are being introduced to the learners for the very first time. Complex physical movements and mental processes are involved in many motor skills. These variables increase learning difficulty and thus register the need for practice at varied periods. To further buttress their facts, Harms and Stehr added that when one decides to study a lesion for two hours, merely putting in the time becomes his main objective as his attention focuses more on the clock than on the lesson.

Among the areas in the field of skills that first received research attention, the researcher observed, were the problems and effects of varied practice. For quite a long period of time, series motor learning studies have been carried out with respect to the phenomena of varied practice and the associated problems of recall than have been the case with any other specific area of research in skill learning.

Initially, interest in the problem of varied practice was awakened by research findings in other learning situations. Jost (1897) and Bilodeau (1968) had not only demonstrated the relatively greater efficiency of varied practice over concentrated trails but had not only demonstrated the

relatively greater efficiency of varied practice over concentrated trials but had also engaged in theoreticals that were in direct connection with varied practice problems.

Some outstanding early works such as those by Starch (1912) and Pyle (1914) were to greater extend concerned with ascertaining whether or not the introduction of rest periods between practice sessions, did as a point of fact influence performance. Such early works were marked by a number of experimental preferences which paved ways for objective research findings and results.

According to Bilodeau (1968) it is not possible to carry out an experiment in which two of the variables are not founded. Experimenters, especially the early ones, evidently and confidently felt that it was important to control the total amount of elapsed time while keeping total amount of practice per each class meeting increase, the length of rests between sessions also registered upward movement or increased comparatively.

Khans (1981) stated that in the early part of twentieth century, the use of the concept of fatigue to give explanation of varied practice effects fell considerably from recognition thus giving rise to the advancement of a considerable number of other special theories and good guesses that could be investigated for application in skill learning. Among such theories and hypotheses, the following seem to have had much hearing with skills learning:

1. The two hypotheses concerning age maturation and stimulation maturation advanced by Wheeler and Perkins (1932); and

2. Snoddy hypothesis.

Wheeler and Perkins hypotheses aimed at identifying the process of learning with the process of maturation and in effect considered learning as a special form of stimulus-induced growth. The age maturation hypothesis simply holds that the ability to benefit from practice depends upon the age-maturational level of the individual learner.

Stimulation maturation hypothesis is described in various ways. Dore and Hilgard (1937) described it as follows: "at any given age-maturational level, the optimum rate of stimulation to secure improvement in a given function depends upon the normal rate of stimulation-induced maturation in the functions". An implication of this formulation is that, given a specific age-maturational level practice will give rise to a rate of improvement that is related more closely to the total elapsed time right from the beginning of practice than the total amount of practice given in that time.

Hilgard (1937) specifically tested in a skill situation the last mentioned implication of the Wheeler and Perkins' theory. With the use of pursuit motor, they varied different amount of practice through the same total amount of elapsed time and their acquisition curves. When performance was plotted against trials, the conventional manner showed a varied practice schedule benefit. When performance was

plotted against elapsed time, however, the improvement curves tended to coincide, thereby lending support to the theory. However, while the results obtained by Hilgard and Smith (1942) also lent support to the hypothesis, Bell (1942) made an effort to reconcile the prevalent contradictory results. They pointed out that in view of what was known about the relative effects of practice and rest, it was possible to predict, solely on empirical tenets that a range of practice and rest conditions exists which could lead to the fulfilment of the predictions of Wheeler and Perkins.

Opposing processes of mental growth had been emphasized by the Snoddy hypothesis. The one relevant to this study is what Snoddy called Primary growth. This growth is supposed to occur early in practice and to be a co-function of amount of practice and the amount of interpolated time.

In a series of studies on temporary delay, Bilodeau and Bilodeau (1958) found out that the point of inter-polation of the feedback between responses had no effect on learning whatsoever. Rather, the finding was that the longer the time between responses, the poorer the learning. Reasons advanced for the poor learning with spaced responses were that subjects with long intervals between responses were forgetting some things of importance. In their opinion, three basic events of training were being subjected to forgetfulness. These were the responses, the feedback or the knowledge of the result and also any planned response or response alternative which the

subject might have had at the time of training.

Accuracy in performance dwindles as the interval between successive positioning responses increase. McPherson, Dees and Grdley (1948) and later Bilodeau and Bilodeau (1958), Denny, Hall and Rokeach (1960) presented evidence to the above assertion.

According to Reynolds and Adams (1953) performance soon improves if a series of massed trials is followed by a series of spaced trials. Poulon (1981) citing Bilodeau (1968) had the feeling that the effect of massed but varied practice is to depress the standard of performance rather than to depress the rate of learning.

The impact of rest depends upon whether practice was massed or varied previously. After massed practice, rest produces a sudden improvement in performance. Initial improvement in performance can also be brought about by rest. These are the concepts of classical reminiscence and classical warm-up effects. According to Ammons (1947), the greater the number of massed trials before rests, the longer the rest lasts, and the greater these effects. However, Adams (1952) viewed that if rest is given successively, the reminiscence effect is bound to disappear while the warm-up effect keeps on featuring.

Often, many questions are asked about class periods. Such questions always hammer on the length of class periods as well as on the frequency of class meetings. Smith and Shores

(1957) indicated that there is very little research evidence to help answer such questions as: How long should a class period be? How often should a class period be? How often should a class meet? They further contended that it has been established that for development of skills, short and frequent periods of practice are more effective than long and infrequent ones. A point of diminishing returns soon sets in if practice on a skill is not varied or is concentrated. The true position is that after a short time further progress is completely extinct.

One of the best known generalisations about learning is that it takes fewer trials to learn something if there are rest periods between trials or to be explicit, if practice and practice periods are varied. In the learning of manual skills, varied practice usually takes superiority over massed practice. Apparently, more and successful learning can take place in a given total amount of time if the learner spends much of the time resting than spending all his time practicing or learning a given skill.

Proper spacing sequence has a lot of facilitating effects upon retention. Reynolds and Glazer (1964) confirmed that consistent superiority of their experimental material even with length of the forgetting interval between last practice and testing confirmed the previous tentative findings on the above assertion. According to Crombach (1954) skill performance is not strictly independent but depends on some

basic learners' characteristics. He argued that skill performance like any other learning depends upon the learners' goals, readiness and interpretation. Skill is developed in the same way as other learning but it is a more polished and automatic form of response. Its attainment comes through effective practice.

Smith and Shores (1957) had the contention that the variation of the time alloted to various subjects and how such time has been varied has been determined more often by rule-of-thumb and by convenience which lead to over-learning.

Investigators on over-learning (Kruger 1929), Postman (1961) and Briggs (1957) had shown that retention of paired-associate lists is not negatively related to the degree of original learning. These findings are in agreement with most existing learning theories which have the assumption that the strength of learning and the consequent resistance to forgetting vary as a function of the number of repeated practices recorded. Preston (1959) stressed that drill or repetitive practice is for the purpose of fixing responses at an automatic level to assure immediate recall. Reynolds and Glazer (1964) advocated short instructional sequences in several related topics, each punctuated with short reviews of the material previously taught.

Some pertinent questions as they affect learning are still being asked for answers to be given. Such questions include: When is a conditional response really established?

When is the skill learned? Once learned, will it be retained? Cole (1950) gave an answer to the questions by stating that the answers to all the questions involve a discussion of repetition in educational parlance of varied and massed practices in skill learning.

Arithmetically, many widely varied periods to add and subtract are more result-oriented than a few long periods. Gole and Bruce (1950) found out that it was more effective to schedule learning over a period of ten days than to use a single long learning period in learning French vocabulary.

In their review of earlier investigations Welborn and Associate (1937) indicated that retention of materials in any meaningful way tends to remain constant regardless of the amount of repetition during original learning sessions. Frandsen (1957) supported the above views when he stated that for learning of both verbal and motor skills, research results have favoured few trials per practice period and relatively longer rests intervals between practice periods over massed practice. He further made it quite clear that the perceived difference is not general but specific in that the advantages of varied practice depend upon certain conditions like motivation, lack of boredom, fatigue or retro-active inhibition. For activities such as handwriting, spelling, memorizing or music shorter practice periods with rest periods of an hour or even a day are viewed more advantageous. Intervals between practice periods are likely to be helpful in

memory work and skill activities, but long intervals could cause too much forgetfulness. Longer practice periods are better where variability of approach is needed in complex problem solving.

Although he failed to find its effects on retention test, Wilson (1949) discovered that there were errors in the performance of those who were treated to varied practice conditioning than those who were treated to massed practice despite the fact that varied practice conditioning than those who were treated to massed practice most often results in more rapid learning.

Gibson and Gibson (1955) propounded a theory that with varied practice, enormous responses commonly show an increase over those in concentrated practice, especially during the early trials. The implication of their theory is that with varied practice there are more errors, but learning may still be more rapidly taking place under conditions of varied practice.

Varied practice is synonymous with repetitive practice. Emphasising on the importance of repetition, Rock (1957), Rock and Heimer (1959), Clark et. al. (1960) and Estes (1960) argued that repetition is of importance in learning only in so far as it strengthens associations which have already been formed on a single trial. The implication of their argument is that repetition improves performance and not learning.

Varied practice received a high degree of acceptance from many other researchers. Oseas and Underwood (1952) using very short intervals between practice periods found that college students identified and remembered abstract concepts association more efficiently when practice trials were varied rather than massed.

In his contribution, War (1964) found that the probability of correct response assessed by recognition tests declines with increasing number of successive repetition of items is different for all types of learning hence the need for further experiments to investigate the importance of repetition and varied practice in differing kinds of task. In his conclusion, he warned that attempts to generalize from one set of results to other learning situations must be treated with utmost caution.

Tsae (1948) stated that with equal amount of practice, spaced learning is more efficient than massed, but more repetitions are more effective than few trials when duration of time is equal. He was however unable to reconcile his results with growth theory which proposed that improvements in performance should be more closely related with lapsed time than with the total amount of practice given the proper minimum stimulation.

Gratty (1964) opined that the manner in which practice sessions and trials are spaced in time, and how much of the total skill is practiced at one time exerts important

influence on the speed with which people learn skills. He identified that there are few viable theoretical models by which the findings may be explained and organised with consideration given to such variables as the duration of the practice, the duration and frequency of the trials and nature of the motor task. He further stated that although much literature indicates that skill learning and performance are facilitated if practice trials are varied rather than massed in time; this generalization does not always hold. In this connection, Garrison et. al. (1955) contended that maturation, practice and motivation are factors which contribute to readiness for writing instruction as they do to the learning of any other skill. For the achievement of effectiveness, he further stressed, practice must be sufficiently long for the learner to identify cues and make discernable progress on the task. There is need for practice to be arranged in such a way and manner that there is a minimum lapse of time between cue and reinforcement. They noted that the importance of adequate variation of practice period is a fundamental principle of learning as well as the acquisition of skills. They draw conclusion that a mere repetition may create unfavourable attitudes towards a task and may thus act as a barrier to the development of a high state of efficiency.

Ausubel (1969) evidently supported the conclusion that varied practice is more effective than massed practice for both learning and retention. However. he later attested

unreservedly to the fact that relatively efficacy of varied practice depends on factors such as the age and ability of the learner and the nature, quantity and difficulty of the learning task.

Richey (1958) was of the views that scientific investigations have shown that learning is facilitated by meaningful repetition which indicates that drill has secured a place in modern concept of education.

Farrant (1976) pointed out that tone of the characteristics of the need for activity in learning is in the use made of practice and repetition. Effective learning depends on repeated experiences. The more often something is done, the more established does it become a part of the total learned activity. He put up argument that practice and repetition should be regarded as a principle of improvement. Repetition enhances memorisation, establishes skills and habits and forms part and parcel of conditioning and training. Farrant (1976) had the conviction that too much practice in the initial learning period may provide the learner with a method of solving problems which he applies mechanically even when he is altogether inappropriate. Nonetheless, sheer repetition makes little provision for and may even destroy the desire for understanding and display of curiosity, imagination and creativity.

Learning and mastery of skill go along with occasional tension. Commenting on such a condition, Travers (1977)

argued that the learner of skill becomes tensed with a resulting decrement of performance in the process of learning. For such a reason, when acquisition of skill is attempted, short sessions interspersed with rest periods are rather likely to provide a learning situation in which there is continuous improvement. However, there is some evidence that learning still occurs even if there is a decline in performance on a perceptual motor skill that is being learned. At the end of any training session, when the level of performance on a motor skill shows a decline, a short rest period is most likely to produce a remarkable increase in performance. The increase in performance is caused by the dissipitations of the inhibitory effects that had built up during practice sessions.

Murdoc (1962) and Glanzer and Gunitz (1966) found that longer presentation periods increase immediate free recall of beginning and middle items, but not terminal items. Ekstrand, Wallace and Underwood (1966) viewed it differently and stated that a frequency differential arises primarily from subjects' implicit rehearsal of the correct response during the feedback phase of the task.

It is somewhat difficult if not impossible to prescribe the optimum length of practice period. Dudycha (1963) upheld this view when he opined that no formula can be given that prescribes the optimum length of practice or study period. When one is learning simple skills, short practice periods are

preferable to long ones. In contrast, and in complex skills, adult learner who has a strong motivation and superior mastery can practice for long periods of time with huge success. However, Travers (1939) proved that the length of practice periods does not make a difference in the efficiency of learning a simple skill.

Duncan (1951 compared the effect of varied with massed practice and found the latter definitely inferior in motor learning. Practice was carried out continuously for five minutes by those subjects who used varied method practice for ten seconds and rested for twenty seconds through the five minutes work schedule. Despite the fact that the subjects using the varied method practiced only one-third as long as the subjects using massed technique, their performance was undoubtedly superior.

In the views of Wright and Taylor (1949) the fact that a rest period interpolated between practice seems to be more important than the length of the rest period itself.

Viewing it differently, Dececco (1963) concluded that if the interval between trials is too long, everything that has been learned on the preceding trials tends to be forgotten and has to be relearned on the next trial.

Hovland (1938) found that variation of practice yields more benefit than massed practice. Practice improves motor skills. Gagne (1977) bought this idea in his statement that the most obvious feature of motor skills is that they improve

with practice. In his opinion, repetition without intent and purpose on the part of the learner to achieve an improved performance through feedback which provides information to the learner is not in any way implied by the word practice, and learning under such negative condition is essentially fruitless. His argument showed that massed practice has never been seen to be inferior to varied practice.

Certain considerations need to be given in planning practice sessions. Gagne (1977) contended that practice considerations such as avoiding learners' fatigue and lowered motivation need to be considered in planning practice sessions. Reasons such as these are thought to favour the variation of sessions for practice, or at least the avoidance of extreme massing although Gane (1977) argued that massed practice has not been shown to be inferior to varied practice.

Using college students as subjects, Reed (1924) found that they gained more proficiency from three daily 20-minutes periods or six daily 10-minutes periods than from an hour of continuous practice. Also, with college students as subjects, Harmon and Miller (1950) gathered data on learning a complex perceptual motor task which suggests that spacing the practice periods with increasing longer intervals between them is economical of the total time required for mastery over subjects.

Frandsen (1961) commented that research findings on varied and massed practice do not provide precise guidance on

the most effective variation of practice period for every school or college subject. What they suggest is that existence of certain principles, and that efficient learners and teachers should try to discover optimum variations of practice for varied learning activities in which students undertake. He further had the contention that long practice periods on repetitive activities like practicing such skills as Shorthand or Typewriting leads to dampening motivation, fatigue and interference between the several only partially-learned cometing responses.

Mursell (1952) rejected that learning depends wholly on practice. The notion that one learns only by doing is simply untrue. Some of the identified best learnings go on when practicing or doing does not at all occur. Mursell argued that there is much disagreement among experimental findings in terms of detail such as the extent of superiority by varied practice or the best strategy for varying practice, whether for example, four practice periods of fifteen minutes each day are better than two practice periods of thirty minutes each day. According to him and in consideration of the enormous works that many researchers have carried out, it would appear that in many cases, the outcomes of learning, depending on what is learned, depend more on the total elapsed time than on the sheer amount of practice. He drew conclusion that varied practice tends to enhance improvement in performance and longer retention than massed practice.

Still with students as a focus, Stephen (1966) suggested that students should perhaps apportion their practice periods in line with the minimum consistent with practical circumstances. A forty-minute practice for example might be adequate and efficient under some circumstances while in some occasions such time frame might prove grossly inappropriate.

Baddeley and Ecob (1973) showed that repeated items are recognized more quickly than non-repeated items from equivalent sequences. Fishman et. al. (1968) came out with the following research findings on the completion of their investigations on 'massed versus varied practice in computerized spelling drills': the massed condition was superior to the varied condition on the second and third presentations of the training sequence; and the varied condition was superior on both of the test session. It therefore appears that the massed repetitions are better in terms of short-term performance while learning occurs in the long run when repetitions of an item are well varied.

Jones and Holding (1975) viewed that perceptually, conditioned subjects who are not tested repeatedly, but who are given a single test for an illusion after an appreciable time has elapsed, ought therefore to retain substantial after-effects. This prediction was confirmed by Holding and Jones (1976) and Riggs et. al. (1974) when the two groups of researchers independently compared the residual after-effects in repeated test and time-elapse group. Through analysis, the

repeated test scores showed an approximate decrease linearly, reaching zero mark at five days. Furthermore, the time elapse testing of groups at various intervals showed relatively little decrease in the after-effect which remained at better than half strength at about three months, but projecting to zero at six months later.

Meunier et. al. (1992) and Tulving (1966) commented that sheer repetition of labels or facts in a kind of overt rehearsal does not necessarily lead to better encoding or retention.

Allan (1976) drew conclusion that the relationship between the physical duration of a stimulus and its perceptual duration is yet to be understood. Waugh and Norman (1965) and Atkinson and Shiffrin (1968) saw the importance of rehearsal as an explanation concept which stems from its central role in multi-store models of memory. Such models identify rehearsal as the central mechanism by which information is transferred from a transient short-term store to a more permanent long-term store. These models define rehearsal simply in terms of repetition.

Rundus (1971), Rundus and Atkinson (1970) and Rundus et. al. (1970) proved rehearsal as a powerful instrument in learning which has been demonstrated in several investigations. These studies have explained that memory performance for an item is a positive monotonic function of the number of overt repetition accorded that item and that a

number of free recall penomena may be accounted for, simply in terms of the number of overt repetition accorded individual items.

Craik and Lockhard (1972) suggested that rehearsal can be usefully broken down into its maintaining and elaborating functions respectively. In as much as the subject uses rehearsal time to enrich and elaborate the memory trace, subsequent retention will be enhanced. If the time is used merely to maintain the trace in some simple form, then further repetition or prolonged stay results in the short-term retention. It is an established fact that memory for repeated items improves with an increase in the interval between the two occurrences of that item.

The question of spacing and pacing of learning activities looks a permanent problem. According to Blair et. al. (1968) even when learning is made meaningful and material is presented or studied in the form of comprehensive elements, problems or units, there still remains the question of spacing and pacing the activity. They stressed that learning efficiency varies with the length of study of practice periods, with the spacing of such periods and with the rapidity with which the material is presented. Theoretically, for some types of learning, more will be gained from three twenty-minute period of study than only one sixty-minute period. Blair et. al. (1968) further gave some general principles that can guide in appropriate spacing of learning

activities in school. According to them, the following variables need be given thorough consideration in determining the variation of study and work activities:

(a) monotony, boredom and fatigue result more quickly, especially in rote learning than is generally realized. Such factors are obviously deleterious to learning.

(b) another variable is the retroactive inhibition that results from the interference between various parts of a given material or activity. This type of interference increases the length of the material and the extent to which the practice is massed.

(c) the type of material to be learned is another factor. Difficult memorisation and complex perceptual motor learning require short practice periods whereas well integrated and interesting materials such as problem solving can be studied or practised for longer periods without a decrement in motivation or efficiency.

Madsen et. al. (1968) emphasized on teachers' contact with students as they affect learning. They showed that teachers' contacts with or teachers' attention to students reinforce their learning behaviour but they failed to indicate whether the frequency or the length of such contacts have different effect.

Watson (1946) stressed that sheer repetition without indications of improvement or any kind of reinforcement is a poor way to attempt to learn. The learner cannot improve by repeated efforts unless he is informed about how well each one attempt has improved or succeeded.

How practices are varied have some levels or reflection on reminiscence. Singer (1975) indicated that the method of varying practice might reflect greater or lesser degrees of

reminiscence. In his views, it seemed that practice trials that are relatively massed will afford the greatest amount of reminiscence which will correspondingly result in a similar performance or in a performance slightly below that of a group for varied practice.

Fieishman and Parker (1962) saw no effect on retention by both massed and varied practices. It was the belief of Koffka (1935) that a greater organisation of the stimulus trade results in less probability of its weakening over time. However, it was a belief of Welder (1958) that high arousal during the associative process, that is during practice, results in greater permanent memory.

Although Canning (1977) identified monotony, mindlessness and unproductivity as the danger in repetition, he also looked at it as a necessary part of the learning process. He saw continuity as important and long holiday periods while its absence was seen as having harmful effects on learning skills.

Cain and Willey (1939) comparing retention curves of massed and varied practice for meaningful materials found that after seven days those who received varied practice treatment retained almost three times as much materials as those who had massed practice.

Cook (1937) concluded that the nature of the materials learned is also a factor in determining what is retained. The conclusion was based on the finding of his study that the solutions to puzzles were retained better over a considerable

period when the problems had been solved by varied practice sessions.

In a classroom setting, Leith et. al. (1969) researched on 'Distributed Versus Varied Practice', using materials related to the teaching of Physics. The finding was a quite clear advantage of varied practice over massed.

Lorge (1930) also confirmed the superiority of varied practice over massed in his research. He used three tasks in the study: mirror drawing, mirror reading and code substitution. In that work, the tasks were learned under three conditions. The first was massed practice; the second was varied practice with one minute intervals between trials while the third task was varied practice with twenty-four hour intervals between trials. Generally, the subjects performed more efficiently when practice was varied than when it was massed. However, it was found that small differences existed between the varied practice with one-minute rest intervals and twenty-four-hour rest intervals. In this particular research, the presence of rest was more important than the length of rest.

Added learning is claimed as an important advantage of varied practice. Frandsen (1961) noted that one explanation of the advantage of varied practice is the claimed added learning which results from nulling over or thinking about a task between periods of actual practice. According to cognitive learning theory, formation of cognitive maps to be

applied subsequently in actual practice could be used in structuring approaches to the problem.

Learning is directly proportional to the force of the experience that causes it. Learning grows out of the reaction of our response mechanism to the force of our environment and Farrant (1976) identified readiness, motivation and activity as most important factors which contribute to speed and effective learning.

In a study to increase productivity through increased work efficiency in an industry, MacGehee (1949) noticed that the training for spinning operators in textile mills was reduced to thirty percent by varying rather than massing practice.

In some instance, massed practice results in a high level of wastage in terms of man-hour. The truth in this statement was revealed in Fryer and Edgerton's study (1950) when 165 trainees working four hours each day made as much daily progress in practising Morse Code as did 355 other trainees who were practising for seven hours a day.

Generally, varied conditions of learning are more productive than massed conditions. Child (1968) observed that a possible cause for this situation is that retention is inhibited as a task proceeds and until there is some rest, the inhibition continues to affect performance.

In his investigation of longer delay intervals, Brand and Wood (1958) found that after one week, significant losses in

word recall and clustering occurred. Mandler (1967) in the same vein showed that the act of forgetting increased rapidly up to four weeks and then levelled off with no significant loses occurring even after four months. Conducting a research on 'The Effects of Delay Interval of Word Recall and Clustering', Fisher (1971) found out that the amount of words recalled and the number of clusters recalled decreased with increases in the delay interval.

Evidence in Zajonc (1968) showed that more repeated exposure of the individual to a stimulus is sufficient condition for the advancement of his attraction toward it. For a variety of stimuli, effective ratings of the subjects are found to increase systematically with exposure.

Giving a tentative explanation of the exposure-liking relationship, Harrison (1968) suggested that the initial appearance of novel stimulus tenuously elicit a number of antagonistic response tendencies producing a tension state which is more often than not associated with negative effect. Nonetheless, it is Gagnes' (1977) belief that by making a repeat of the essential movements in successive trials of practice, the learner is discovering kinesthetic cues which signal the difference between error and error-free performance. In addition to the external cues these interval cues function in controlling and regulating the performance and thus leads to increasing degrees of precision and timing accuracy. Practice is then very necessary because it is only

by repeating the essential movements can the learner be provided with the cues that regulate the motor performance. As practice proceeds with suitable feedback, internal cues leading to errors are progressively rejected, and interval cues associated with performance, smoothness and precision become established and retained as regulators of skill performance. Howard (1960) and Roberton (1969) interestingly noted that it is often the studies of variation conducted under field conditions that produce non-significance.

Banes (1962) observed that more discrete skills, practised under tight controls and more refined variation have persistence in favouring varied practice than massed practice.

Townsend and Burke (1962) opined that the greater the amount of materials learned at a time, the more difficult retention is and grater the influence of inhibiting processes. Retention is directly related to the amount of rehearsal and amount of material to be learned and retained. Up to the point of satiation, when boredom and fatigue generate strong negative feeling-tone, the more work done with the material, the greater the retention. As the point of satiation approaches, the influence of the work periods is reduced. Study contributes most to retention at the beginning while relearning contributes less and less to the final retention. It is the opinion of Adams and Reynolds (1954) that the variation of practice is a performance variable rather than a learning variable. This implies that practice changes the

underlying abilities while rest helps performance.

Townsend and Burke (1962) observed that remembering is a function of practice. The type of task to be accomplished and the calibre of the person to execute it determine the effective length of any work session. The effect of varied practice on the acquisition of the practice sessions is relatively to the material to be learned. Mbabah (1982) viewed the duration of the practice has the most important effects early in the rehearsal series.

It was the opinion of Gates, Jersild, McConnell and Challman (1948) that no experiment has yielded dependable and conclusive results concerning how learning periods could be gainfully varied. The optimum length and spacing of practice periods depend so much on the nature of the task and on individual differences in learners and learning materials.

Gates et. al. (1948) in their numerous studies found out that it was economical to break up the available time into periods of thirty minutes or less separated by intervals of from thirty minutes to twenty-four hours.

They enumerated some factors that place varied practice and spaced learning at an advantage in relation to series of tasks. The factors are:

(a) varied practice may favour a variety of responses at a time when the correct reactions may be discovered.

(b) early massing of practice may tend to establish errors occurring during the exploratory periods.

(c) spacing makes it possible for one to capitalize on a fruitful variation which can be followed up by more concentrated effort; and

(d) spacing may conserve interest and forestall fatigue. It is possible that during recess periods, errors may tend to fade out and one may gain new insight into the task in the next trial.

Thyne (1966) observed that with motor skills, and with verbal-numeral material, massed practice is generally more effective than varied practice. In the intervals between the practices, consolidation which enhances recall appears to occur.

Kozman et. al. (1958) noted that repetition is an outstanding essentiality to new learnings. People remember what they have learned most thoroughly, remember those things that are meaningful to them and remember those things that they do most often. In itself repetition does not perfect motor skills. Repetition only enhances learned responses which take place unconsciously when carrying out activities requiring the skill.

Davis and Willis (1962) observed that one advantage of varied practice over massed practice is that improvement takes place during the interval between practice sessions. However, how and why it happens that way has not yet been clearly understood. Errors in practice which come up by chance are noted to be less firmly established than the more appropriate responses, and hence forgotten sooner. In this way the intervals between practices seem to aid in the elinination of

errors. Adaptable performance, recalled and reapplied after an interval of no practice seemed to gain greater performance than the same adaptable performance successively reapplied on continuous practice. Short bouts of practice alternated with periods of rest during which learning continues to take place appear to be the process that establishes the most effective learning. Learning requires time, rest and work.

One peculiar feature of skill learning as viewed by Davis and Willies (1962) is that the learner is undergoing rapid physiological impairment as he attempts to acquire skills. He cannot practice a motor skill or any other type of skill demanding vigorous muscular contraction or mental exertion for several consecutive hours. Short periods of intense practice proves more gainful. Practice of most skills at least three times weekly during rather short practice periods appears best. Practice once a week is not often enough for the efficient development of motor skills and long practice periods are usually not beneficial.

The length of practice periods in the development of motor skills depends on the activities being practised and the interest span of the learner. Unduly short periods of practice have proved to be insufficient and unproductive in learning.

Watson (1964) stressed that without indications of improvement of any kind of reinforcement (reward) sheer repetition is a poor way to try to learn. Practice is not

just enough. The learner cannot improve by repeated efforts unless he is informed about how well each one has succeeded.

2.5 Mastery of Shorthand Principles, and Skills Learning

One of the cardinal issues in Shorthand instruction which is well recognised world-wide in Shorthand learning as identified by Russon (1968) is the deliberate teaching of the theories or rules of Shorthand system and frequent testing for knowledge of the theory, reading and copying of perfect Shorthand Textbook without any peculiar problem as a basis for taking dictation.

As reported by Hendrickson and Schroeder (1952), knowledge of the principles of refraction was beneficial in the throwing of dart and shooting of ryle at a target under water.

Cox (1933) found that knowledge of principles involved in manipulating electrical equipment facilitated the assembling and stripping of such equipment.

Similar results from investigations involving mental games and arithmetic respectively had been reported by Katona (1940) and overman (1930).

Contrasting these findings are a number of studies in which the understanding of principles did not appear to be related to skill performance. Among such investigations which saw no relationship in positive form between the understanding of principles and skill performance were Olander (1931),

Babitz and Keys (1939), and Hendrix (1947). With the exception of the studies by Hendrickson and Schroeder and Cox, all the mentioned studies dealt with various types of learning other than fine-motor skill subjects.

Colville (1957) indicated that the ability to use understood principles in performing a motor skill presents a complex problem since more than one type of learning is involved. He concluded that there was no evidence from his study that instruction concerning mechanical principles utilized in the performance of a motor skill facilitates the initial learning of the skill to any greater extent than an equivalent amount of time spent in practising the skill. That such knowledge facilitates subsequent learning is evidenced in the performance of a similar or more complicated skill which the same principle is applicable.

On time of drills for speed and accuracy, Fradson (1961) said that practice for refining skills, for automatising response, for increasing speed and accuracy should rather precede the achievement of understanding and the discovery of efficient modes of attack. In the early stages of practice on skills, teachers should emphasise understanding, discovery of efficient modes of attack and cultivation of good form. When the timing of speed drills is adjusted to the accomplishment of these objectives, the long range rate of progress and the ultimate level of efficiency attained are greater.

West (1973) noted that concerning focus on Shorthand rules, since one of the leading symbolic systems of Shorthand is fully phonetic, with the undeviating one-for-one correspondence of sound symbol, numerous Shorthand outlines require adherence to a specific rule if they are to be correctly written. In more recent years attention has been focused on whether or not accurate transcription depends on correctly written Shorthand and whether correct Shorthand, in turn, depends on an instructional focus on Shorthand theory leading to technical correctness of the outlines as measured by frequent word list tests

Enquiry by Pullis (1966) showed positive correlation between word-list score and dictation and transcription scores. Chang and Chang (1967), Chisson (1971) and Singer and Brunk (1967) indicated that the relationship between perceptual-motor and reading or cognitive abilities was more predictive for the young. That is, this relationship appears to decrease as age increases because of specificity to the tasks involved in the two domains.

Regarding the issue of varied practice or massed practice, Gagne (1977) noted that practice is not a factor which affects the learning of rules and concepts or of factual information.

The basic principles which explains the mechanics of performance is a structure which most investigators are interested. This too is an area in which most investigators

are interested. This too is an area in which professional educators emphasise. This aspect of the science of learning emphasises "why" rather than the "how". The point of contention about this aspect is on whether a learner who understands the principles also could perform the skill equally as well.

In this area, there are some conflicting findings. So long as acquisition of skill has been the measure, it has proved difficult to devise a sound experiment showing the teaching of principles to be superior to an equivalent period of actual practice. Callaway (1968), Cabane (1960_), Colville (1957), Farley (1967), Graves (1963), Halverson (1949), Mikessel (1962) and Toth (1969) confirmed the above assertion.

On the other hand, Mohr and Barrett (1962) and Papcsy (1969) have found positive results. Love (1967) found no significant effects from the understanding of principles in skill performance. Papscy (1969) showed clear superiority in learning and retention for subjects who understood the principles.

Bourne and Estrand (1973) noted that some activities such as driving an automobile or playing baseball involve skills as well as knowledge and intention, and repetition of these activities or practice leads to an improvement in skill.

Bunch (1936), Bunch and McGraven (1938) and Bunch and Lang (1939) have indicated that transfer of training remains roughly constant with varying intervals of the time elapsing

between the original learning and transfer task. Within the time limits employed, transfer was quite stable and appeared to be remarkably independent of any memory of the original task. This finding is somewhat paradoxical if one takes the view that the amount of transfer from the original to the transfer task is in a certain sense one possible measure of the retention of the orignal task. It would certainly appear that a task is gradually forgotten in the course of time. As indicated, however, the results do not suggest this.

2.6 Varied Teaching Periods and Shorthand Learning

Shorthand has been identified by Canning (1976) as one of the time-skill subjects. He enumerated the following features of such time-skill subjects:

(a) Time is a vital element as how short a time the sequence of action are to occupy is part of the goal of learning;

(b) The acquisition of the skill spreads over a fairly lengthy period. Several things result from this: firstly, there is a greater problem in maintain the interest and the incentive fundamental to skill acquisition; secondly, much more than the customary repetitive practice may be needed;

(c) The pressure of time is continuous and the learners have to learn to sustain the pressures of working against the clock without a break-down in their muscular relaxation or in their mental attitude of struggle towards success.

It has been stated many times in the past few years that three-minute and five-minute Shorthand dictation tests measure the same skill - that is, if a student can pass a three-minute dictation test at one hundred words per minute with 95%

Canning (1975) identified such requirements as linguistic command, and a reasonable degree of sensory motor coordination which are essential for the study of Shorthand. He noted that it will require anything from 150 to 250 hours of concentrated effort and hard work to achieve the acceptable level of 100-plus words per minute. Like most skills, it requires a daily application over repeated cost for effective results. Three hours continuous study and practice followed by a two day lay-off will not achieve half so much as three separate hours on three consecutive days.

Pitman (1936) pointed out that the reading of printed Shorthand in the advanced style is as important as writing practice and should be practised daily. This statement more or less emphasises the importance of regular practice both in writing and reading the Shorthand printed outlines. It is argued that at first particular attention should be given to the outlines but imperceptibly, the writing will become instinctive by frequent practice which should be regular and systematic. Practice of an hour a day is better than two or even three hours every second day. Regular practice in reading and in writing both printed and the student's own Shorthand notes will quickly give the student confidence which has its root in conscious ability to do the work required.

Canning (1976) noted that over-learning is essential for Shorthand mastery and effective performance standard to be attained. Ideally one has to know how to write what he hears

without giving any conscious thought to the mechanics of the operation. Equally, the goal in writing is the ability to read what one has written with the same unhesitating certainty that one reads his own hand writing. All these essentials are impossible without over-learning.

Smith (1961) confirmed that it is only by repetitive practice that the use of phrases in Shorthand becomes automatic.

Prince (1967) found that intensive drill on 500 most used words led to better transcription performance on those words and another words than did the non-use of intensive drills.

Smith (1961) advised that Shorthand students should never learn phrases by heart but to learn the principles and to understand the application of those principles.

Canning (1967) identified from his analysis of psychological researches and from empirical experiences the following:

(a) it is a mistake to learn too much once;

(b) too much practice at one time is inhibiting rather than helpful;

c) repetitive practice only produces results when it is highly specific and purposeful;

(d) short frequent spells of skill learning are more effective than longer, less frequent spell over a long total period;

(e) since practice is essential, it is important to identify the most effective kind; and

(f) time-skills are more effectively learned in the class group than alone.

Callion, Calhoun and Hillestad (1971) noted that Shorthand drop-outs and the percentage of failure are serious problems, and repetition work is one of the main ingredients in speed development. Students must be made aware of the importance of this and allowed to appreciate the relevance of such a routine.

Gartside (1970) noted that in no subject is the waste of effort so great as in Shorthand. The proportion of students who ever attain a practically useful speed, say eighty words a minute or more is small.

To develop proficiency, in any skill to a standard where it can be effectively employed, Gartside (1970) observed, involves considerable practice. Experience shows that policy of "shorter lessons at more frequent intervals" produces the best results in Shorthand. Two single periods of forty-five minutes on consecutive days yield quicker and more stimulating results than a single period of ninety minutes on alternate days.

The views expressed by Norwood Committee (1943) and Garside (1970) are that for both Shorthand and Typewriting, intensive courses are found to be more effective than the same amount of lessons spaced over a longer period of time.

Cair-Sainders (1949) citing Gartside (1970) "the acquisition of any skill up to a level of efficiency - that is the requirement in Shorthand and Typewriting - involves much practice. Moreover, unless practice is intensive and

frequent, the time required to gain efficiency is disproportionately lengthened".

The period of practice for any skill should not extend beyond the point at which the student gets tired. Once he gets tired he is prone to lapse into bad habits that become fixed and difficult to break. As Gartside (1970) observed, fatigue results in waste of effort and often shows itself in deterioration of the skill and lack of progress.

The right length of the practice period varies with the type of skill and is determined by the point at which fatigue sets in. Mass and Vaughan (1966) noted that experimental studies have shown, in general, that over a wide range of situations, some form of varied practice will be superior to massed practice.

Mass and Vaughan (1966) warned that caution must be exercised in making specific applications of research findings on practice variation effects. Studies involving motor skills have consistently shown the definite superiority of varied practice, but findings from verbal learning research and other complex learning studies are not so clear cut. They noted that the results of the latter are exceptionally complicated and depend upon a number of variables, such as the response measure, the similarity of items used in the material to be learned, and the amount of previous experience the subjects have had a similar tasks. When the material being studied is rather brief and not unusually difficult, massed practice has

this advantage.

Nolan, Hayden and Malsbary (1967) had warned that Shorthand must be used constantly or the skill is soon lost. Few subjects taught in high school require such specialised physical and mental abilities as does Shorthand.

Curzon (1977) opined that varied practice based on practice followed by intervals of rest appears to produce better results than long unbroken period of practice. Two separate thirty-minute periods of practice are generally more productive than one-hour continuous practice.

According to Anderson (1972) a basic concept of the functional method of teaching Shorthand has been that undue emphasis on Shorthand theory would cause hesitation in writing thus interfering with the students' development of dictation skills. According to this concept, emphasis on accurate outlines increases mental block, which causes students to hesitate when they cannot recall an outline automatically. The contention is made that, had there been no emphasis on accurate outlines, when a student encountered a word for which he did not know the correct outline, he would simply construct an outline according to the sound with little or no hesitation. Obviously, this contention is subject to a number of questions. Do students actually construct outlines according to sound with such fluency? It is possible that when there has been no emphasis upon building an accurate Shorthand vocabulary, students might have even more frequent

hesitation and perhaps omissions when taking dictation than do those students who have been required to learn accurate outlines.

Denielson (1959) concluded that Shorthand vocabulary competency was significantly related to Shorthand dictation achievement and that as the students' Shorthand vocabulary increased, the rate of taking dictation also increased. However, it should be noted that Danielson was not concerned with the accuracy of Shorthand outlines since she defined Shorthand vocabulary as the number of Shorthand outlines the students was able to transcribe correctly but not necessarily write correctly. Thus, Danielson actually found that relationship existed between the students' ability to transcribe isolated Shorthand outlines and their ability to produce mailable transcripts of dictated Shorthand contextual material.

In a study analysing the manner in which individual symbols within Shorthand outlines were written, Goetz (1966) found a high positive linear relationship between symbol mastery and selected dictation speeds. A significant difference existed in the degree of symbol mastery possessed among groups of students taking dictation at various speeds. Pullis (1966) obtained a correlation of 0.826 between the students' ability to write accurate Shorthand outlines and their achievement in Shorthand dictation. Approximately 69% of the achievement in Shorthand dictation was found to be

directly associated with competency in Shorthand accuracy.

Colville (1957) suggested that since it appears that some part of the learning period may be devoted to instruction concerning general principles without detriment to the motor learning of the students, it would seem desirable to include such instruction in order to provide this additional opportunity for acquiring some related knowledge about principles of mechanics and the application of forces.

2.7 Summary

Literature review of this study indicates that one of the first areas in the skills field to have received research attention was the problem of practice variation and this interest is not dying off. Studies dealing with skills in the areas of Physical Education far out-number those in the areas of Secretarial Studies and Business Education.

Most of the studies reveal evidence that short repetitive practices are more effective than long and widely spaced practices. Some have shown no difference whatever. Available evidence shows that it is unscientific to generalize the findings on varied teaching periods as every subject has its own peculiarities and levels of difficulties. The studies therefore reveal a vital need for the present study which is to find out among other factors the effects of varied teaching periods in Shorthand learning and performance. The review more often than not favours short repetitive practices with

regards to subjects of Physical Education with particular reference to gross-motor skills. The question pertinent here is whether in Shorthand, as a subject of focus, similar conclusions in support of short varied practice will be arrived at.

The review reveals evidence of positive correlation existing between the learners' ability to write accurate Shorthand outlines and their achievement in Shorthand dictation.

There is no doubt that many teachers and students of skill subjects are aware of what the benefits of regular practice should be. To settle a question as important as this on the basis, not of evidence, but of tradition, is to put administrative convenience above educational consideration.

Chapter 3

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the various techniques and procedures that were used in this study for the collection and analysis of data. These include mainly: the description of the subjects for the study; selection of participants; selection and development of test materials; administration of the tests; collection and scoring of data along with statistical treatment, as well as research design.

3.2 Research Deign

The research design for this study was the Post-test Only Design. This design was chosen because this particular study required two experimental groups and since the two groups were given the same treatments, Control Group was non-existent. Moreso, the researcher used no Control Group since he was attempting to make the two groups systematically different on a dependent variable. Symbolically, the design is presented thus:

$$R - E_1 \quad X_1 \quad Y_1$$
$$R - E_2 \quad X_2 \quad Y_2$$

W H E R E

R = Randomly assigned subjects to the two different groups.

E_1 = The first Experimental Group.

E_2 = The second Experimental Group.

X_1 = Treatment to first Experimental Group.

X_2 = Treatment to second Experimental Group.

Y_1 & Y_2 = Post-tests' Results.

At intervals of three weeks for fifteen weeks, common treatments X_1 and X_2 were administered to the two Experimental Groups E_1 and E_2. After testing at each interval, the results Y_1 and Y_2 respectively were got from the two Experimental Groups for analysis and drawing of conclusions. This design was used in order to avoid the disadvantage that Control Group usually suffers in a typical experimental study i.e. deprivation of the benefits of the new method enjoyed by the experimental group.

3.3 Population

The population for this study was made up of eighty 1994/95 first-year Ordinary National Diploma students of Secretarial Studies in Akwa Ibom State Polytechnic, Ikot Ekpene.

3.4 Sample and Sampling Procedure

Since the population was not too large, all the eighty students that made up the population constituted the sample for this study.

Simple random sampling technique was used in categorizing the sample into groups A and B. The researcher prepared 40 labels each of even and odd numbers from which the 80 students chose randomly. Those who picked odd numbers formed Group A while those who picked even numbers formed Group B. This sampling method was used because the researcher did not want any student to have control over the choice of the group he found himself or herself.

3.5 Instrumentation

The researcher administered a two-part-tests. One part was on Theory while the other part was on Speed. Post-tests Only were used in consonance with the assumption that all the students under study were admitted into the Department based on the same admission criteria and were thus expected to have a common take-off knowledge for better initial performance academically. Moreso, post-tests only were used because the focus of the research was not on comparison of the students' performance before and after treatments as a result of varied teaching periods, but only on the students' performance after treatment as a result of varied teaching periods, Prince (1967) confirmed.

The first parts of the test assessed the ability and agility to write Shorthand at progressively graded rates. All the tests in this part of assessment were through dictation by the researcher and the students were required to take the

speed tests at the same time.

The second parts of the post-tests assessed the students on their understanding and mastery of Shorthand principles, theories and concepts. The tests for both mastery of principles and speed writing were cumulative. This means that the tests on subsequent units would cover the speeds and principles learned in the preceding units.

In order to control the effect of some extraneous variables, the students were instructed to use the same writing materials both in class-work and in the tests. Transcription was done with pen instead of typewriter since emphasis was not on type-written transcription.

3.5.1 Validity and Reliability of the Instrument

(a) Content Validity: To ensure that the post-tests were adequate in content, the work covered in each of the teaching units was adapted from the Standard Textbook for the Course which is Pitman's New Course. On speed tests, New Course graded dictation studies for teachers whose passages have already assured of content validity was used.

(b) Content Reliability: The split-half method was used in testing for test reliability of the instruments. All the theory tests at each unit of the experiment were tested for content reliability

before they were administered to the students after the co-efficient of internal consistency was found significant. For this study, it was 0.75.

3.6 Administration of the Instrument

The teaching and practice periods were designed in such a way that the two groups had the same advantage in terms of the number of hours for classes. The two groups of students were allocated three periods each of one hour per day for three days in a week.

Table 1

TEACHING AND PRACTICE PERIODS

Groups	Morning			Afternoon		
	8.00 a.m. - 12 noon			2.00 p.m. - 6.00 p.m		
Group A	1hr.	1hr.	1 hr.			
Group B				1 hr.	1 hr	1 hr.

3.8 Teaching Procedure

In order to ensure systematic teaching, the researcher drew up a teaching scheme which covered the following areas:

(a) Principles based on Pitman's Shorthand System in the New Course Pitman's Shorthand Textbook;

(b) Short Forms Drills;

(c) Word Drills; and

(d) Graded Dictations.

The two groups were subjected to the same amount of work coverage within each of the units.

3.9 Classroom Setting and Management

The researcher requested for and used one permanent classroom for this study. This approach was necessary in order to control any possible influence of different learning classroom settings.

3.9.1 Test Administration

Five sets of post-tests were administered. They were of two parts. The first part of each of these sets of tests was on speed writing and transcription and was done through direct dictations by the researcher while all the students took the dictation down at the same time.

The second part of the post-tests focussed on the students' understanding and mastery of the principles, theories and concepts. All the post-tests were cumulative

i.e. subsequent tests cover the previous tests taken.

The last day of the three weeks used to teach one unit was set aside for the post-tests.

Speed tests were given at the following progressive rates:

	Speed
First Post-test	60 W.A.M.
Second Post-test	65 W.A.M.
Third Post-test	70 W.A.M.
Fourth Post-test	75 W.A.M.
Fifth Post-test	80 W.A.M.

The second parts of the post-tests were administered to test the understanding of the students in Shorthand principles and rules. Items like remembering the formation of gramalogues, formation of phrases based on principles already covered were assessed in the tests. The last test on theory and principles covered the whole principles learned during the entire course. The second semester examination which was on speed only was administered immediately at the end of the fifteenth week after the completion of the fifth unit. This step was deemed necessary so as not to give room to any unexpected extraneous factors that could register their influence on the students' performance.

In order to ensure the objectivity of the tests, all the theory questions were objective tests and each correct

response attracted a mark or marks as indicated in the tests.

The objectivity of the speed tests was also ensured through strict compliance with the provisions of the marking scheme as shown on page 70.

The same writing materials were used by the students both in their classroom and tests. Every student was instructed to use pencil and reporter's notebook on Shorthand Speed Tests. This uniformity in the use of materials was necessary as a safeguard against undue individualistic complains and excuses on the part of the students.

Although the students were on certain occasions required to learn how to use typewriters for the transcription of their Shorthand notes, they were required to use biro pens in transcribing all the test. This posture was necessary since the study was not on typewriting generally nor was the researcher's emphasis placed on type-written transcription in particular. His focus was on hand-written transcription which usually goes along with theory learning and not typewritten transcription which emphasises mailability.

Syllabic intensity of 1.2 was used in all the passages read for the tests. The marking scheme for the Speed Tests was as recommended by the National Board for Technical Education (NBTE, 1989).

3.9.2 Marking Scheme for Shorthand Writing and Transcription

A. Major Errors: (Each calculated as 1 error):

(a) Omission of words(s);

(b) Addition of word(s);

(c) Superflous words penalised;

(d) Wrong spellings (except repetition of the same mis-spelling). The same mis-spelling penalised); but the repetitions of a word mis-spelt in a variety of ways must be penalised each as an error;

(e) Wrong placement of parts of business letter or memo e.g. Date, Salutation, Enclosure Notation, Improper Spaces between letters, words and punctuation signs.

B. Minor Errors: (each calculated as ½ error. Two (2) minor errors equal 1 major error.

(a) Wrong tense;

(b) Single for plural and vice versa;

(c) 'a' for 'the' and vice versa;

(d) Transposition of words;

(e) Omission or addition of articles;

(f) Root word, e.g. difficult for difficulty;

(g) Inadvertent omission of lines(s) where the Shorthand notes are quite legible;

(h) Where transcription is not completed, incomplete portion is charged as minor error.

C. Minor Errors with penalty ceiling: Penalise 1/4 for each error to a maximum of 2 errors.

(a) Faulty punctuation that affects the sense of the passage;

(b) Word capitalisation;

(c) Unintelligible and artibrary paragraphing (when a maximum of 2 errors penalty for 1,2,3 have been reached, other faults detected should be marked 'a.p.)'.

Number of errors should be shown in the left margin of the student's answer script. Major errors in the far left, minor ones closer to the margin.

SCORE CHART

Total Errors	Marks
0	100
1	98
2	96
3	94
4	92
5	90
6	88
7	86
8	84
9	82
10	80
11	78
12	76
13	74
14	72
15	70
16	68

SCORE CHART (CONT'D)

Total Errors	Marks
17	66
18	64
19	62
20	60
21	58
22	56
23	54
24	52
25	50
26	48
27	46
28	44
29	42
30	40
31	38
32	36
33	34
34	32
35	30
36	28
37	26
38	24
39	22
40	20
41	18
42	16
43	14
44	12
45	10
46	8
47	6
48	4
49	2
50	0

3.10 Data Analysis Technique

Four null hypotheses were formulated for this study and appropriate statistics chosen for the testing of these hypotheses. All hypotheses were tested at an alpha level of 0.05.

Hypotheses 1 and 2 were on lack of significant difference between variables under study and One-way Analysis of Variance (ANOVA) was used for testing these hypotheses.

Hypotheses 3 focused attention on relationship between the Speed Test Performance and Theory Test Performance of the morning students. Hypotheses 4 dealt with relationship between the Speed Test Performance and the Theory Test Performance of the afternoon students. In testing these latter hypotheses, Pearson's Product Moment Correlation along with t-test for test of significant relationship was used.

Lastly, all the four null hypotheses were subjected to further testing through the application of Mean.

Chapter 4

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

The purpose of this chapter is to provide empirical evidences for drawing conclusions. The analysis of data and interpretation of findings in this study were carried out on the basis of the post-tests administered in the course of the experiment. Results of the post-tests were collected and analysed in line with the four Null Hypotheses formulated for the study.

Total mean scores from all the post-tests were computed, analysed and used to test the four Null Hypotheses.

For the ascertainment of conviction in the results of the analyses with overall or total mean scores, detailed analyses of each of the post-tests were further carried out and conclusions drawn therefrom according to the decision rule.

4.2 Data Presentation, Analysis, Interpretation of Findings, and Conclusions

The Tables below are extracts from the Appendices and were used as the basis for the testing of the Hypotheses for the study;

TABLE 2

TABLE OF ANALYSIS OF VARIANCE BETWEEN PERFORMANCES OF MORNING AND AFTERNOON STUDENTS IN SHORTHAND SPEED

Sources of Variance	Sum of Squares	df	Variance Estimate	F-CAL	F-CRIT
Between Group	219771.1	1	5.52	0.002	3.84
Within Group	222562.0	158	2790.90		
T o t a l	442333.1	159	2769.42		

HYPOTHESIS 1: There is no significant difference in the mean performances of the morning and afternoon students in Shorthand Speed.

DECISION RULE: If F-Cal. > F-Crit., reject the H_0.
If F-Cal. < F-Crit., do not reject the H_0.

CONCLUSION: F-Cal. = 0.002: F-Crit. = 3.84
F-Cal. < F-Crit.

The table above shows the result of Analysis of Variance in respect of H_0.1. In the computation, Between Group and Within Group Sum of Squares of 219771.1 and 222562.0 were respectively found. Degrees of freedom for the two sources of variance stood at 1 and 158 respectively. Variance estimates of 5.52 and 2790:90 were respectively calculated for the sources of variance. The value of the computation (F-Cal.), stood at 0.002. At an alpha level of 0.05 and with degrees of freedom of 1 and 158, table value (F-Crit.) of 3.84 was got.

Going by the decision rule stated above, H_0.1 is not rejected. The implication here is that morning and afternoon students relatively perform equally in Shorthand Speed tests,

and that it is most probable that any observed difference is due to sampling error and not due to the effect of varied teaching periods. Simply stated, morning or afternoon period has no effect on the students' performance.

TABLE 3

TABLE OF ANALYSIS OF VARIANCE BETWEEN PERFORMANCES OF MORNING AND AFTERNOON STUDENTS IN SHORTHAND THEORY

Sources of Variance	Sum of Squares	df	Variance Estimate	F-CAL	F-CRIT
Between Group	247922.0	1	168.2	0.07	3.84
Within Group	247753.8	158	2398.0		
T o t a l	495675.8	159	2566.2		

HYPOTHESIS 2: There is no significant difference in the mean score performances of the morning and afternoon students in Shorthand Theory.

DECISION RULE: If F-Cal. > F-Crit., reject the H_0.
If F-Cal. < F-Crit., do not reject the H_0.

CONCLUSION: F-Cal. = 0.07: F-Crit. = 3.84
F-Cal. < F-Crit.

The table above shows the result of Analysis of Variance in respect of H_0.2. Sums of squares for the sources of variance stood at 247922.0 and 247753.8 while 1 and 158 respectively represented their degrees of freedom. Variance estimates in the computation were 168.2 and 2398.0 respectively for Between Group and Within Group sources of variance. The result of computation (F-Cal.) stood at 0.07 while 3.84 represented their table value (F-Crit.) at an alpha

level of 0.05. Degrees of freedom used were 1 and 158 for the two sources of variance.

Based on the provisions of the decision rule stated above, $H_0.2$ is not rejected. This implies that the performances of morning and afternoon students in Shorthand Theory tests are at the same level. The probability that any observed difference is again due to sampling error and not due to the effect of varied teaching periods is implied. Once again the inference is that morning or afternoon period has no effect on the students' performance.

TABLE 4

TABLE OF SIGNIFICANT RELATIONSHIP BETWEEN PERFORMANCES OF MORNING STUDENTS IN SHORTHAND SPEED AND THEORY - COMBINED POST-TESTS

Post-Tests 1 - 4	Alpha Level	df	r	T-Cal.	T-crit
	0.05	38	0.34	2.23	2.02

HYPOTHESIS 3: There is no significant relationship between the Speed Test Performance and the Theory Test Performance and the morning students.

DECISION RULE: If T-Cal. > T-Crit., reject the H_0.
If T-Cal. < T-Crit., do not reject the H_0.

CONCLUSION: T-Cal. = 2.23: T-Crit. = 2.02
T-Cal. < T-Crit.

The above table shows correlation co-efficient (r), the calculated value (F-Cal.) and table value (F-Crit.) using post-tests 1 - 4 together. The H_0 was first tested with Product Moment Correlation for relationship and later tested

with t-test for significant relationship. Co-efficient correlation (r) was 0.34, calculated value (T-Cal.) was at 2.03 while the table value (T-crit) was at 2.02. An Alpha level of 0.05 and degree of freedom of 38 were used in determining the table value (T-Crit.). Conclusion was based on the result of the test of significant relationship.

With T-Cal. of 2.23 > T-Crit. of 2.02, H_0.3 is rejected. This implies that there is significant relationship in the mean performances of the morning students in Speed and Theory tests. The explanation therefore is that the morning students who perform well in Speed tests also perform well in Theory tests and vice versa; and that it is most probable that it is the effect of the treatments the students received and not sampling error that accounts for the significant relationship.

TABLE 5

TABLE OF SIGNIFICANT RELATIONSHIP BETWEEN PERFORMANCES OF AFTERNOON STUDENTS IN SHORTHAND SPEED AND THEORY TEST - COMBINED POST-TESTS

Post-Tests 1 - 4	Alpha Level	df	r	T-Cal.	T-CRIT
	0.05	38	0.84	9.58	2.02

HYPOTHESIS 4: There is no significant relationship between the Speed Test Performance and the Theory Test Performance and the afternoon students.

DECISION RULE: If T-Cal. > T-Crit., reject the H_0.
If T-Cal. < T-Crit., do not reject the H_0.

CONCLUSION: T-Cal. = 9.58: T-Crit. = 2.02
T-Cal. > T-Crit.

The above table shows the result of t-test for significant relationship between the performance of afternoon students in Shorthand Speed and Theory tests. $H_0.4$ was tested for relationship with Pearson's Product Correlation and later subjected to test of significant relationship by using t-test. In testing $H_0.4$, scores from post-tests 1 - 4 on Shorthand Speed and Theory were used. Correlation Co-efficient of 0.84 was got while (T-Cal.) stood at 9.58. At an Alpha level of 0.05 and a degree of freedom of 38, table value (T-Crit.) of 2.02 was achieved. Conclusion drawn was based on the result of the test of significant relationship.

Using the above stated decision rule as the basis, $H_0.4$ is rejected. The implication therefore is that there is significant relationship in the mean performances of the afternoon students in Speed and Theory tests. This means that the afternoon students who perform well in Speed tests also perform well in Theory tests and vice versa.

TABLE 6

TABLE OF SIGNIFICANT RELATIONSHIP BETWEEN PERFORMANCES OF AFTERNOON STUDENTS IN SHORTHAND SPEED AND THEORY - EACH POST-TEST

	Alpha Level	df	r	T-Cal.	T-crit
Post-Test 1	0.05	38	0.47	3.72	2.02
Post-Test 2	0.05	38	0.33	2.28	2.02
Post-Test 3	0.05	38	0.41	3.05	2.02
Post-Test 4	0.05	38	0.24	1.53	2.02

HYPOTHESIS 3: There is no significant relationship between the Speed Test Performance and Theory Test Performance of the afternoon students.

DECISION RULE: If T-Cal. > T-Crit., reject the H_0.
If T-Cal. < T-Crit., do not reject the H_0.

CONCLUSION: T-Cal. = 3.72, 2.28, 3.05 and 1.53 for post-tests 1, 2, 3 and 4 respectively.
T-Crit. = 2.02 for the four post-tests.

The table above shows the result of the analysis of each post-test in respect of H_0.3., a design meant to check if each post-test has any effect on the H_0 which the combined post-tests analysis earlier done could not disclose. The H_0 was first tested with Pearson's Product Correlation for determination of relationship and later tested with t-test for significant relationship. Conclusion was based on the result of the test of significant relationship.

Drawing conclusion from the decision rule applied in the analysis, H_0.3 is rejected in respect of post-tests 1 - 3 while it is not rejected in respect of post-test 4. The deduction therefore is that afternoon students who perform well or badly in Speed tests also register corresponding performance in Theory tests without attributing the probability of such events to sampling error but to the treatments the students received. In connection with post-test 4, the connotation is that it is most probable that poor or good performance students in Speed tests may not necessarily be poor or good performance students in Theory tests and vice versa. Furthermore, it implies that afternoon

students' performance in Speed tests is independent of their performance in Theory tests with the effect of sampling error recognized as the major influencing factor for the outcome.

TABLE 7

TABLE OF SIGNIFICANT RELATIONSHIP BETWEEN PERFORMANCES OF MORNING STUDENTS IN SHORTHAND SPEED AND THEORY - EACH POST-TEST

	Alpha Level	df	r	T-Cal.	T-CRIT
Post-Test 1	0.05	38	0.76	7.20	2.02
Post-Test 2	0.05	38	0.62	4.48	2.02
Post-Test 3	0.05	38	0.57	5.52	2.02
Post-Test 4	0.05	38	0.09	0.56	2.02

HYPOTHESIS 4: There is no significant relationship between the Speed Test Performance and Theory Test Performance of the morning students.

DECISION RULE: If T-Cal. > T-Crit., reject the H_0.
If T-Cal. < T-Crit., do not reject the H_0.

CONCLUSION: T-Cal. = 7.20, 4.48, 5.20 and 0.56 for post-tests 1, 2, 3 and 4 respectively.
T-Crit. = 2.02 for the four post-tests.

The above table shows the result of the analysis of each post-test in respect of H_0.4, a design used to ascertain each post-test's effect on rejecting or not rejecting the H_0. Testing of the H_0 was done with Pearson's Product Correlation to determine relationship and later with t-test to determine significant relationship. Conclusion was based on the result of the test of significant relationship.

Using the decision rule stated above as the basis, H_0.4

is rejected in respect of post-tests 1 - 3 while it is not rejected in respect of post-test 4. The implication is that there is significant relationship between Speed and Theory tests of the morning students when considering post-tests 1 - 3. The deduction that arises is that it is most probable that the effect of the treatments given to the students and not the effect of sampling error accounts for the significant relationship since the students' performances in both Speed and Theory tests are correspondingly at par.

As it happened in the analysis of post-test 4 for the morning students in relation to $H_0.3$, the analysis of post-test 4 for the afternoon students in relation to $H_0.4$ shows a non-significant relationship between Speed Test Performance and Theory Test Performance by the afternoon students. This occurrence connotes that the quality of students' performance in Speed test is independent of the quality of the students' performance in Theory test. Simply stated, good or bad performance students in Speed test may not necessarily be good or bad performance students in Theory test.

TABLE 8

TABLE OF MEAN SCORES IN POST-TESTS ASSOCIATED WITH HYPOTHESES 1 AND 2

Hypothesis	Post-Test	Type of Test	MSM*	MSA**
$H_0.1$	1-5 (combined)	Speed	52.68	52.15
$H_0.2$	1-5 (combined)	Theory	57.10	54.20

* Mean Score for Morning Students.

** Mean Score for Afternoon Students.

The above table shows further analysis of data in relation to $H_0.1$ and $H_0.2$. Mean was used in the analysis. Morning students had higher Mean Scores of 52.68 and 57.10 in Speed and Theory tests respectively as against the afternoon students Mean Scores of 52.15 and 54.20 in Speed and Theory tests respectively. By this outcome, $H_0.1$ and $H_0.2$ are rejected since the rejection implies the existence of significant difference between morning and afternoon students in Speed and Theory tests.

TABLE 19

TABLE OF MEAN SCORES IN POST-TESTS ASSOCIATED WITH HYPOTHESES 3 AND 4

Hypothesis	Post-Test	Students	MSS*	MST**
H0.3	1-4 (Combined)	Morning	52.75	57.10
	1 only		48.40	56.68
	2 only		50.00	56.18
	3 only		53.60	57.30
	4 only		50.40	58.10
H0.4	1-4 (Combined)	Afternoon	52.15	54.65
	1 only		50.90	55.38
	2 only		49.30	51.45
	3 only		50.03	52.53
	4 only		54.60	55.93

* Mean Scores for Speed Test.

** Mean Scores for Theory Tests.

The above table shows further analysis of data in respect of $H_0.3$ and $H_0.4$. The statistics used in the analysis was the Mean. Comparing the morning and afternoon students' scores in Speed tests, morning students were higher by three Mean Scores (52.75, 50.00 and 53.60) than afternoon students while afternoon students were higher than morning students by two Mean Scores (50.90 and 54.60). In respect of Theory tests, the morning students showed superiority in all the Mean Scores. By these results, $H_0.3$ and $H_0.4$ are not rejected since no significant relationship between the morning and afternoon students in both Speed and Theory tests is implied.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter contains Re-statement of the Problems, Description of the Procedure Used, Summary of Findings, Conclusions, Recommendations and Suggestions for Further Research.

5.2 Re-statement of the Problems

Shorthand is taught for long but irregular hours in many tertiary institutions while in some, the periods for the subject are short and also irregular (Leo, 1991). Depending on the type of institution, Shorthand is at times taught either in the morning, afternoon or evening. While some institutions allocate to Shorthand one hour, others allocate thirty, forty-five minutes or two-hour period either in the morning or in the afternoon (Myrtle, 1973). Those mostly affected by these varied periods are the students (Mbabah, 1982). This study therefore aimed at finding out which among the above named modalities is best suited for the learning and teaching of Shorthand for improved performance by Shorthand learners and teachers.

5.3 Description of the Procedure Used

Primarily, the study aimed at determining whether morning or afternoon period was conducive for teaching and learning Shorthand for good performance by both the teacher and the students.

The study is experimental in nature. The researcher used all the 80 students of 1994/95 OND students of Secretarial Studies from Akwa Ibom State Polytechnic, Ikot Ekpene as both the population and the sample because of the relative fewness of the number of the students used for the study.

The sample was randomized into Groups A and B, the former and the latter representing morning and afternoon periods respectively. A three-week interval teaching and post-tests spread over fifteen weeks were carried out. Before the tests were administered, the test instruments were validated and reliability test conducted to determine the co-efficient of internal consistency which was 0.75 for this study.

Students' scores from the post-tests were collected for analysis and drawing of conclusions.

The study had four research questions from which four null hypotheses were drawn and tested. The statistics used to analyse the data (students scores) were Analysis of Variance (ANOVA), Pearson's Product Correlation along with t-test for test of significant relationship between dependent and independent variables, and Mean. An alpha level of 0.05 was used to test all the hypotheses.

5.4 Summary of Findings

After careful statistical analysis of data at an alpha level 0.05, the following findings were obtained:

No significant different existed between the mean performance of the morning and afternoon students in Speed tests as measured by Analysis of Variance (ANOVA). This Finding is in contrast with Mbabah (1982) which recorded significant difference in performance between the morning and afternoon students. However, by using Mean for further testing of hypotheses 1 and 2 as the major H_0, the extent of significant difference between the two groups of students was recorded in conformity with Mbabah (1982).

As measured by Pearson's Product Moment Correlation, significant relationship existed between the Speed Test Performance and Theory Test Performance of the morning students in relation to $H_0.3$ when post-tests 1 - 3 were considered.

There was no significant relationship between the Speed Test and Theory Test Performances of the morning students in post-test 4 in relation to $H_0.3$.

Furthermore, there was significant relationship between the Speed Test and Theory Test Performances of the afternoon students in relation to $H_0.4$ when post-tests 1 - 3 were analysed as measured by Product Moment Correlation.

In post-test 4 and in relation to $H_0.4$, a non-significant relationship existed as measured also by Pearson's Product

Moment Correlation. The existence and non-existence of significant relationship in relation to $H_0.3$ and $H_0.4$ are in conformity with (Geotz, 1966 and Roberton, 1969) whose principal findings were that significant relationship existed between their experimental subjects in Theory Tests different periods of the day notwithstanding while non-significant relationship was recorded in Speed Tests mainly in the afternoon periods.

Morning and afternoon students perform better in Theory Tests than in Speed Tests while morning students also perform better than afternoon students both in Speed and Theory Tests.

Lastly, in relation to all the four null hypotheses, 10 (71.40%) out of 14 Mean Scores were in favour of morning period while 4 (28.60%) favoured afternoon period.

5.5 Conclusions

Based on the findings of this study, it is concluded that different periods of the day and how short or long lecture periods are affect learning and teaching of Shorthand.

Since most of the Mean Scores of the morning students' performances in Speed and Theory Tests are higher than the Mean Scores of the afternoon students' performances in Speed and Theory Tests, the conclusion that morning periods are more conducive than afternoon periods in learning and teaching Shorthand is drawn.

Also, based on the findings of this study, it is concluded that the students' poor performance in Speed Tests is not caused by the effect of the period of the day since both the morning and the afternoon students comparatively perform poorly in Speed tests than in Theory tests.

It is also concluded that the students good performance in Theory tests is quite independent of the effect of the period of the day since both the morning and afternoon students perform relatively well in Theory tests than in Speed tests.

5.6 Recommendations

Based on the findings of this study, the following recommendations are made:

Teachers and students alike should be made by school authorities to make good use of the morning periods in learning and teaching Shorthand. This could be done by reflecting the subject for the morning periods in the school or departmental time-table.

Teachers should look into the causes of students' poor performance in Shorthand Speed Tests, and also design appropriate teaching strategies to get rid of such causes.

There is need to find out other causes apart from conducive period for students' good performance in Theory tests in order to maintain or improve upon the students' level of performance and the teachers' teaching inputs.

5.7 Suggestions for Further Research

The following areas are suggested for further research:

1. Determination of whether poor students in Shorthand Speed who cannot function as secretaries can function as good Shorthand teachers;

2. Determination of whether or not high rate Shorthand writers will make more errors than slow writers;

3. Determination of whether gender affects students' performance in Shorthand.

References

Adams, J.A. (1952) 'The Warm-Up-Decrement in Performance on Pursuitroter', American Journal of Psychology, Vol.65, pp.404-414.

Adams, J.A. (1971) 'A Closed-Loop Theory of Motor Behaviour', Journal of Experimental Psychology, Vol.3, p.215.

Adams, J.A. and Reynolds, B., (1954) 'Effect of Shift in Distribution of Practice Conditions Following Interpolated Rest', Journal of Experimental Psychology, Vol.47, p.112.

Allan, L.G. (1976) 'Is there a Constant Minimum Perceptive Duration?', Journal of Experimental Psychology, Vol.28, pp.71-76.

Ammons, R.B. (1947) 'Acquisition of Motor Skill, Rotary Pursuit Performance with Continuous Practice Before and After a Single Rest', Journal of Experimental Psychology, Vol.37, pp.393-399.

Ammons, R.B. (1951) 'The Effect of Distributed Practice on Rotary Pursuit', Journal of Experimental Psychology, Vol.41, pp.205-209.

Anderson, R.I. (1972). 'Changing Methods of Teaching Business Subjects', National Business Education Year Book, Vol. 10, p.102.

Anderson, V.E. (1965). Principles and Procedures of Curriculum Improvement, the Ronald Press Co., N.Y., p.79.

Andrey, N,. and Nicholas, H. (1972). Developing a Curriculum: A Practical Guide, George Allen and Union Ltd., London, 81.

Atkinson, R.C. and Shiffrin, R.M.L. (1968). Human Memory: A Prosed System and Its Control Processes, Academic Press, N.Y., pp.91-93.

Ausubel, D.P. and Robinson, F.G. (1969). School Learning: An Introduction to Education Psychology, Holt Rine-hart and Winston Inc., N.Y., p.287.

Babits, M. and Keys, N. (1939). 'Teaching Pupils to Apply Scientific Principles', Science Education, Vol.23, p.67.

Baddelly, A.D. Ecop, J.R. (1973). 'Reaction Time and Short Term Memory': Implication of Repetition Effects for High Level Performance', Quarterly Journal of Experimental Psychology, Vol.25, p.229.

Baines, W.E. (1962). An Experimental Study to Determine the Effects of Various Practice Period Patterns on the Achievement Levels of two Motor Skills: An Unpublished Doctor of Philosophy Thesis, Boston University, p.19.

Bell, H.M. (1941). 'Rest Pauses in Motor Learning as Related to Snoddy's Hypothesis of Mental Growth', Psychology Monograph, Vol.54, p.42.

Blair, G.M. Jones, R.S. and Simpson, R.H. (1968). Educational Psychology, MacMillan Publishing CO. Inc., N.Y., p.239.

Bloom, B.S. (1969). Taxonomy of Educational Objectives: Cognitive Domain, David and Kckay, N.Y., p.30.

Bloom, B.S., Hasting, J.T. and Madam, F.G., (1971). Handbook on Formative Evaluation of Students. McGraw-Hill Book Co., p.40.

Bourne, L.E. (Jr,) and Estrand, B.R. (1973). Psychology: Its Principles and Meanings, the Dryden Press, N.Y., p.91.

Brand, H. and Woods, P.J. (1958). 'The Organisation and Repetition of Verbal Material', Journal of Genetic Psychology, Vol.58, p.127.

Briggs, G.E. (1957). 'Retroactive Inhibition as a Function of A Degree of Original and Interpolated Learning', Journal of Experimental Psychology, NO.53, pp.60 & 67.

Brooks, J.E. (1975). Basics of Time-Tabling, Wardlock Educational and Open University Press, Chicago, p.250.

Bunch, M.E. (1936). 'The Amount of Transfer in Rational Learning as a Function of Time', Journal of Comparative Psychology, Vol.25, p.61.

Bunch, M.E. and McGraven, J. (1938). 'Temporal Cause of Transfer in the Learning Memory Material', Journal of Comparative Psychology, Vol.25, p.61.

Bunch, M.E. and Lang, E.S. (1939). 'The Amount of Transfer of Training from Partial Learning After Varying Intervals of Time', Journal of Comparative Psychology, Vol.25, p.19.

Cains, L.F. and Willey, R. (1939). 'The Effects of Spaced Learning on the Curve of Retention', Journal of Experimental Psychology, Vol.25, p.39.

Callaway, C.R. (1968). 'The Effect of Five Different Approaches in Teaching Overhead Throw for Accuracy to Junior High School Girls': An Unpublished Master's Degree Thesis, University of North Caromina, p.66.

Canning, B.W. (1976). 'Learning Shorthand', Education and T raining, Vol.18, NO.6, p.73.

Canning, B.W. (1977). Teaching Office Skills, Pearson-Pitman Publishers Inc., California, p.109.

Chang, T.M. and Chang, V.A. (1967). 'Relationship of Visual Motor Skills and Reading Achievement', Perceptual Motor Skills, NO.24, p.60.

Child, Dennis (1968). Psychology and the Teacher, Holt Rinehart and Winston, London, pp. 154-155.

Chisson, B.S. (1971). 'A Factor Analytic Study of Relationship of Motor Factors to Academic Criteria for First and Third Grade Boys', Child Development, NO.42, p.38.

Clark, L.L., Landsford and Dallenback, (1960). 'Repetition and Associative Learning, American Journal of Psychology, NO.73, pp.207-221.

Cobane, E. (1960). A Comparison of Two Methods of Teaching Selected Motor Skills: An Unpublished Doctoral Thesis, Syracuse University, p.51.

Cole, L.E. and Bruce, W.F. (1950). Educational Psychology, World Book Co., N.Y., p.397.

Colville, F.M. (1957). 'The Learning of Motor Skills as Influenced by Knowledge of Mechanical Principles' Journal of Educational Psychology, Vol. 48, p.72.

Cook, T.W. (1937). 'Distribution of Practice and Size of Maze Pattern', British Journal of Psychology, Vol.27, p.91.

Cox, J.W. (1933). 'Formal Training in the Acquisition of Skills', British Journal of Psychology, NO.24, p.42.

Craik, F.I.M. and Lockhart, R.S. (1972). 'Levels of Processing': A Framework for memory Research, Journal of Verbal Learning and Verbal Behaviour, NO.11, p.606.

Crank, D.H. Anderson, R.T. and Peterson, J.C. (1982). Methods of Teaching Shorthand Land Transcription, Gregg Division and McGraw-Hill Book Co., N.Y., p.78.

Cratty, B.J. (1964). Teaching Motor Skills, Prentice-Hall Inc., Eaglewood Cliffs, N.Y., p.59.

Cronbach, L.J. (1954). Educational Psychology, Holt Rinehart and Winston, London, p.355.

Curson, L.B. (1977). Teaching in Further Education: An Outline of Principles and Practice, Cassel and Co. Ltd., London, p.941.

Danielson, H.A. (1959). The Relationship Between Competency in Shorthand Vocabulary and Achievement in Shorthand Dictation. An Unpublished Ph.D. Thesis, Bloomington, Indiana University, p.50.

Davis, E.C. and Willis, E.L. (1962). Toward Better Training in Physical Education, Prentice-Hall Inc., N.Y., P.114.

Dececco, J.P. (1963). Human Learning in the School, Holt Rinehart and Winston Inc., London, p.47.

Denny, M.R., Allard, M. Hall E., and Rokeach M. (1960). 'Delay of Knowledge of Results, Knowledge of Task and Internal Interval', Supplementary Report, Journal of Experimental Psychology, NO.60, p.327.

Dudychia, J.G. (1963). Applied Psychology, the Ronald Press, N.Y., p.42.

Duncan, C.D. (1951). 'Effects of unequal Amounts of Practice on Motor Learning Before and After Rest, Journal of Experimental Psychology, No. 42. pp.257-264.

Estes, W.K. (1960). 'Learning Theory and New Mental Chemistry', Psychology Review, NO. 67, pp.22-32.

Estrand, B.R. Wallace, W.F. and Underwood, B.J., (1966). 'High Frequency Theory of Verbal Discrimination Learning', Psychology Review, NO.73, p.566-578.

Farley, W.E. (1967). The Effects of Instruction and Use of a Mechanical Device Based Upon a Scientific Principle as Applied to Basket Ball Shooting. An Unpublished Ph.D. Thesis, Colorado State University, p.33.

Farrant, J.S. (1976). Principles and Practice of Education, Longman Group Ltd., London, p.94.

Fieshman, E.A. and Parker, J.A. (1962). 'Factors in the Retention and Relearning of Perceptual Motor Skill', Journal of Experimental Psychology, Vol.69, p.132.

Finch, A.U. (1971). 'Contributions of Research to Business Education, National Business Education Year Book, NO.9, p.283.

Fisher, D.F. (1971). 'The Effects of Delayed Interval on World Recall and Clustering', Journal of Psychology, Vol.77, p.153.

Fishman, E.J. Keller, L. and Atkinson, R.C. (1968). Massed Versus Distributed Practice in Computerized Spelling Drills', Journal of Educational Psychology, Vol.59, pp.290-296.

Fitts, P.M. and Posner, M.I. (1967). Human Performance, McGraw-Hill Book Co. Inc., California, p.29.

Frandsen, A.N. (1957) How the Child Learns: An Educational Psychology, McGraw-Hill Book Co. Inc., N.Y., p.160

Frandsen, A.N. (1961) Principles of Learning in Teaching, McGraw-Hill Book Co., N.Y., P.145.

Fryer, D.H. and Edgerton, H.A. (1950) 'Research Concerning Off-the-job-training', Personnel Psychology, Vol.3, pp. 262-284.

Gagne, R.M. (1973). 'The Domains of Learning', Interchange, Vol.3, pp.1-8.

Gagne, R.M. (1977). The Conditions of Learning (3rd Ed.), Holt Rinehart and Winston Co., N.Y., P.120.

Garrison, K.C., Kingston, A.J. and McDonald A.S. (1955). Educational Psychology, (2nd Ed.), Appleton, Century-Crofts, p.115.

Gartside, L. (1970). Teaching of Business Subjects, McDonald and Evans, Belmont, p.155.

Gates, A.I. Jersild, A.T., McConnel, T.R. and Challman, R.C. (1948). Educational Psychology, (3rd. Ed.), McMillan Co Inc., N.Y., p.379.

Gibson, J.J. and Gibson, E.J. (1955). 'Perceptual Learning', Psychology Review, Vol.62, pp.32-41.

Glanzer, M. and Cunitz, A.R. (1966) 'Two Storage Mechanism in Free Recall', Journal of Verbal Learning and Verbal Behaviour, Vol.62, pp.351-360.

Goetz, L. (1966). The Relationship Between Symbol Mastery and Selected Dictation Speed, in Gregg Short-hand. An Unpublished Ph.D. Thesis, Grand Forks, University of North Dakoto, p.56.

Graves, O.C. (1963). The Effects of Initial Tsting and Knowledge of Mechanical Principles Upon the Performance of a Motor Skill. An Unpublished Doctoral Thesis, Colorado State University, p.48.

Halverson, L.E. (1949). A Comparison of Three Methods of Teaching Motor Skills, An Unpublished Master's Thesis, University of Wisconsin, p.29,

Harmon, J.M. and Miller, A. (1950). 'Time Patterns in Motor Learning', Research Quarterly, Vol.21, pp.182-186.

Harms, H. and Stehr, B.W. (1963). Methods in Vocational Business Education, (2nd Ed.), South-Western Publishing Co., N.Y., p.46.

Harrison, A.A. (1968). 'Response Competition, Frequency and Exploratory Behaviour', Journal of Personality and Social Psychology, Vol.30, p.113.

Henddickson, G. and Schroeder, W.H. (1952). 'Transfer of Training in Learning to Hit a Submerged Target', Journal of Educational Psychology, Vol.9, p.51.

Hendrix, G. (1974). 'A New Clue to Transfer of Learning', Elementary School Journal, Vol 48, p.39.

Hilgard, E.R. and Smith, M.B. (1942). 'Distributed Practice in Motor Learning': Score Changes Within and Between Daily Sessions, Journal of Experimental Psychology, Vol. 22, pp.136-146.

Hosford, P.L. (1975)/ 'The Role of Theory in Instruction', Educational Leadership, Vol.32, NO.6, p.379.

Howland, C.I. (1938). 'Experimental Studies in Rote Learning Theory', Journal of Experimental Psychology, Vol.22,pp. 201-224.

Irion, A.L. (1968). Acquisition of Skill, Academic Press, N.Y., p.603.

Jones, P.D. and Holding, D.H. (1975). 'Extremely Long Term Persistence of the McCollough Effect': Human Perception and Performance, Journal of Experimental Psychology, Vol.1, pp. 323-324.

Kanu, I.N. (1991). 'Difficulties and Problems in Learning Shorthand as Identified by Learners and Teachers of Shorthand', Business Education Journal, Vol.2, NO.3, Sept., p.49.

Katona, G. (1940). Organising and Memorising, Columbia University Press, N.Y., p.60.

Kerlinger, F.N. (1977). Foundation of Behavioural Research, Holt and Winson, N.Y., p.333.

Kientzie, K.J. (1949). 'Ability Patterns Under Distributed Practice', Journal of Experimental Psychology, Vol.39, p.142.

Koffka, K. (1935). Principles of Gestalt Psychology, Harcourt Brace and Jovannavice Inc., Maryland, p. 106.

Kozman, H.C., Cassidy R. and Jackson, C.O. (1958). Methods in Physical Education, (3rd Ed.), Saunders Co. Inc., London, p.76.

Krueger, W.A. (1929). 'The Effect of Overhearing Upon Retention', Journal of Educational Psychology, Vol.12, pp.71-79.

Leith, G.O., Biran, L.A. and Opollot, J.A. (1969). 'The Place of Review in Meaningful Verbal Learning', Canadian Journal of Behavioural Science, Vol., p.64.
Leo, U. (1991). "Research in Teaching and Learning Transcription", Business Education Journal, Vol.11, NO.3, p.75.

Leo, U. (1991) "Research in Teaching and Learning Transcription", Business Education Journal, Vol.11, NO.3, p.75.

Lorge, I.L. (1930). 'The Influence of Regularly Interpolated Time Intervals Upon Subsequent Learning', Teachers' College Contribution to Education, Vol.6, p.114.

Madsen, C.H., Becker, W.C. and Thomas, D.R. (1968). 'Rules, Praise and Ignoring Elements of Classroom Control', Journal of Applied Behaviour Analysis, Vol.2, p.12.

Mandler, G. (1967). Organisation and Memory, Academic Press, N.Y., p. 103.

Mass, B.M. and Vanghan, J.A. (1966). Training in Industry: The Management of Learning, Brooks and Cole Publishing Co., California, p. 48.

Mbabah, N.U. (1982). The Effect of Practice Distribution Schedule on Cognitive and Psychomotor Elements in Shorthand Learning. An Unpublished Doctoral Dissertation, University of Nigeria, Nsukka, p.176.

Melton, A.W. (1964). 'The Science and the Technology of Educational Method', Harvard Education Review, NO.30, p. 53.

Meunier, C.F., Ritz, D. and Meunier (1972). 'Rehearsal of Individual Items and Short Term Memory', Journal of Experimental Psychology, NO.95, pp. 534 and 542.

McGehee, W. (1949). Current trends in Industrial Psychology, University of Pittshurge Press, Pittsburge, p.62.

McGeoch, J.A and Irion, A.L. (1952). The Psychology of Human Learning, (2nd Ed.), Longman and Green, N.Y., p.242.

McKensie, G.N. (1971). Curriculum Change, Participants, Powers and Processes, Columbia, N.Y., p. 402.

Mikessell, D.J. (1971). The Effect of Practice Distribution on Mechanical Principles Centred Instruction on the Acquisition of Badminton Skills. An Unpublished Master's Thesis, University of Illinois, p.33.

Mohr, D.R. and Barret, M.E. (1962). 'Effect of Knowledge of Mechanical Principles in Learning to Perform Intermediate Swimming Skills', Research Quarterly, NO.5, p.18

Murdock, B.B. (Jr.) (1962). 'The Serial Position Effect in Free Recall', Journal of Experimental Psychology, No. 24, pp.482-488.

Mursell, J.L. (1952). Psychology in Modern Education: What Happens When We Learn, W.W. Norton and Co., Inc., N.Y., p.299.

Myrtle, I.H. (1973). "Providing Students with office-level Shorthand skill" Business Education Forum, Vol.28, NO.3, p.33.

National Board for Technical Education (1989). Curriculum and Course Specifications, Atman Ltd., Kaduna, Nigeria.

Nolan, C.A., Hayden C.K. and Malsbary, D.R. (1967). Principles and Problems of Business Education, (3rd Ed.), South-Western Publishing Co., pp.231-232.

Ochs, Rene (1974). 'Some Implications of the Concept of Life-long Education for Curriculum Development and Evaluation': A Seminar Paper on Evaluation of Quantitative Aspects of Education, International Institute of Educational Planning, Paris, p.65.

Olander, J.H. (1931). 'Transfer of Learning in Simple Addition and Subtraction', Elementary School Journal, Vol. 32, p.56.

Oseas, L. and Underwood, B.J. (1952). 'Studies of Distributed Practice in Learning and Retention of Concepts', Journal of Educational Psychology, Vol.43, pp. 145-148.

Osuala, E.C. (1981). Business Education: Principles and Practice, Nishkan Press, Meerut, India, p.185.

Overman, J.R. (1930). 'Studies of the Effect of Methods of Instruction of Transfer of Training in Arithmetic', Elementary School Journal, NO.31, p.39.

Papcsy, P.E. (1969). The Effect of Understanding a Specific Mechanical Principles Upon Learning a Physical Education Skills. An Unpublished Ph.D. Thesis, New York University, p.55.

Pitman, Isaac (1936). Pitman New Era Shorthand New Course, Pitman Publishing Ltd., London, p.14.

Postman, L. (1961) 'Retention as a Function of a Degree of Overlearning', Science, NO.135, pp.666-667

Postner, M.I. and Keele, S.W. (1973). Skill Learning in Second Handbook of Research on Teaching, College Publishing Co., Chicago, p.805.

Poulon, E.C. (1968). Tracking Behaviour in Acquisition of Skill, Academic Press, N.Y., p.402.

Preston, E.C. (1959). Teaching Study Habits and Skills, Holt Rinehart and Winston, Chicago, p.45.

Prince, D.J. (1969). An Experiment Comparing the Achievement in Transcription of Students when the 500 Most Used Words were Emphasized with the Achievement of Students when these words were not Emphasized in Beginning Shorthand. An Unpublished Master's Thesis, University of Maryland, p. 25 and p. 27.

Pullis, J.M. (1966). The Relationship Between Competency in Shorthand Accuracy and Achievement in Shorthand Dictation. An Unpublished Ph.D. Thesis, Denton North, Texas State University, p.44.

Pullis, J,M, (1966). 'The Effect of Length of Shorthand Test on Shorthand Achievement', National Business Education Year Book, Vol.10, p.44.

Pyle, W.H. (1914). 'Concentrated Versus Distributed Practice', Journal of Educational Psychology, NO.5, pp. 247-251.

Ragsdale, C.E. (1950). 'How Children Learn the Motor Types of Activities', National Society for the Study of Education Year Book, NO.49, University of Chicago Press, p.38.

Reed, H.B. (1924). 'Distributed Practice in Action', Journal of Educational Psychology, NO.15, pp. 248-249.

Reynolds, B. and Adams, J.A. (1953). 'Effects of Distributive and Shift in Distribution of Practice Within a Single Training Session', Journal of Experimental Psychology, Vol. 46(b), pp.137-145.

Reynold, B. and Glazer, R. (1964). 'Effects of Repetition and Spaced Review Upon Retention of a Complex Learning Task', Journal of Educational Psychology, Vol.55.

Richey, R.W. (1958). Planning for Teaching: An Introduction to Education, McGraw-Hillbook Co. Inc., N.Y., p.256.

Riggs, L.A., While, K.D. and Rimas, P.D. (1970). 'Establishment and Delay of Orientation-Contingent After-effects of Colour Perception', Psychophysics, NO.16, pp. 534-542.

Roberton, J.A. (1969). The Effect of Varying Short-time Intervals Between Repetitions Upon Performance of a Motor Skill. An Unpublished Ph.D. Thesis, University of Southern California, p.121.

Rock, I. (1957). 'The Role of Repetition in Associative Learning', American Journal of Psychology, Vol. 8, pp. 186-193.

Rock, I. and Heimer, W. (1959). 'Evidence on One Trial Associative Learning', American Journal of Psychology, Vol. 7, pp.1-16.

Rundus, D. (1971). 'Analysis of Rehearsal Processes in Free Recall', Journal of Experimental Psychology, No. 89, pp. 66-67.

Rundus, D. and Atkinson, R.C. (1970). 'Rehearsal Process in Free Recall': A Procedure for Direct Observation, Journal of Verbal Learning, NO.9, pp. 99-105.

Rundus, D,m Loftus, G.R. and Atkison, R.C. (1970). 'Immediate Free Recall and Three-Week Delayed Recognition', Journal of Verbal Learning and Verbal Behaviour, No. 9, pp. 684-688.

Singer, R.N. (1975). Motor Learning and Human Performance: An Application to Physical Education Skills, (2nd Ed.), McMillan Publishing Co. Inc., N.Y., p. 22.

Singer, R.N. and Brunk, J.W. (1967). 'Relation of Perceptual Motor Ability and Intellectual Ability in Elementary School Children, Perceptual and Motor Skills, NO.24, p.49.

Smith, B.O., Stanley, W.O. and Shores, J.H. (1957). Foundation of Curriculum Development, Harcourt Brace and World Inc., N.Y., p.106.

Smith, E.D. (1961). The New Phonographic Phrase Book, Isaac Pitman and Sons Ltd., N.Y., p.41.

Snoddy, G.S. (1935). Evidence for Two Opposed Process in Mental Growth, Science Press, Lancaster, p.104.

Starch, D. (1912). 'Periods of Work in Learning', Journal of Educational Psychology, NO.8, pp.203-213.

Stephen, J.M. (1966). The Psychology of Classroom Learning, Holt Rinehart and Wonston Inc., N.Y., p.208

Taba, H. (1962) Curriculum Development, Theory and Practice, Harcourt, Brace and World Inc., N.Y., p.343.

Thyne, J.M. (1966). The Psychology of Learning and Techniques of Teaching, University of London, p.196.

Toth, J. (1969). The Effect of Knowledge of Mechanical Principles of Transfer of Learning Selected Gymnastic Movement. An Unpublished Doctoral Thesis, Colorado State University, p.44.

Travis, R.C., (1939). 'Length of Practice Period and Efficiency in Motor Learning' Journal of Experimental Psychology, NO.29, pp.339-345.

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Tsao, J.C. (1948). 'Studies in Spaced and Massed Learning', Journal of Experimental Psychology, Vol.2, pp.29-36.

Tuckman, B.W. (1968). Structural Analysis as an Aid to Curriculum Development, No.1, Post-Graduate Seminar, Graduate School of Education, Ritgers, p.45.

Tyler, R.W. (1949). Basic Principles of Curriculum and Instruction, University of Chicago Press, Chicago, pp.133.

War, P.B. (1964). 'The Effects of Repetition of Items on Two Phases of Paired Associate Learning', Quarterly Journal of Experimental Psychology, NO.16, pp. 224-231.

Watson, G. (1946). What Psychology Can We Trust in Learning?, Haper and Row Co. Inc., N.Y., p.89.

Waugh, N. and Norman, D.A. (1965). 'Primary Memory', Psychology Review, NO.72, pp.87-104.

Welborn, E.L. and English, H. (1937). 'Logical Learning and Retention', General Review of Experiments with Meaningful Verbal Material, Psychology Bulletin, NO.34, pp.1-20.

Welford, A.T. (1968). The Fundamentals of Skills, McThuen and Co. Ltd., London, p.31.

West, L.J. (1973). Research on Teaching Business Subjects, Rand McNally College Publishing Co., Chicago, p.18.

Wheeler, R.H. and Perkins, F.T. (1932). Principles of Mental Development, Cromwell Publishing Co., N.Y., p.66.

Wheeler, D.K. (1979). Curriculum Process, Unibook Hodder and Stroughton, London, p.30.

Wilson, J.F. (1949). 'The Formation and Retention of Remote Association in Rote Learning', Journal of Experimental Education, NO.39, pp.830-838.

Wright, S.T.H. and Taylor, D.W. (1949). 'Distributed Practice in Verbal Learning and Maturation Hypothesis', Journal of Experimental Psychology, NO.39, pp.527-531.

Zajone, R.B. (1968). 'Attitudinal Effects of Mere Exposure', Journal of Personality and Social Psychology, Vol.9, NO.2, p.94.

APPENDIX I

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 1 - SPEED (PASSAGE 1)
(60 W. A. M.)

Dear Sir,

During the month of April we proposed to increase the prices of a/ number of the items at present in the catalogue. The increases are necessary because / / the higher costs we now have to absorb. If your branch is going to issue /// a new catalogue, you should not proceed with it until you have the new prices.//// Please remember that you must not issue your list until we post you the / prices.

In April, we brought out a new series of history books. The series is// for use in forms two to six. These books solve many problems for the teacher///. They treat the subject in a bright, practical way, and we think you will agree//// that the series gives a new and better approach to the subject.

With your present / heavy programme, the books should enable you to make the greatest progress with your classes//. If you would care to inspect the books, we should be glad to despatch copies /// to you. If you would give the books a trial. we know you would be //// delighted with the results.

Yours truly,

S.I. = 1.2

APPENDIX II

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 1 - SPEED (PASSAGE 2)
(60 W. A. M.)

Our records show that you have not purchased anything in this store for some time/. We regard this as most unfortunate, for we value your patronage highly. We hope that // it is not due to some unsatisfactory purchase or to some lack of proper service///. We wish to give you services strictly in accordance with your desires.

Several members of//// the college expressed the belief that it was absolutely necessary to include an extra course/ in this subject. Our industry prospers because of the direct methods we employ with our // customers. We tell them only the truth when we describe our products.

I think that we should take the proper steps to bring about the passage of those bills relating//// to labour problems, and I believe that care should be exercised by all not to / obstruct this. It is equally true that the recent decreases in the prices of cheaper // fabrics are expected to result in increased sales.

Since you have expressed a desire to /// know something of our silk blouses and dresses, we take the liberty of inviting you to visit our offices and salesroom at the//// headquarters of our company. We shall be pleased to show you

examples of our styles for this season. Our designs avoid all extremes in styles without any loss of charm.

S.I. = 1.2.

APPENDIX III

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 2 - SPEED (PASSAGE 1)
(65 W. A. M.)

A man who wished to employ a safe driver asked each applicant how near he could / drive a car to the edge of a cliff. One said a foot; a second said // six inches. The third did not know. He had not tried. He got the job.

You will /// see from the enclosed statement of your account that settlement is very much overdue. When the //// shipment was sent to you, you told us that you would make payment within the usual / thirty days - in fact, you stated when we opened the account with you that you planned to // take advantage of the cash discount generally allowed for payment within ten days. You have not observed /// the terms of your agreement, and we feel that we have deserved better treatment. We must//// point out that we cannot run a successful business unless the accepted rules regarding credit are observed /. We want to treat you fairly, but we cannot extend the time for payment more than // we have already. We must ask you to accept the draft for the full amount due /// which we have drawn on you through your bank today.

It has been found necessary to //// reduce expenses in our plant, and it is clear that he shall have to be more

strict in our demand if a more favourable balance is to be shown. If you can come to town before the 1st of the month, anything you have to say relating to the new arrangement can be discussed with the officials responsible to making loans.

S.1. = 1.2

APPENDIX IV

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 2 - SPEED (PASSAGE 1)
(65 W. A. M.)

Dear Sir,

With the small amount of information in our possession, we are unable to give you / a definite decision on your application for a loan. You make no mention at all of // any provision for expansion at your present factory, nor do you tell us if you have /// any intention of taking over the operation of more machines.

However, we believe that the proposition//// is certainly worth discussion, although action must, of course, wait till you supply us with additional/ information about your plans.

We suggest that you call at our office some time during the next // few days, to permit us to go over every detail of the situation with you.

Because /// of our decision to erect a building of our own, we shall not be in a//// position to renew our lease when it expires next year. Permit us to take this occasion / to thank you for the many courtesies you have always extended to us. Preparations for the // erection of our new offices and sales rooms are going ahead nicely, but there is just a /// chance that our new building may not be ready before the expiration of our lease. WE //// wish to make provision for

any unexpected delays, and if you do not object, we should like to have your permission to remain in this building, if necessary, for not more than three months, at the present rental.

Very truly yours,

S.I. = 1.2.

APPENDIX V

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 3 - SPEED (PASSAGE)
(70 W. A. M.)

Husbands may be good or bad, helpful or harmful. We think it would be fairer if all helped / the Neighbourhood Workers' Club according to their means. Everyone cannot give an equal amount. Some people could give // more than others. Perhaps this opportunity may not occur again, and we shall be greatly surprised if /// you do not hasten to accept. The gentleman to whom the house was leased was quite surprised //// to receive a request for higher rent.

The good secretary does not always have her hat on in / readiness to leave the office at five o'clock. There are times when important correspondence must be answered,// and she should show her loyalty to her employer and help him by not leaving the office until /// the replies are in the post. She should hold herself in readiness for these occasions. In the /// average office they do not occur often.

We are sorry to learn that the package we sent / to you by registered post on 14th October, 1994 has not been received. Promptly upon receipt of your // note we sent a duplicate e. It is possible, of course, that the label was incorrectly addressed, but /// we do not think that there is any likelihood that this is the case. We are asking//// the

postal authorities to institute a search for the lost parcel, and no doubt they will be able to find it.

Meanwhile, if the original package is delivered to you, will you kindly return it to us. The cost of postage will be sent to you, or you can make an adjustment in your account when you post your cheque.

S.I. = 1.2

APPENDIX VI

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 3 - SPEED (PASSAGE I)
(70 W. A. M.)

Dear Mr. Wilson,

I fear that it will not be possible for me to attend the discussion next / Thursday night. I have just received word that I must make a trip out of town, and // I do not expect to return before Friday. However, if it is possible for me to attend I /// shall certainly do so, for I wish to show my support of your plans.

I am sending my /// cheque for five hundred naira which is to be applied towards the building fund. You will understand the / spirit in which it is sent, and my name need not be mentioned when you acknowledge the // gift.

We wrote to the bank and we received word that as they were not able to /// collect the second note they had not tried to collect the third.

He told us that he /// would send us a remittance, but that he could not undertake to pay the debt while/ trade was not certain. Thank you for your promptness in sending the thousand feet of copper wire//. We are enclosing our cheque which covers our outstanding indebtedness.

The last shipment was short by a hundred /// naira, and

our account should be credited for the amount of the shortage.

Will you please try /// to find for me a report of the total imports and exports through the Port of Calabar during the last year.

Awaiting your reply very soon.

Yours truly,

Marketing Manager.

S.I. = 1.2.

APPENDIX VII

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 3 - SPEED (PASSAGE I)
(75 W. A. M.)

Gentlemen,

We received your communication of the 15th, in which you complain of the delay in the completion of / your contract. That we have failed to accomplish what we promised we must admit, and we very much regret // out failure.

We are confident, however, that the contract could have been completed as agreed upon but for the /// recent trouble with the Commercial Transport Committee which was immediately responsible for the delay. Their decision interfered considerably //// with our business, and when we state that only thirty of our transport men have continued at work, we / think you will recognize how difficult it has been to satisfy our customers.

It is unnecessary for us to // add that we should regret the transfer of your business, considering the long connection between us, and the cause /// of the present interruption.

The rise in prices is governed by circumstances beyond our control. In all probability /// there will be a drop in prices when the supply is sufficient to meet the demand.

Most of the / large department stores advertise regularly

in the daily newspapers. Whenever they hold a special sale, and particularly at Christmas // and Easter, when people do more shopping than usual, the stores increase the size of their advertisements. It would /// be interesting to know whether the additional sales are sufficient to cover the expense of advertising. Evidently, it //// is sufficiently profitable, for the stores to continue their campaigns without interruption.

Wishing you more business success.

Yours faithfully,

S.I. = 1.2

APPENDIX VIII

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 4 - SPEED (PASSAGE II)
(75 W. A. M.)

You may be interested in the following theory concerning the periodic appearance of depression in almost all branches of / trade. Experience shows that the most probable cause of this common trouble is that prices have suddenly fallen, after // a period of speculation during which prices have been unusually high. The high prices occasioned during the period of /// speculation may have resulted from the expectation or a shortage in the supply of some particular commodity, or //// some other similar cause. Eager buying helps to produce the expected rise in prices, and the first buyers seem / to have the ability to make huge profits. Their success encourages others, and the speculative spirit spreads to all // commodities. Borrowers use all their credit, bankers are will to lend, and a general spirit of recklessness prevails ///.

After a while, however, the upward trend of prices ceases. When those who hold stocks wish to realize, a //// reaction comes and prices begin to fall. They start falling so rapidly that everyone seems to be loosing/. Credit is obtained only with great difficulty. No one will part with ready money, or postpone his claim to // it. Merchants cannot meet their obligations, and many firms fall because they are

unable to obtain the credit /// which they are accustomed. This is what we call a commercial crisis. In extreme cases there is overconfidence, //// and money is borrowed for short periods at a ruinous rate of interest. Prices of commodities and stocks then fall as much below the usual level as they had risen above that level during the period of inflation.

S.I. = 1.2.

APPENDIX IX

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 5 - SPEED (PASSAGE I)
(80 W. A. M.)

Making progress in Shorthand can be a very slow business, particularly if you, like a great many people find Shorthand/ a little more difficult than the teacher seems to appreciate. When you know something very well, as a teacher of // any subject does, it can be incredibly difficult to truly understand the problems of others. I can assure you that /// a large proportion of students that have difficulties can result in //// an identification of the probable causes of the problems, and having done this you are already on your way to / proficiency in the skill.

A large number of students do not come to grip with the principle of the system // and yet are surprised when they do not progress. Whilst it is not necessary to know the rules by heart /// in order to write at speed, you must as a result of practice and writing correct outlines many times, be //// able to form accurate outlines rapidly. This is why reading of exercises written in Shorthand helps to build up your / vocabulary. Words and phrases are your stock-in-trade, your tools and equipment, and if you are to be a // member of a production team you must be both proficient and productive.

Thus reading Shorthand notes should be stressed, if /// you are a stranger to it this practice will go far in speeding up your rate of Shorthand progress. There //// should be pleasure in the reading, but also some pressure.

S.I. = 1.2.

APPENDIX X

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

POST-TEST 5 - SPEED (PASSAGE II)
(80 W. A. M.)

Dear Sir,

At the last Board Meeting we discussed in some detail the decline in the company's profit over the / past year, and we decided that some reductions must be made. After much discussion we eventually agreed to make these // reductions by closing down some of our branch offices. Although we have been aware for some time that a number of /// our branches have not been doing as much business as in the past, we did not intend to close them //// as we felt that we might lose some of our established customers.

We had requested you earlier to prepare for / us a list of our branch offices showing the turnover figures for the last three years, together with an indication // of the present value of the sites. In addition, we asked you to indicate the total number of staff employed /// at each branch. This information was received a month ago and the Board has made its decision on the branches to //// be closed. As you will see, the selected branches have been closed bearing in mind both the turnover figures/ and the value of the site.

We hope to offer other jobs to the managers of the branches either in // another branch or at Head Office, and we will maintain their present salary. Unfortunately, the other branch staff will have /// to be laid off.

At present I would ask you to treat this matter as being highly confidential.

Yours sincerely,////

S.I. = 1.2.

APPENDIX XI

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

FIRST POST-TEST - THEORY

INSTRUCTIONS: Fill in the blank spaces. Each point carries 2 marks.

1. Where a final diphthong is joined, a single stroke is generally halved to indicate a final..... and.....
2. In words of two of more..... a stroke is generally ..... to indicate a.....t or d.
3. ..... rt and .....rts standing alone are not used to avoid confusion with ..... and .....
4. The ..... principle is not used in certain words, where the proper ..... of a ..... stroke would not clearly show.
5. When a final vowel follows t or d, it is necessary to write the stroke t or d in order to place the ....
6. Letter 1 is usually written downward after ..... or ..... for .....
7. When an initial vowel comes before l, and the l is followed by a simple horizontal stroke, l is written downward for the purpose of ....

8. A small beginning hook, written on the circle side of straight downstroke and ..... and ..... forms a series of ....

9. Phonetic pronunciations of double consonants Pl and Bl are ..... and.....

10. A series of double consonants formed with a small initial hook, written on the non-circle side of straight downstrokes and ..... and ..... are called ....

11. Phonetic pronunciations of double consonants Pr and Br are ..... and .....

12. ..... is included when an initial circle or loop is written on the same side as the hook of ....

13. With double consonants, a dot vowel may be indicated by writing a small ..... instead of ..... either after or before the .... strokes.

14. A dash vowel, or a diphthong, is shown by writing the vowel sign or diphthong sign ....., or at the ..... or ..... of the .....

15. A small initial hook, written on the inside of curves forms a series of ....

16. Double consonants can also be represented with a large initial hook, written on the ..... of .....

17. After k, g, n, or straight upstrokes .....

and ..... are reversed.

18. The double consonant shl is always written .....
while the stroke shr is always written .....

19. The heavy sign ..... is used to represent ng-kr or ng-gr.

APPENDIX XII

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

SECOND POST-TEST - THEORY

INSTRUCTIONS: Fill in the blank spaces. Each point carries 2 marks.

1. A small final ....., written on the inside of curves adds n.
2. N-hook is written with clockwise motion at the end of all ....
3. Final ..... when hooked, is usually written .....
4. A small final hook, written with anti-clockwise motion at the end of all straight stokes, adds ..... or .....
5. There is no ..... or ..... hook to curves.
6. A finally hooked stroke is halved to indicate a following ..... or .....
7. Hooks for v and n are used in the middle of a word when they .... to some strokes.
8. Final s-chicle is written inside ..... or ..... hook.

9. A final circle, or a final loop, written on the same side of a straight stroke as the ..... hook, includes the .....

10. A circle written inside an ..... hook attached to a full-length curve adds the final sound ..... only.

11. After a curved stroke the light sound ..... is represented by stroke ..... and the final a-circle.

12. A circle written inside an n-hook attached to a half-length curve adds the final sound ..... or .....

13. When a ..... follows f, v, or n, at the end of a word, it is necessary to write the stroke in order to be able to indicate the following.....

14. A large final ..... adds the final syllable .....

15. When attached to a straight stroke, the ..... hook is written on the ..... side to an initial ..... or ..... to balance the outline.

16. The ..... hook is written on the right side of simple ....., ... or .....

17. When -shun follows the ..... circle or the ..... circle, it is represented by a curl (a continuation of the circle).
18. A final s-circle is placed ..... the curl.
19. In words ending in -uation or -uition, the stroke ..... and ..... hook are generally used.
20. A stroke hooked for -shun is halved to indicate a final ..... or .....
21. When m is immediately followed by pr, br, pl or bl, the double consonant strokes .... are used.
22. A small initial hook prefixes ..... to ..... while a large initial hook prefixes ..... to ..... also.

APPENDIX XIII

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

THIRD POST-TEST - THEORY

INSTRUCTIONS: Fill in the blank spaces. Each point carries 2 marks.

1. Generally the upward form of h is used when it is joined to ....
2. When h is the only ....., or when it is followed by ..... or ....., the ..... form is used.
3. A small tick at the beginning of m, downward l, and downward r, represents .....
4. Where it would be awkward to write the stroke ..... in the middle of a word, h is represented by a ....., ... placed alongside the vowel sound.
5. Where a medial t is only lightly sounded after ....., it may sometimes be .....
6. Other lightly sounded ..... may sometimes be omitted also.
7. The strokes ..... and ..... are halved and thickened to indicate a following .....
8. Downward ..... and downward ..... are ..... and ..... to indicate a following .....

9. When a vowel comes between ..... or ..... the full ..... must be written.

10. Strokes of unequal length must not be ..... if their length would not clearly .....

11. To show the difference in length, disjoin half-length ..... or ..... following stroke ..... or .....

12. Curved strokes are doubled in length to indicate a following syllable ....., ..., or .....

13. Stroke l standing alone, or with only a final ...., is doubled to add ..... only.

14. A straight stroke is doubled to indicate tr, dr, or THR only when it follows another ..... or .... or when it has a finally joined ..... or a final .....

15. In a few common words the syllable -ture is represented by the ....

16. The doubling principle is not used in ....

17. In order to add final er ....., ... or ..... is doubled.

18. ..... is doubled to add final ..... or .....

APPENDIX XIV

DEPARTMENT OF SEC. ADMINISTRATION
AKWA IBOM STATE POLYTECHNIC - IKOT EKPENE

THIRD POST-TEST - THEORY

INSTRUCTIONS: Fill in the blank spaces. Each point carries 2 marks.

1. The prefix ..... or ..... is expressed by a ..... written at the beginning of an outline.
2. In words beginning with the one- or com- dot, the first ..... after the ..... determines the ..... of the outline.
3. ..... or ..... is expressed by ....., either joined or disjoined, always in the ..... position.
4. Intro- is expressed by ....., always in the ..... position.
5. ....., ... or ..... is expressed by disjoined m, always in the ..... position.
6. Self- is expressed by a disjoined ....
7. Self-con- is represented by writing the..... ..... in the place of the ..... dot.
8. When the prefix in- means not, it is always expressed by

the ....

9. Where it would be awkward to write ..... at the end of a word, the suffix ..... is expressed by a light .....
10. The suffix -ment is represented by ..... where the sign ..... cannot be easily joined.
11. The suffix ..... cannot be easily joined.
12. The endings -fulness and -lessness are expressed by disjoined ..... and ..... respectively.
13. -lity or -rity, preceded by a ....., is expressed by ..... the preceding stroke.
14. The endings -logical-ly are represented by ....
15. The word endings -ward and -yard are expressed by half-length ..... and ..... respectively.
16. Two consecutive vowels, pronounced in two separate syllables are represented by angular signs ..... and ..... and are called .....
17. To keep the outline close to the line of writing, the upward r is generally used where ..... follows two ..... while downward r is used finally after two .... for the same reason.

18. The strokes is written where a ..... immediately follows initials and where the final syllable ..... is immediately proceed by a .....

APPENDIX XV

RESEARCH DATA ON MORNING STUDENTS

S/N	EXAM. NO.	PT-1		PT-2		PT-3		PT-4		PT-5	AVERAGE	
		T	S	T	S	T	S	T	S	SE S	T	S
1.	DSA/38	57	50	66	69	58	50	64	51	53	61	55
2.	" /48	51	48	62	61	67	65	60	49	58	60	56
3.	" /05	55	52	67	55	60	52	50	45	61	58	53
4.	" /07	63	56	53	44	46	44	57	46	72	55	52
5.	" /06	56	40	60	62	65	55	60	53	58	60	54
6.	" /11	70	58	63	62	54	60	50	46	45	59	54
7.	" /52	57	44	54	59	70	65	65	57	59	62	57
8.	" /15	60	56	60	66	61	57	50	47	62	58	58
9.	" /60	41	48	67	68	46	42	62	54	51	54	53
10.	" /19	56	53	54	49	55	45	58	48	54	56	50
11.	" /04	51	35	45	54	53	65	40	38	60	47	50
12.	" /23	63	55	64	75	63	56	64	60	39	63	57
13.	" /32	53	54	52	64	56	49	51	48	54	53	54
14.	" /27	54	44	56	58	48	59	63	54	66	55	56
15.	" /12	66	56	58	46	56	53	54	44	43	59	48
16.	" /31	65	52	50	42	64	66	62	46	48	60	51
17.	" /16	62	58	68	80	50	47	60	58	70	60	63
18.	" /20	58	57	70	56	50	63	57	55	36	59	53
19.	" /37	68	62	50	43	71	67	51	58	50	60	56
20.	" /66	71	68	60	62	62	54	66	63	56	65	61
21.	" /46	60	40	58	54	63	51	54	51	48	59	49
22.	" /43	57	31	53	46	49	40	62	46	64	55	45
23.	" /80	61	53	52	49	54	58	60	40	68	57	54
24.	" /47	45	30	50	36	53	57	58	50	49	52	44
25.	" /40	52	45	58	49	58	51	67	65	58	59	54
26.	" /51	51	44	51	43	61	55	60	52	61	56	59
27.	" /24	43	38	60	37	72	63	46	44	54	55	47
28.	" /55	57	51	63	45	44	56	55	50	45	55	49
29.	" /28	48	36	50	31	58	70	60	52	62	54	50
30.	" /59	60	55	55	52	46	57	72	67	66	58	59
31.	" /76	74	61	58	50	80	60	65	57	70	69	00
32.	" /63	54	43	56	50	32	51	46	42	56	48	48
33.	" /36	41	37	46	35	52	56	51	39	60	48	45
34.	" /67	48	40	42	40	43	52	65	52	52	50	48
35.	" /72	52	38	63	53	48	23	63	56	63	57	47
36.	" /56	53	56	61	54	60	43	51	48	34	56	54
37.	" /70	60	52	54	44	65	44	58	60	50	59	50
38.	" /75	51	25	35	42	60	70	72	68	38	55	49
39.	" /44	70	65	62	50	66	48	57	46	72	64	56
40.	" /02	56	50	40	45	64	55	54	41	53	54	49

APPENDIX XVI

RESEARCH DATA ON AFTERNOON STUDENTS

S/N	EXAM. NO.	PT-1		PT-2		PT-3		PT-4		PT-5	AVERAGE	
		T	S	T	S	T	S	T	S	SE S	T	S
1.	DSA/79	58	57	70	56	50	63	57	55	53	59	57
2.	" /68	62	50	43	71	67	51	58	43	60	58	55
3.	" /09	71	68	60	62	62	54	66	63	64	65	62
4.	" /08	60	40	58	54	63	51	54	51	47	59	49
5.	" /10	57	31	53	46	49	40	62	46	56	55	44
6.	" /20	61	53	52	49	53	58	60	40	58	57	52
7.	" /14	60	46	45	52	53	46	53	58	60	53	52
8.	" /33	74	65	40	27	58	55	60	64	54	58	53
9.	" /18	55	46	52	41	47	43	64	62	70	57	52
10.	" /35	65	40	51	35	55	48	62	61	68	58	50
11.	" /22	52	58	50	55	63	56	58	54	48	55	54
12.	" /53	60	48	40	27	56	48	52	50	54	52	45
13.	" /26	47	42	42	45	36	51	38	56	52	47	49
14.	" /57	68	60	40	58	36	51	43	41	58	47	55
15.	" /30	50	32	39	53	40	48	38	53	50	42	47
16.	" /25	56	65	59	61	53	64	50	70	72	55	66
17.	" /34	54	53	52	50	54	59	40	61	66	50	58
18.	" /65	33	35	30	31	42	45	57	55	45	41	42
19.	" /01	65	49	77	61	62	57	70	54	70	68	58
20.	" /49	33	42	46	31	54	44	60	50	57	48	45
21.	" /42	49	60	40	55	56	42	62	53	49	52	52
22.	" /77	53	36	51	35	33	24	48	50	55	46	40
23.	" /41	57	46	50	43	49	52	60	56	62	54	52
24.	" /03	51	45	53	50	59	47	67	54	36	58	46
25.	" /50	62	58	52	46	42	25	56	48	48	53	45
26.	" /13	58	56	55	41	48	43	57	44	54	55	48
27.	" /54	48	45	51	46	45	35	50	54	58	49	48
28.	" /71	61	60	62	58	68	57	65	52	52	64	56
29.	" /58	49	45	53	38	56	39	33	43	62	53	45
30.	" /17	54	40	56	46	61	50	58	52	51	51	48
31.	" /62	47	66	57	41	74	61	46	35	66	56	54
32.	" /64	52	49	56	54	48	59	65	60	42	55	53
33.	" /39	52	64	48	63	52	54	54	66	53	52	60
34.	" /68	46	57	53	50	45	55	50	60	49	49	54
35.	" /73	65	72	59	54	68	53	63	72	58	64	62
36.	" /69	43	35	39	55	48	56	52	67	60	46	55
37.	" /74	55	50	45	58	40	61	53	60	55	48	57
38.	" /61	52	64	48	63	52	54	54	66	72	52	64
39.	" /78	54	34	60	56	58	41	55	42	50	57	45
40.	" /45	70	62	74	63	60	55	64	48	56	67	57

KEY: PT = POST TEST.
T = THEORY TEST MEAN SCORE.
S = SPEED TEST MEAN SCORE.
SS = SEMESTER EXAMINATION SPEED.

APPENDIX XVII

MORNING AND AFTERNOON STUDENTS' AVERAGE SCORES IN SHORTHAND SPEED

S/N	A*	B**
1.	55	57
2.	56	55
3.	53	62
4.	52	49
5.	54	44
6.	54	52
7.	52	52
8.	58	53
9.	53	52
10.	50	50
11.	50	54
12.	57	45
13.	54	49
14.	56	55
15.	48	47
16.	51	66
17.	63	58
18.	53	42
19.	56	58
20.	61	45
21.	49	52
22.	45	40
23.	54	52
24.	44	46
25.	54	55
26.	59	48
27.	47	48
28.	49	56
29.	50	45
30.	59	48
31.	60	54
32.	48	53
33.	45	60
34.	48	54
35.	47	62
36.	54	55
37.	50	57
38.	49	64
39.	56	45
40.	49	57
TOTAL ...	2107/40 = 52.68+	2086/40 = 52.12++

* Morning Students.
** Afternoon Students.

\+ Mean Score for Morning Students (Speed).
++ Mean Score for Afternoon Students (Speed).

APPENDIX XVIII

ANALYSIS OF VARIANCE FOR THE TESTING OF HYPOTHESIS 1

WITHIN GROUPS VARIANCE (Wgv):

$$SSx^2ij - \frac{T^2j}{nj} \quad \text{WHERE}$$

xij = the addition of the square of each group.

T^2j = the square of the total of each group.

nj = the no. of cases in each group.

$$W_{gv} = S(A^2+B^2) - S(\frac{(A)^2}{nj} + \frac{(B)^2}{nj})$$

$$= S(111286 + 111276) - S(\frac{(2107)^2}{40} + \frac{(2086)^2}{40})$$

$$= S(111286 + 111276) - S(\frac{4439449}{40} + \frac{4351396}{40})$$

$$= S(111286 + 111276) - S(110986.22 + 108784.9)$$

$$= 222562 - 219771.1$$

$$= 2790.9$$

BETWEEN GROUPS VARIANCE (Bgv):

$$\frac{ST^2j}{nj} - \frac{T^2}{N} \quad \text{WHERE}$$

T^2 = sum of all observations squared

N = total no. of all observations.

$$B_{gv} = S(\frac{(A)^2}{nj} + \frac{(B)^2}{nj}) - \frac{(A + B)^2}{N}$$

$$= S(\frac{4439449}{40} + \frac{4351396}{40}) - \frac{(4193)^2}{80}$$

$$= S(110986.23 + 108784.9) - 219765.61$$

$$= 219771.13 - 219765.61$$

B_{gv} = 5.52 = $SS_{Bg} - SS_{Wg}$

DEGREE OF FREEDOM (df) BETWEEN GROUPS:

df_B = K - 1 WHERE K = no. of groups.

= 2 - 1 = 1.

APPENDIX XVIII (CONTD).

DEGREE OF FREEDOM (df) WITHIN GROUPS:

df_W = K(N-1) WHERE K = no. of groups.

N = no. of observations.

= 2(80-1)

= 2 X 79

= 158.

F-CALCULATED:

$$\text{F-CALCULATED} = \frac{\text{VARIANCE ESTIMATE } B_g}{\text{VARIANCE ESTIMATE } W_g}$$

$SS_T = SS_B + SS_W$

$SS_B = SS_T - SS_W$

$SS_W = SS_T - SS_B$

APPENDIX - XIX

MORNING AND AFTERNOON STUDENTS' AVERAGE SCORES IN SHORTHAND THEORY

S/N	A*	B**
1	61	59
2	60	60
3	58	65
4	55	59
5	60	55
6	59	57
7	62	53
8	58	58
9	54	57
10	56	58
11	47	55
12	63	52
13	53	47
14	55	47
15	59	42
16	60	55
17	60	50
18	59	41
19	60	69
20	65	48
21	59	52
22	55	46
23	57	54
24	52	58
25	59	53
26	56	55
27	55	49
28	55	64
29	54	53
30	58	51
31	69	56
32	48	55
33	48	52
34	50	49
35	57	64
36	56	46
37	59	48
38	55	52
39	64	57
40	54	67
TOTAL	2248/40 = 52.16+	2168/40 = 54.20++

* MORNING STUDENTS
** AFTERNOON STUDENTS

\+ Mean Score for Morning Students (Theory).
++ Mean Score for Afternoon Students (Theory).

APPENDIX XX

ANALYSIS OF VARIANCE FOR THE TESTING OF HYPOTHESIS 2

WITHIN GROUPS VARIANCE (Wgv):

$$SSx^2ij - \frac{T^2j}{nj} \quad \text{WHERE}$$

xij = the addition of the square of each group altogether.

T^2j = the square of the total of each group.

nj = the no. of cases in each group.

$$W_{gv} = S(A^2 + B^2) - S(\frac{(A)^2}{nj} + \frac{(B)^2}{nj})$$

$$= S(131228 + 119092) - S(\frac{(2284)^2}{40} + \frac{(2168)^2}{40})$$

$$= S(131228 + 119092) - S(130416.4 + 117505.6)$$

$$= 250320 - 247922$$

$$= 2398.$$

BETWEEN GROUPS VARIANCE (Bgv):

$$\frac{S^{T^2}j}{nj} - \frac{T^2}{N} \quad \text{WHERE}$$

T^2 = sum of all observations squared.

N = total no. of all observations

$$B_{gv} = S(\frac{(A)^2}{nj} + \frac{(B)^2}{nj}) - \frac{(A + B)^2}{N}$$

$$= S(\frac{5216656}{40} + \frac{47000224}{40}) - (\frac{4452}{80})^2$$

$$= S(130416.4 + 117505.6) - 247753.8$$

$$= 247922 - 247753.8$$

$$= 168.2 = SS_{Bg} - SS_{Wg}$$

APPENDIX XX (CONTD).

DEGREE OF FREEDOM (df) BETWEEN GROUPS:

df_B = K - 1 WHERE K = no. of groups.

= 2 - 1 = 1.

DEGREE OF FREEDOM (df) WITHIN GROUPS:

df_W = K(N - 1) WHERE K = no. of groups.

N = no. of observations.

= 2(80 - 1)

= 2 X 79.

= 158.

F-CALCULATED:

$$\text{F-CALCULATED} = \frac{\text{VARIANCE ESTIMATE } B_g}{\text{VARIANCE ESTIMATE } W_g}$$

$SS_T = SS_B + SS_W$

$SS_B = SS_T - SS_W$

$SS_W = SS_T - SS_B$

APPENDIX XXI

MEAN SCORES OF AFTERNOON STUDENTS IN SPEED TEST AND THEORY TEST PERFORMANCES

S/N	EXAMINATION NUMBER	TEST T	TEST S
1.	DSA/79	59	57
2.	" /21	60	55
3.	" /09	65	62
4.	" /08	59	49
5.	" /10	55	44
6.	" /29	57	52
7.	" /14	53	52
8.	" /33	58	53
9.	" /18	57	52
10.	" /35	58	50
11.	" /22	55	54
12.	" /53	52	45
13.	" /26	47	49
14.	" /57	47	55
15.	" /30	42	47
16.	" /25	55	66
17.	" /34	50	58
18.	" /65	41	42
20.	" /49	48	45
21.	" /42	52	52
22.	" /77	46	40
23.	" /41	54	52
24.	" /03	58	46
25.	" /50	53	45
26.	" /13	55	48
27.	" /54	49	48
28.	" /71	64	56
29.	" /58	53	45
30.	" /17	51	48
31.	" /62	56	54
32.	" /64	55	53
33.	" /39	52	60
34.	" /68	49	54
35.	" /73	64	62
36.	" /69	46	55
37.	" /74	48	57
38.	" /61	52	64
39.	" /78	57	45
40.	" /45	67	57

KEY:

S = SPEED MEAN SCORE.
T = THEORY MEAN SCORE.
TS = TEST SCORES.

APPENDIX XXII

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 3

(POST-TEST 1 - 4)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/79	57	59	3249	3481	3363
2.	" /21	55	60	3025	3600	3300
3.	" /09	62	65	3844	4225	4030
4.	" /08	49	59	2401	3481	2891
5.	" /10	44	55	1936	3025	2420
6.	" /29	52	57	2704	3249	2964
7.	" /14	52	53	2704	2809	2756
8.	" /33	53	58	2809	3364	3074
9.	" /18	52	57	2704	3249	2964
10.	" /35	50	58	2500	3364	2900
11.	" /22	54	55	2916	3025	2970
12.	" /53	45	52	2025	2704	2340
13.	" /26	49	47	2401	2209	2303
14.	" /57	55	47	3025	2209	2585
15.	" /30	47	42	2209	1764	1974
16.	" /25	66	55	4356	3025	3630
17.	" /34	58	50	3364	2500	2900
18.	" /65	42	71	1764	1618	1722
19.	" /01	58	69	3364	4761	3422
20.	" /49	45	48	2025	2304	2160
21.	" /42	52	52	2704	2704	2704
22.	" /77.	40	46	1600	2116	1840
23.	" /41	52	54	2704	2916	2288
24.	" /03	46	58	2116	3364	2668
25.	" /50	45	53	2025	2809	2385
26.	" /13	48	55	2304	3025	2640
27.	" /54	48	49	2304	2401	2304
28.	" /71	56	64	3136	4096	3584
29.	" /58	45	53	2025	2809	2385
30.	" /17	48	51	2304	2601	2448
31.	" /62	54	56	2916	3136	3024
32.	" /64	53	55	2809	3025	2915
33.	" /39	60	52	3600	2704	3120
34.	" /68	54	49	2916	2401	2646
35.	" /73	62	64	3844	4096	3968
36.	" /69	55	46	3025	2116	2530
37.	" /74	57	48	3249	2304	2736
38.	" /61	64	52	4096	2704	3328
39.	" /78	45	57	2025	3249	2565
40.	" /45	57	67	3249	4489	3819
	T O T A L	2086	2186	109380	120878	114766

APPENDIX XXII (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.114766) - (2086.2186)}{\sqrt{[(40.109380) - 4351396][(40.120878) - 4778596]}}$$

$$= \frac{4590640 - 4559996}{\sqrt{(4375200 - 4351396)(4835120 - 4778596)}}$$

$$= \frac{30644}{\sqrt{23804.56524}} = \frac{30644}{\sqrt{1345497296}}$$

$$r = \frac{30644}{36681.02} = 0.84$$

$$r = 0.84.$$

TEST FOR SIGNIFICANT RELATIONSHIP

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$ WHERE

r = Correlation Co-efficient

N = No. of observations.

$$t = \frac{0.84\sqrt{40 - 2}}{\sqrt{1 - 0.84^2}}$$

$$\frac{0.84\sqrt{38}}{\sqrt{1 - 0.71}}$$

$$t = \frac{0.84 \times 6.16}{0.54} = \frac{5.17}{0.54} = 9.58$$

T-Cal. = 9.58: T-Crit. = 2.02

df = N - 2 = 40 - 2 = 38

Alpha Level = 0.05.

APPENDIX XXIII

MEAN SCORES OF MORNING STUDENTS IN SPEED TEST AND THEORY TEST PERFORMANCE

S/N	EXAM. NUMBER	TS	
		S	T
1.	DSA/38	55	61
2.	" /48	56	60
3.	" /05	53	56
4.	" /07	52	55
5.	" /06	54	60
6.	" /11	54	59
7.	" /52	57	62
8.	" /15	58	58
9.	" /60	53	54
10.	" /19	50	56
11.	" /04	50	47
12.	" /23	57	63
13.	" /32	54	53
14.	" /27	56	55
15.	" /12	48	59
16.	" /31	51	60
17.	" /16	63	60
18.	" /20	53	59
19.	" /37	56	60
20.	" /66	61	65
21.	" /46	49	59
22.	" /43	45	55
23.	" /80	54	57
24.	" /47	44	52
25.	" /40	54	59
26.	" /51	59	56
27.	" /24	47	55
28.	" /55	49	55
29.	" /28	50	54
30.	" /59	59	58
31.	" /76	60	69
32.	" /63	48	48
33.	" /36	45	48
34.	" /67	48	50
35.	" /72	47	57
36.	" /56	54	56
37.	" /70	50	59
38.	" /75	40	55
39.	" /44	56	64
40.	" /02	49	54

APPENDIX XXIV

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 4

(POST-TEST 1 - 4)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/38	55	61	3025	3721	3355
2.	" /48	56	60	3136	3600	3360
3	" /02	53	58	2809	3364	3074
4.	" /07	52	55	2704	3025	2860
5.	" /06	54	60	2916	3600	3240
6.	" /11	54	59	2916	3481	3186
7.	" /52	57	62	3249	3844	3534
8.	" /15	58	58	3364	3364	3364
9.	" /60	53	54	2809	2916	2862
10.	" /19	50	56	2500	3136	2800
11.	" /04	50	47	2500	2209	2350
12.	" /23	57	63	3249	3969	3591
13.	" /32	54	53	2916	2809	2862
14.	" /27	56	55	3136	3025	3080
15.	" /12	48	59	2304	3481	2832
16.	" /31	51	60	2601	3600	3060
17.	" /16	63	60	3969	3600	3780
18.	" /20	53	59	2809	3481	3127
19.	" /37	56	60	3136	3600	3360
20.	" /66	61	65	3721	4225	3965
21.	" /46	49	59	2401	3481	2891
22.	" /43	45	55	2025	3025	2475
23.	" /80	54	57	2916	3249	3078
24.	" /47	44	52	1936	2704	2288
25.	" /40	54	59	2916	3481	3186
26.	" /51	59	56	3481	3136	3304
27.	" /24	47	55	2209	3025	2585
28.	" /55	49	55	2401	3025	2695
29.	" /28	50	54	2500	2916	2700
30.	" /59	59	58	3481	3364	3422
31.	" /76	60	69	3600	4761	4140
32.	" /63	48	48	2304	2304	2304
33.	" /36	45	48	2025	2304	2160
34.	" /67	48	50	2304	2500	2400
35.	" /72	47	57	2209	3249	2679
36.	" /56	57	56	3249	3136	3192
37.	" /70	50	59	2500	3481	2950
38.	" /75	49	55	2401	3025	2695
39.	" /44	56	64	3136	4096	3684
40.	" /02	49	54	2401	2916	2646
	T O T A L	2110	2284	114373	131228	121016

APPENDIX XXIV (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2-(SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.121016) - (2110.2284)}{\sqrt{[(40.114373) - 4452100][(40.131228)-5216656]}}$$

$$= \frac{4840640 - 4819240}{\sqrt{(4574920 - 4452100)(5249120 - 5216656)}}$$

$$= \frac{21400}{\sqrt{122820.32464}}$$

$$= \frac{21400}{\sqrt{3987228480}}$$

$$r = \frac{21400}{63144.5} = \frac{214000}{631445} = 0.34.$$

$$r = 0.34.$$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$ W H E R E

r = Correlation Co-efficient.

N = No. of observations.

$$t = \frac{0.34\sqrt{40 - 2}}{\sqrt{1 - 0.34^2}} = \frac{0.34\sqrt{38}}{\sqrt{1 - 0.12}}$$

$$=$$

$$t = \frac{0.34 \times 6.16}{0.94} = \frac{2.09}{0.94} = 2.23$$

T-Cal. = 2.23: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38

APPENDIX XXV

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 3

(POST-TEST 1).

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/79	57	58	3249	3364	3306
2.	DSA/21	62	68	3844	4624	4216
3.	DSA/09	68	71	4624	5041	4828
4.	DSA/08	40	60	2400	3600	2400
5.	DSA/10	31	57	961	3249	1767
6.	DSA/29	53	61	2809	3721	3233
7.	DSA/14	46	60	2116	3600	2700
8.	DSA/33	65	74	4225	5476	4810
9.	DSA/18	46	55	2116	3025	2530
10.	DSA/35	40	65	1600	4225	2600
11.	DSA/22	58	52	3364	2704	3016
12.	DSA/53	48	60	2304	3600	2880
13.	DSA/26	42	47	1764	2209	1974
14.	DSA/57	60	68	3600	4624	4080
15.	DSA/30	32	50	1024	2500	1600
16.	DSA/65	65	56	4225	3136	3640
17.	DSA/34	53	54	2809	2196	2862
18.	DSA/65	35	33	1225	1089	1155
19.	DSA/01	49	65	2401	4225	3185
20.	DSA/49	42	33	1764	1225	1386
21.	DSA/52	60	49	3600	2401	2940
22.	DSA/77	36	53	1296	2809	1908
23.	DSA/41	46	47	2116	2209	2162
24.	DSA/03	45	51	2025	2601	2295
25.	DSA/50	58	62	3364	3844	3596
26.	DSA/13	56	58	3136	3364	3248
27.	DSA/54	45	48	2025	2304	2160
28.	DSA/71	60	61	3600	3721	3660
29.	DSA/58	45	49	2025	2401	2205
30.	DSA/17	40	54	1600	2916	2160
31.	DSA/62	66	47	4356	2209	3102
32.	DSA/64	49	52	2401	2704	2548
33.	DSA/39	64	52	4096	2704	3328
34.	DSA/68	57	46	3249	2116	2622
35.	DSA/73	72	65	5184	4225	4680
36.	DSA/69	35	43	1225	1849	1505
37.	DSA/74	50	55	2500	3025	2750
38.	DSA/61	64	52	4096	2704	3328
39.	DSA/78	34	54	1156	2916	1836
40.	DSA/45	62	70	3844	4900	4340
	T O T A L	2036	2215	109318	125355	114598

APPENDIX XXV (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.114598) - (2036.2215)}{\sqrt{[(40.109318) - 4145296][(40.125355) - 4906225]}}$$

$$= \frac{4583920 - 4509740}{\sqrt{(4372720 - 4145296)(5014200 - 4906225)}}$$

$$= \frac{74180}{\sqrt{227424 \times 107975}}$$

$$= \frac{74180}{476.89 \times 328.60}$$

$$= \frac{74180}{156706.05} = \frac{7418000}{15670605}$$

$$r = 0.47.$$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$ W H E R E

r = Correlation Co-efficient.

N = No. of observations.

$$t = \frac{0.47\sqrt{40 - 2}}{\sqrt{1 - 0.47^2}}$$

$$= \frac{0.47 \times 6.16}{\sqrt{1 - 0.22}}$$

$$= \frac{2.90}{0.78} = 3.72$$

t = 3.72.

T-Cal. = 3.72: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXVI

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 3 (POST-TEST 2)

S/NO.	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1	DSA/79	56	70	3136	4900	3920
2	" 21	43	50	1849	2500	2150
3	" 09	62	60	3844	3600	3720
4	" 08	51	58	2601	3364	2958
5	" 10	46	53	2116	2809	2438
6	" 29	49	52	2401	2704	2548
7	" 14	52	45	2704	2025	2340
8	" 33	27	40	729	1600	1080
9	" 18	41	62	1681	3844	2542
10	" 35	35	51	1225	2601	1785
11	" 22	55	50	3025	2500	2750
12	" 53	27	40	729	1600	1080
13	" 26	65	42	4225	1764	2730
14	" 57	58	40	3364	1600	2320
15	" 30	53	39	2809	1521	2067
16	" 25	61	59	3721	3481	3599
17	" 34	50	52	2500	1764	2100
18	" 65	31	30	961	900	930
19	" 01	61	77	3721	5929	4697
20	" 49	31	46	961	2116	1426
21	" 52	58	40	3364	1600	2320
22	" 77	35	51	1225	2601	1785
23	" 41	43	50	1849	2500	2150
24	" 03	50	53	2500	2809	2650
25	" 50	46	52	2116	2704	2392
26	" 13	41	55	1681	3025	2255
27	" 54	46	51	2116	2601	2346
28	" 71	58	62	3364	3844	3590
29	" 58	38	53	1444	2809	2014
30	" 17	46	56	2116	3136	2576
31	" 62	41	57	1681	3249	2337
32	" 64	54	56	2916	3136	3024
33	" 39	63	48	3969	2304	3024
34	" 68	50	43	2500	1849	2150
35	" 73	54	59	2916	3481	3186
36	" 69	55	39	3025	1521	2145
37	" 74	58	45	3364	2025	2610
38	" 61	63	48	3969	2304	3024
39	" 78	56	60	3136	3600	3360
40	" 45	63	74	3969	5476	4662
	TOTAL	1972	2058	101522	109690	102780

APPENDIX XXVI (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.102786) - (1972.2058)}{\sqrt{[40.101522-3888784][40.109696-4235364]}}$$

$$= \frac{4111440 - 4058376}{\sqrt{(4060880-3888784)(4387840-4235364)}}$$

$$= \frac{53064}{\sqrt{172096 \times 152476}}$$

$$= \frac{53064}{414.84 \times 390.48}$$

$$= \frac{53064}{161986.72} = \frac{5306400}{16198672}$$

$$r = 0.33$$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$ WHERE

r = Correlation Co-efficient.
N = No. of observations.

$$t = \frac{0.33\sqrt{40 - 2}}{\sqrt{1 - 0.33^2}}$$

$$= \frac{0.33 \times 6.16}{\sqrt{1 - 0.11}} = \frac{2.03}{0.89}$$

$$t = 2.28.$$

T-Cal = 2.28: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXVII

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 3

(POST-TEST 3)

S/N	EXAM. NO.	S (X)	T (y)	X^2	Y^2	XY
1.	DSA/79	63	50	3969	2500	3150
2.	" /21	67	71	4489	5041	4757
3.	"/09	54	62	2916	3844	3348
4.	" /08	51	63	2601	3969	3213
5.	" /10	40	49	1600	2401	1960
6.	" /29	58	53	3364	2809	3074
7.	" /14	46	53	2116	2809	2438
8.	" /33	55	58	3025	3364	3190
9.	" /18	43	47	1845	2205	2021
10.	" /35	48	55	2304	3025	2640
11.	" /22	56	63	3136	3969	3528
12.	" /53	48	56	2304	3136	2688
13.	" /26	51	36	2601	1296	1836
14.	" /57	51	36	2601	1296	1836
15.	" /30	48	40	2304	1600	1920
16.	" /25	64	53	4096	2809	3392
17.	" /34	59	52	3481	2704	3068
18.	" /65	45	42	2025	1764	1890
19.	" /01	47	62	2209	3844	2914
20.	" /49	44	54	1936	2916	2376
21.	" /52	42	56	1764	3136	2352
22.	" /77	24	33	576	1089	792
23.	" /41	52	49	2704	2401	2548
24.	" /03	47	59	2209	3481	2773
25.	" /50	25	42	625	1764	1050
26.	" /13	43	48	1849	2304	2064
27.	" /54	35	45	1225	2025	1575
28.	" /71	57	68	3249	4624	3876
29.	" /58	39	56	1521	3136	2184
30.	" /17	50	61	2500	3721	3050
31.	" /62	61	74	3721	5476	4514
32.	" /64	59	48	3481	2304	2832
33.	" /39	54	52	2916	2701	2808
34.	" /68	55	45	3025	2025	2475
35.	" /73	53	68	2809	4624	3604
36.	" /69	56	48	3136	2304	2688
37.	" /74	61	40	3721	1600	2440
38.	" /61	54	52	2916	2701	2808
39.	" /78	41	58	1681	3364	2378
40.	" /45	55	60	3025	3600	3300
	TOTAL	2001	2117	103575	115681	107350

APPENDIX XXVII (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.107350) - (2001.2117)}{\sqrt{[40.103575 - 4004001][40.115681 - 4481689]}}$$

$$= \frac{4294000 - 4236177}{\sqrt{(4143000 - 4004001)(4627240 - 4481689)}}$$

$$= \frac{57883}{\sqrt{138999 \times 145551}}$$

$$= \frac{57883}{372.83 \times 381.51} = \frac{57883}{142238.37}$$

$$= \frac{5788300}{14223837} = 0.41$$

$r = 0.41$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - 0.41^2}}$$

W H E R E

r = Correlation Coefficient.

N = No. of Observations.

$$t = \frac{0.41\sqrt{40 - 2}}{\sqrt{1 - 0.41^2}}$$

$$t = \frac{0.41 \times 6.16}{\sqrt{1 - 0.17}} = \frac{2.53}{0.83} = 3.05$$

T-Cal. = 3.05: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXVIII

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 3

(POST-TEST 4).

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/79	55	57	3025	3249	3135
2.	" /21	58	51	3364	2601	2958
3.	" /09	63	66	3969	4356	4158
4.	" /08	51	54	2601	2916	2754
5.	" /10	46	62	2116	3844	2852
6.	" /29	40	60	1600	3600	2400
7.	" /14	58	63	3364	3969	3654
8.	" /33	64	60	4096	3600	3840
9.	" /18	62	64	3844	4096	3968
10.	" /35	61	62	3721	2116	3782
11.	" /22	54	58	2916	3364	3132
12.	" /53	50	52	2500	2704	2600
13.	" /26	56	38	3136	1444	2128
14.	" /57	41	43	1681	1849	1763
15	" /30	53	38	2809	1444	2014
16.	" /25	70	50	4900	2500	3500
17.	" /34	61	40	3721	1600	2440
18.	" /65	55	57	3025	3249	3135
19.	" /01	54	70	2916	4900	3780
20.	" /49	50	60	2500	3600	3000
21.	" /52	53	62	2809	3844	3286
22.	" /77	50	48	2500	2304	2400
23.	" /41	56	60	3136	3600	3360
24.	" /03	54	67	3025	4489	3618
25.	" /50	48	56	2304	3136	2688
26.	" /13	44	57	1936	3249	2508
27.	" /54	54	50	3025	2500	2700
28.	" /71	52	65	2704	4225	3380
29.	" /58	43	53	1849	2809	2279
30.	" /17	52	58	2704	3364	3016
31.	" /62	35	46	625	2116	1610
32.	" /64	60	65	3600	4225	3900
33.	" /39	66	54	4356	2916	3564
34.	" /68	60	50	3600	2500	3000
35.	" /73	72	63	5184	3969	4536
36.	" /69	67	52	4485	2704	3484
37.	" /74	60	53	3600	2809	3180
38.	" /61	66	54	4356	2916	3564
39.	" /78	42	55	1764	3025	2310
40.	" /45	48	64	2304	4096	3072
	T O T A L	2184	2237	121670	125797	122448

APPENDIX XXVIII (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.122448) - (2184.2237)}{\sqrt{[40.121670 - 4769856][40.125797 - 5004169]}}$$

$$= \frac{4897920 - 4885608}{\sqrt{(4866800 - 4769856)(5031880 - 5004169]}}$$

$$= \frac{12312}{\sqrt{96944 \times 27711}}$$

$$= \frac{12312}{311.36 \times 166.45} = \frac{12312}{51825.87}$$

$$= \frac{1231200}{5182587} = 0.24$$

$$r = 0.24.$$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}} \quad \text{W H E R E}$$

r = Correlation Co-efficient.
N = No. of Observations.

$$t = \frac{0.24\sqrt{40 - 2}}{\sqrt{1 - 0.24^2}}$$

$$= \frac{0.24 \times 6.16}{\sqrt{1 - 0.06}} = \frac{1.48}{0.97} = 1.53$$

$$t = 1.53.$$

T-Cal. = 1.53: T-Crit. = 2.02.
df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXIX

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 4

(POST-TEST 1)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/38	50	57	2500	3249	2850
2.	" /48	48	51	2304	2601	2448
3.	" /05	52	55	2704	3025	2860
4.	" /07	56	63	3136	3969	3528
5.	" /06	40	56	1600	3136	2240
6.	" /11	58	70	3364	4900	4060
7.	" /52	44	57	1936	3249	2508
8.	" /15	56	60	3136	3600	3360
9.	" /60	48	41	2304	1681	1968
10.	" /19	53	56	2809	3136	2968
11.	" /04	35	51	1225	2601	1784
12.	" /23	55	60	3025	3600	3300
13.	" /32	54	53	2916	2801	2862
14.	" /27	44	54	1936	2916	2376
15.	" /12	56	66	3136	4356	3696
16.	" /31	52	65	2704	4225	3380
17.	" /16	58	62	3364	3844	3596
18.	" /20	57	58	3249	3364	3306
19.	" /37	62	68	3844	4624	4216
20.	" /66	68	71	4624	441	4828
21.	" /46	40	60	1600	3600	2400
22.	" /43	31	57	961	3249	1767
23.	" /80	53	61	2809	3721	3233
24.	" /47	30	45	900	2025	1300
25.	" /40	45	52	2025	2704	2340
26.	" /51	44	51	1936	2601	2244
27.	" /24	38	43	1444	1849	1634
28.	" /55	51	57	2601	3249	2907
29.	" /28	36	48	1296	2304	1728
30.	" /59	55	60	3025	3600	3300
31.	" /76	61	74	3721	5476	4514
32.	" /63	34	54	1849	2916	2322
33.	" /36	37	41	1369	1681	1517
34.	" /67	40	48	1600	2304	1920
35.	" /72	38	52	1444	2704	1872
36.	" /56	56	53	3136	2809	2968
37.	" /70	52	60	2704	3600	3120
38.	" /75	25	51	625	2601	1275
39.	" /44	65	70	4225	4900	4550
40.	" /02	50	56	2500	3136	2800
	T O T A L	1936	2267	97584	126347	111900

APPENDIX XXIX (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.111900) - (1936.2267)}{\sqrt{[(40.97584) - 3748096][(40.126347) - 5053880]}}$$

$$= \frac{44760000 - 4388912}{\sqrt{(3903360 - 3748096)(5139289 - 5053880)}}$$

$$= \frac{87088}{\sqrt{155264 \times 85409}}$$

$$= \frac{87088}{394.03 \times 292.25}$$

$$= \frac{87088}{115155.26} = \frac{8708800}{11515526}$$

$$r = 0.76$$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}} \quad \text{W H E R E}$$

r = Correlation Co-efficient.

N = No. of Observations.

$$= \frac{0.76\sqrt{40 - 2}}{\sqrt{1 - 0.76^2}}$$

$$t = \frac{0.76 \times 6.16}{\sqrt{1 - 0.76^2}} = \frac{4.68}{0.65}$$

$$r = 7.2.$$

T-Cal. = 7.2: T-Crit. = 2.02

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXX

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 4

(POST-TEST 2)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/38	69	66	4761	4356	4554
2.	" /48	61	62	3721	3844	3782
3.	" /05	55	67	3025	4489	3685
4.	" /07	44	53	1936	2809	2332
5.	" /06	62	60	3844	3600	3720
6.	" /11	62	63	3844	3969	3906
7.	" /52	59	54	3481	2916	3186
8.	" /15	66	60	4356	3600	3960
9.	" /60	68	67	4624	4489	4556
10.	" /19	49	54	2401	2916	2646
11.	" /04	54	45	2916	2025	2430
12.	" /23	75	64	5625	4096	4800
13.	" /32	64	52	4096	2704	3328
14.	" /27	58	56	3364	3136	3248
15.	" /12	46	58	2116	3364	2668
16.	" /31	42	50	1764	2500	2100
17.	" /16	80	68	6400	4624	5440
18.	" /20	56	70	3136	4900	3920
19.	" /37	43	50	1849	2500	2150
20.	" /66	62	60	3844	3600	3720
21.	" /46	54	58	2916	3364	3132
22.	" /43	46	53	2116	2809	2438
23.	" /80	49	52	2401	2704	2548
24.	" /47	36	50	1296	2500	1800
25.	" /40	49	58	2401	3364	2842
26.	" /51	43	51	1849	2601	2193
27.	" /24	37	61	1369	3721	2257
28.	" /55	45	63	2025	3969	2835
29.	" /28	31	50	961	2500	1550
30.	" /59	52	55	2704	3025	2860
31.	" /76	50	58	2500	3364	2900
32.	" /63	50	56	2500	3136	2800
33.	" /36	35	46	1225	2116	1610
34.	" /67	40	42	1600	1764	1680
35.	" /72	53	63	2809	3969	3339
36.	" /56	54	61	2916	3721	3294
37.	" /70	44	54	1936	2916	2376
38.	" /75	42	35	1764	1225	1470
39.	" /44	50	62	2500	3844	3100
40.	" /02	45	40	2025	1600	1800
	T O T A L	2080	2247	112916	128649	118955

APPENDIX XXX (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.118955) - (2080)(2247)}{\sqrt{[(40.112916) - 4326400][(40.128649) - 5049009]}}$$

$$= \frac{4758200 - 4673760}{\sqrt{(4516640 - 4326400)(5145960 - 5049009)}}$$

$$= \frac{84440}{\sqrt{190240 \times 96651}}$$

$$= \frac{84440}{436.17 \times 311.34}$$

$$= \frac{8444000}{13579717} = 0.62$$

$r = 0.62$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}} \quad \text{W H E R E}$$

r = Correlation Co-efficient.

N = No. of Observations.

$$t = \frac{0.62\sqrt{40 - 2}}{\sqrt{1 - 0.62^2}} = \frac{0.62 \times 6.16}{\sqrt{1 - 0.38}}$$

$$t = \frac{3.82}{0.79} = 4.84$$

T-Cal. = 4.84: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXXI

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 4

(POST-TEST 3)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/38	50	58	2500	3364	2900
2.	" /48	65	67	4225	4489	4355
3.	" /05	52	60	2704	3600	3120
4.	" /07	44	46	1936	2116	2024
5.	" /06	55	65	3025	4225	3575
6.	" /11	60	64	3600	4096	3840
7.	" /52	65	70	4225	4900	4550
8.	" /15	57	61	3249	3721	3477
9.	" /60	42	46	1764	2116	1936
10.	" /19	45	55	2025	3025	2475
11.	" /04	65	53	4225	2809	3445
12.	" /23	56	63	3136	3969	3528
13.	" /32	49	56	2401	3136	2744
14.	" /27	59	48	3481	2304	2832
15.	" /12	53	56	2809	3136	2968
16.	" /31	66	64	4356	4096	4224
17.	" /16	47	50	2209	2500	2350
18.	" /20	63	50	3969	2500	3150
19.	" /37	67	71	4489	5041	4757
20.	" /66	54	62	2916	3844	3348
21.	" /46	51	63	2601	3969	3213
22.	" /43	40	49	1600	2401	1960
23.	" /80	48	53	2304	2809	2544
24.	" /47	57	53	3249	2809	3021
25.	" /40	51	58	2601	3364	2958
26.	" /51	55	61	3025	3721	3355
27.	" /24	63	72	3969	5184	4536
28.	" /55	56	44	3136	1936	2464
29.	" /28	70	58	4900	3364	4060
30.	" /29	57	46	3249	2116	2622
31.	" /76	60	80	3600	6400	4800
32.	" /63	51	32	2601	1024	1632
33.	" /36	56	52	3136	2704	2912
34.	" /67	52	43	2704	1849	2236
35.	" /72	23	48	529	2304	1104
36.	" /56	43	60	1849	3600	2580
37.	" /70	44	65	1936	4225	2860
38.	" /75	70	60	4900	3600	4200
39.	" /44	48	66	2304	4356	3168
40.	" /55	55	64	3025	4096	3520
	T O T A L	2144	2292	120462	134818	125343

APPENDIX XXXI (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.125343) - (2144)(2292)}{\sqrt{[(40.120462) - 4596736][(40.134818) - 5253264]}}$$

$$= \frac{5013720 - 4914048}{\sqrt{[4818480 - 4596736][5392720 - 5253264]}}$$

$$= \frac{99672}{\sqrt{221744.139456}}$$

$$= \frac{99672}{470.90.373.44} = \frac{99672}{175852.90}$$

$$= \frac{9967200}{17585290} = 0.57$$

$r = 0.57$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$ WHERE

r = Correlation Co-efficient.

N = No. of Observations.

$$\frac{0.57\sqrt{40 - 2}}{\sqrt{1 - 0.57^2}}$$

$$= \frac{0.57 \times 6.16}{\sqrt{1 - 0.32}} = \frac{3.51}{0.68}$$

$t = 5.2$

T-Cal. = 5.2: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.

APPENDIX XXXII

CORRELATIONAL COMPUTATION FOR THE TESTING OF HYPOTHESIS 4

(POST-TEST 4)

S/N	EXAM. NO.	S(X)	T(Y)	X^2	Y^2	XY
1.	DSA/38	51	64	2601	4096	3264
2.	" /48	49	60	2401	3600	2940
3.	" /05	45	50	2025	2500	2250
4.	" /07	46	57	2116	3249	2622
5.	" /06	53	60	2809	3600	3180
6.	" /11	46	50	2116	2500	2300
7.	" /52	57	65	2704	4225	3705
8.	" /15	47	50	2209	2500	2350
9.	" /60	54	62	2916	3844	3348
10.	" /19	48	58	2304	3364	2784
11.	" /04	38	40	1444	1600	1520
12.	" /23	60	64	3600	4096	3840
13.	" /32	48	51	2304	2601	2448
14.	" /27	54	63	2916	3969	3402
15.	" /12	44	54	1936	2916	2376
16.	" /31	46	62	2116	3844	2853
17.	" /16	58	60	3364	3600	3480
18.	" /20	55	57	3025	3249	3135
19.	" /37	58	51	3364	2601	2958
20.	" /66	63	66	3969	4356	4158
21.	" /46	51	54	2601	2916	2550
22.	" /43	46	62	2116	3844	2852
23.	" /80	40	60	1600	3600	2400
24.	" /47	50	58	2500	3364	2900
25.	" /40	65	67	4225	4489	4355
26.	" /51	52	60	2704	3600	3120
27.	" /24	44	46	1936	2116	2024
28.	" /55	50	55	2500	3025	2750
29.	" /28	62	60	3844	3600	3720
30.	" /29	67	72	4489	5184	4824
31.	" /76	57	65	3249	4225	3705
32.	" /63	42	46	1764	2116	1932
33.	" /36	39	51	1521	2601	1989
34.	" /67	52	65	2704	4225	3380
35.	" /72	56	63	3136	3969	3528
36.	" /56	48	51	2304	2601	2448
37.	" /70	60	58	3600	3364	3480
38.	" /75	68	72	4624	5184	4896
39.	" /44	46	57	2116	3249	3312
40.	" /02	41	54	1681	2916	2214
	T O T A L	2056	2320	132676	136498	121191

APPENDIX XXXII (CONTD).

$$r = \frac{NSXY - (SX)(SY)}{\sqrt{[NSX^2 - (SX)^2][NSY^2 - (SY)^2]}}$$

$$= \frac{(40.121191) - (2056)(2320)}{\sqrt{[(40.132676) - 4227136][(40.136498] - 4816638]}}$$

$$= \frac{4847640 - 4769920}{\sqrt{[5307040 - 4227136][5459920 - 4816638]}}$$

$$= \frac{77720}{\sqrt{1079904.643282}}$$

$$= \frac{77720}{1039.18.802.05} = \frac{77720}{833474.32}$$

$$= \frac{7772000}{83347432} = 0.09$$

$r = 0.09.$

TEST FOR SIGNIFICANT RELATIONSHIP.

$$\frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}} \quad \text{W H E R E}$$

r = Correlation Co-efficient.

N = No. of Observations.

$$\frac{0.09\sqrt{40 - 2}}{\sqrt{1 - 0.09^2}}$$

$$= \frac{0.09 \times 6.16}{\sqrt{1 - 0.01}} = \frac{0.55}{0.09}$$

$t = 0.56.$

T-Cal. = 0.56: T-Crit. = 2.02.

df = N - 2 = 40 - 2 = 38.

Alpha Level = 0.05.