ACADEMIC ACHIEVEMENT OF SUBJECT MATTER CONTENT AS A FUNCTION OF DIFFERENTIAL FEEDBACK

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PREFACE

The contrast between contemporary American education and that of 50 or 60 years ago is striking in at least one respect, teachers of today are frequently encouraged to employ various psychological theories to facilitate the learning process. However, bringing psychological theory into classroom situations has sometimes resulted in ineffective applications.

A part of this problem stems from the fact that scientists have traditionally sought explanations of complex phenomena in simpler ones. Psychologists, whose task is to provide the basic data for the analysis of human performance, have used the logic of starting with analysis then proceeding to synthesis. The process has not been without its critics, however. Many psychologists, especially those interested in a cognitive approach to learning, perception, and problem solving, have argued that complex behavior cannot be predicted from an understanding of its elements. They further claim that efforts to analyze and study limited components of behavior have led to such simplification that the phenomena originally under investigation are no longer present.

The study presented here addresses itself to an investigation of one of the potential problems where a specific psychological theory, which is based on simple rather than complexed phenomena, has been advocated for classroom teaching situations.

I should like to take this opportunity to sincerely thank all who have aided me in this study.

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CHAPTER I

INTRODUCTION

Learning is acknowledged to be a key process underlying behavioral changes of organisms, and some would contend it is the process underlying human behavioral changes (Hall, 1966, p. 1-2). The presence or absence of learning in humans is all pervasive, it influences everything we do and think. It is involved in the language we speak, our customs, attitudes and beliefs, goals, personality traits, and even our perceptions.

Although learning makes a notable contribution to our daily lives, the reasons why we learn (or why we do not) are not always clear. This lack of clarity is a product of numerous factors. A primary reason is that when learning does take place, it generally does so under very poorly controlled conditions; and, as a result, it becomes exceedingly difficult to determine those variables which have made the primary contributions (Ausubel, 1953).

In classroom settings, where learning for students is a primary concern, we usually employ a variety of techniques which we assume will facilitate the learning process. Some of these techniques include giving rewards, punishments, long practice periods, short practice periods, and immediate or delayed feedback concerning their performance.

Given a typical learning situation, the task of determining the relative contribution of each of these techniques or variables to a

student's subsequent achievement becomes nearly impossible. Due to the difficulty of accessing the significance of a particular variable for learning and/or achievement, several important controversies have arisen.

An important controversy, often appearing in the literature, concerns the use of feedback. The present study is a further investigation of whether immediate feedback (IF) or delayed feedback (DF) is desirable when we are interested in facilitating student achievement.

For the past sixty years, psychologists and educators alike have exhibited interest in the effects of IF and DF on learning and achievement. During these sixty years of study, most of the research has been conducted with animal subjects, and findings have uniformly shown that DF following a correct response will slow or even prevent learning (Renner, 1964). Based on the findings of these studies with animals, prominent experimental psychologists such as Hull (1952) and Spence (1956) have made the theoretical assertion that IF is superior to DF in facilitating learning.

It is interesting to note that some educational psychologists (Townsend and Burke, 1962; Blair, Jones & Simpson, 1968), and other scientists directly involved with pedagogy, have espoused conclusions drawn by the experimentalists, that IF is vital for efficient learning. They state that the immediacy, "as soon as possible," of feedback has great value for the student, but they cite no evidence to support their position.

A review of recent studies on the feedback controversy reveals that IF may not produce the desired result of facilitating the learning process, particularly when the confounding variable of time is introduced. Sassenrath and Yonge (1968), More (1969), and Vandyke and Newton (1970)

present results which cast doubt on the principle that IF is superior to DF in facilitating learning. In these studies, there was, in fact, support for the theoretical assertions noted earlier where IF led to an earlier or quicker acquisition of the desired response. However, measures of achievement taken several hours or weeks later revealed that DF students retained more of the material and subsequently had higher achievement scores than students receiving IF.

Based on these studies, it appears the IF versus DF issue remains unresolved where there is concern for human achievement persisting over a defined period of time. In other words, if we are interested in arranging feedback conditions so students will remember or retain what they have achieved, should we provide IF or DF? If the answer to this question agrees with the results of the studies (Sassenrath and Yonge, 1968; More, 1969; Vandyke and Newton, 1970) that show DF will result in higher achievement scores over a defined period of time than IF, then another equally important question needs to be considered.

In classroom settings, if we elect to provide DF to students to facilitate achievement (i.e., make achievement persist for a longer period of time), we may have created some problems with achievement that as yet have not been considered. Following the presentation of IF and prior to the presentation of DF, it is inevitable that new material or subject matter to be achieved will be presented to the student. Therefore, a relevant question of interest is whether achievement of new material will be facilitated or inhibited by the conditions of feedback, IF and DF.

In conjunction with these two questions, a third question concerning student achievement in the classroom setting was considered. A

review of literature reveals that there have been no attempts to determine the effects on achievement of material presented after DF has been provided. Investigating this aspect of the effects of IF and DF is viewed as important since we know that after test results are presented, in the DF situation, there is usually some additional material presented before the next testing period.

The three primary questions discussed above suggest some important secondary questions. Studies reported by Alexander, Elsom, Means and Means (1971) and Means and Means (1971) have demonstrated that student's grade point averages (GPA) may interact with other teaching variables in influencing achievement. Since these studies show that GPA may influence achievement when interactions with other teaching techniques or variables are considered, GPA was added to further the present investigation and to aid in future research. The basic question underlying the inclusion of GPA was: does GPA influence achievement under IF and DF conditions, and are interactive effects produced by the combination of GPA and the feedback treatments? The possibility of these effects and interactions was considered for each of the three primary questions discussed earlier.

As an additional aid to further research, the present study identified the relationships between two personality measures and the IF versus DF treatments. One of these personality measures consisted of using form F of the Omnibus Personality Inventory (OPI), constructed by Heist and Yonge (1968). The purpose in using this instrument was to determine whether the effects of IF and DF on achievement would correlate with measures of personality.

The other personality measure used in the present study was the

Tolerance Intolerance of Cognitive Ambiguity Test (TICA) constructed by Hampton (1967). The reason for using this test was that a DF situation might be considered as an ambiguous situation, and TICA measures are designed to indicate an individual's need for closure or the lack of this need when faced with ambiguous situations.

The Problem

Statement of the Problem

The present study was concerned with investigating how student achievement, as measured by using an achievement test in a classroom setting, is influenced by the variable feedback. To make a closer inspection of the effects of feedback possible, the overlying purpose was divided into three foci. The first goal was to determine whether the achievement of material presented just before IF would be significantly influenced by IF and DF. Part two was to determine whether the achievement of material presented after IF, but before DF, would be influenced by IF and DF. Part three of the study was to determine whether achievement of material presented after DF would be influenced by the treatments IF and DF. Included in these three basic purposes was an investigation of the effects of GPA on achievement. The purpose was to determine whether GPA would interact with the feedback treatments in influencing achievement. Secondary questions, related to all of the questions above, concerned a determination of the relationship of two personality measures, the OPI and the TICA, to the treatments, IF and DF.

Significance of the Study

Today, in most classroom settings, the routine of testing students

and giving them feedback on their test performance has become an integral part of teaching procedures. Although teachers usually make an effort to return test results to students as quickly as possible, students frequently wait several days or even weeks for the results of their test performance (delayed feedback situation).

With respect to this situation, when students experience DF, the evidence reported by Sassenrath and Yonge (1968), More (1969), and Vandyke and Newton (1970) indicates that subtle changes in achievement may occur. The present study provides a further check on the studies cited above by using actual classroom procedures and materials. Another major objective of this study, then, was to check on the influence of IF and DF on the achievement of material presented between the time of IF and DF. The third objective of this study was to check on the influence of IF and DF on the achievement of material presented following DF.

Since there are several studies cited in the literature that demonstrate GPA may interact with various teaching methods and techniques, GPA was also used as an organismic variable in the present study. The reason for using GPA in the present study was essentially the same as for the earlier cited studies. That is, to determine whether achievement would be significantly influenced by an interaction of the feedback treatments and GPA.

Secondary questions in the present study concerned the relationship of two cognitive measures (OPI and TICA) to the feedback treatments, IF and DF. Determination of the relationships between personality measures and treatment variables was viewed as a possible aid for explaining the results of the present study while providing a basis for future research.

Theoretical Approach to the Problem

Studies by Sassenrath and Yonge (1968) and Vandyke and Newton (1970), and More (1969) indicate the presistance of learned or achieved material will be greater under DF conditions as opposed to IF conditions. A psychological concept viewed as useful for interpreting this phenomenon is retroactive inhibition. Underwood (1966) employed the following classical experimental design for investigating the effects of retroactive inhibition.

RETROACTIVE INHIBITION			
EXPERIMENTAL GROUP	LEARN X	REST	RECALL X
CONTROL GROUP	LEARN X	LEARN Y	RECALL X

Repeated investigations of this design have shown that learning material Y will interfere with the subsequent recall of material X. In other words, the recall of material X by the control group will be proportionately less than the recall of material X by the experimental group.

The following design is produced by substituting the IF and DF treatments of the present study in the retroactive inhibition design.

DF (Experimental Group)	LEARN X	REST	RECALL X
IF (Control Group)	LEARN X	LEARN Y	RECALL X

The logic behind the illustration above is: (1) the IF group will learn more of Y than the DF group, (2) since more of Y will be learned, there will be more interference in the ability to recall X for the IF group than for the DF group. It should be noted that the logic in this approach will be valid only as long as the IF group learns a greater

proportion of material Y than the DF group, and this statement leads to the next important question: why should we assume that the IF group will learn and retain or remember a greater proportion of material Y than the DF group? Implied in this question is that some form of inhibition is taking place within the DF group, and to explain why this inhibition might take place, we now turn to the concept of proactive inhibition.

The classical design for investigating proactive inhibition effects is presented by Underwood (1966), and it is illustrated in the following way.

PROACTIVE INHIBITION			
EXPERIMENTAL GROUP	LEARN X	LEARN Y	RECALL Y
CONTROL GROUP	REST	LEARN Y	RECALL Y

This design, too, has been frequently used by many investigators, and the recall of material Y by the control group is typically greater than the recall of material Y by the experimental group. The inference drawn from this result is that the original learning of material X has interfered with the experimental groups ability to recall material Y.

Substitution of the IF and DF treatments in the proactive inhibition design produces the following illustration.

DF (Experimental Group)	LEARN X	LEARN Y	RECALL Y
IF (Control Group)	REST	LEARN Y	RECALL Y

In this case, we are expecting the DF group to have greater persistance with respect to their achievement of material X, and subsequently this will interfere with their recall of material Y.

At this point, we are again left with a problem of answering why we

should assume that the persistance in achievement of material X will be greater for the DF group than the IF group. To answer this question, we must make a third assumption which appears to underly both the assumptions made earlier with respect to retroactive and proactive inhibition. In other words, before we can use the concepts of retroactive and proactive inhibition as explanations for differences in achievement, we must, in the first place, ask why DF as opposed to IF will produce achievement that persists over some defined period of time.

The Zeigarnick effect theory is viewed as having value for understanding why we should assume DF will result in achievement which persists for a defined period of time. Zeigarnick (1927) postulated that, when actively working on a task, some people develop "task tensions" that do not dissipate until they have completed the job at hand. If the task is not completed because of some interruption, this tension remains and the individual should, according to theory, continue to think about the uncompleted task and should be motivated to complete it, if given an opportunity. Zeigarnick was able to demonstrate the validity of his hypothesis by showing that 80 percent of the subjects in his studies recalled more of the uncompleted than of the completed tasks - the finding now known as the Zeigarnick effect.

Considering the DF condition as a special type of interrupted or non-completed task, we can interpret the effects of DF on achievement in terms of the Zeigarnick effect. In other words, the DF student, as opposed to the IF student, will experience "task tensions" that will cause him to continue to think about his uncompleted task, which in turn results in achievement that will persist for a longer period of time.

The three theories presented above (retroactive inhibition,

proactive inhibition, and Zeigarnick effect) are viewed as being most relevant for explaining the expected results. These theories not only provide a sound theoretical basis for the present study, but they indicate a means of interpreting the results while showing the way for future research.

Definition of Terms Used

Achievement

The attained ability to perform school tasks; the form of the instrument used to measure achievement in the present study was a multiple choice test, taken from Gibson's (1968) test manual that accompanies the text, Educational Psychology: A Programmed Text.

Feedback

Feedback consisted of providing the subjects the raw scores of their test performance and an indication of the corresponding letter grades (A, B, C, D, & F). The test questions and answers were not returned to the subjects during either IF or DF portions of the experiment.

Feedback, Immediate (IF)

Feedback that is provided to the IF group the first class period following the first testing period.

Feedback, Delayed (DF)

Feedback that is provided to the DF group the fifth class period following the first testing period.

Learning

The process involved in attaining the ability to perform school tasks (achievement). The multiple choice test questions were used as an indication of what was learned, or in other words, achieved.

Old Material

Subject matter presented in the course before the first testing period.

New Material

Subject matter presented in the course during the five class periods between IF and DF.

Post DF Material

Subject matter presented in the course during the five class periods following DF. After the additional material was presented, the second test was given during the sixth class period following DF.

Limitations of the Study

The present study limited its scope of investigation to students enrolled in educational psychology courses taught at a southwestern university during the fall semester, 1970. Any generalizations made from this study should be limited to similar populations as it is obvious that many variables may not have been accounted for in the sample selection.

Empirical Focus

Based on the theoretical approach to the IF and DF issue discussed

earlier, the following statements and questions were proposed.

I. The achievement test covering Old Material is specifically related to the concept of retroactive inhibition and the Zeigarnick effect.

   a. Will the DF group recall more, in terms of achievement test scores, of the Old Material than the IF group?

   b. Will the high GPA group recall more, in terms of an achievement test score, of the Old Material than the low GPA group?

   c. Will achievement test scores over the Old Material be significantly influenced by an interaction of the feedback treatments and GPA?

II. The achievement test covering the New Material is specifically related to the concept of proactive inhibition and the Zeigarnick effect.

   a. Will the IF group recall more, in terms of achievement test scores, of the New Material than the DF group?

   b. Will the high GPA group recall more, in terms of achievement test scores, of the New Material than the low GPA group?

   c. Will achievement test scores over the New Material be significantly influenced by an interaction of the feedback treatments and GPA?

III. The third set of questions are speculative in that a theoretical basis is not available to decide which treatment variable, IF or DF, will produce a superior amount of achievement on the Post DF Material.

   a. Will there be a difference, in terms of achievement test scores over Post DF Material, between the IF and DF groups?

   b. Will the high GPA group recall more, in terms of an achievement

test score, of the Post DF Material than the low GPA group?

c. Will achievement test scores over the Post DF Material be significantly influenced by an interaction of the feedback treatments and GPA?

IV. The secondary questions are basically concerned with the relationships between two personality measures (OPI and TICA) and the treatment variables (IF and DF).

a. Will various aspects of personality, as measured by the OPI, be highly correlated with the effects of the treatment variables, IF and DF?

b. Will the subjects need for closure, as measured by the TICA, be highly correlated with the effects of the treatment variables, IF and DF?

CHAPTER II

A REVIEW OF RELATED LITERATURE

It is the primary purpose of this review of related literature to provide a historical framework for viewing the IF versus DF controversy. In conjunction with this historical review, a second purpose is to reveal how certain learning theories are related to the feedback variable as it is commonly found in classroom situations.

Before beginning this review of the literature, we should note early studies used the term reinforcement instead of feedback, and the present study uses these terms interchangeably. Justification for considering reinforcement as feedback and vice versa may be found in the statement by Logan (1960) that he and other researchers view these concepts as being essentially identical.

Animal Learning

It is evident, when reviewing the literature concerned with the feedback variable, that early investigations relied on animal subjects for experimentation. For example, one of the earliest investigations was done by Clements (1928), using albino rats for subjects. Following Clements' work were studies by Hamilton (1929), Roberts (1930), and Warden and Diamond (1931) which also investigated the feedback variable by using white rats for subjects. The findings of all the animal studies cited above agreed with the work done by Wood (1933). Wood used

chicks as subjects and found that delays in reinforcement or feedback would consistently hinder an animal's progress in making correct choices. Thus, early studies were in general agreement that the more quickly feedback or reinforcement is provided to an organism, the more rapid the acquisition of a desired response.

By the early thirties, enough evidence had accumulated to provide a basis for theory building concerning the feedback variable, and perhaps the best known theorist to first devise a theoretical model was Clark Hull (1932). Briefly, Hull's theorizing dealt mainly with explaining why animals make some choices and eliminate others in reaching a prescribed goal. Due to inconsistancies between Hull's early formulations and the results of animal studies which followed, Hull (1943, 1952) revised certain aspects of his initial theory. However, we should note that from the first stages of theory building to the later revisions, Hull's formulations, based on results of animal studies, always predicted that IF, as opposed to DF, was superior for facilitating the learning process.

Other theorists displayed interest in the effects of feedback. Spence (1947, 1956), for example, proposed his own theory to explain why DF hindered an organism's progress in making a correct response. It is notable that most of the specific details of Spence's (1947, 1956) theories, which were all based on studies that used animals as subjects, were in agreement with Hull's theorizing, that IF is the desirable mode of feedback over DF for facilitating learning.

At this point, it is important to recognize that the model building cited above by both Hull and Spence was supported by pure as opposed to applied research. In other words, their work may be viewed as summaries

of research done with animal subjects under controlled laboratory conditions. In focusing on discovering a logical pattern of animal behavior, Spence and Hull were not chiefly concerned with how their formulations could be directly applied to human behavior.

The literature review reveals that some investigators have made concerted efforts to apply the findings from research with animal subjects to human behavior, and perhaps the most clear-cut example can be found in the work of the prominent empericist, B. F. Skinner (1961, 1964). Skinner (1961) takes a position similar to the views expressed by Hull (1952) and Spence (1956) with respect to the feedback variable. Discussing the use of operant conditioning techniques and the scientific approach in the classroom, Skinner (1954) emphasizes the "practicality" of precisely controlling and providing immediate feedback to students in order to speed up the learning process. Support for Skinner's (1954) discussion comes directly from his investigations of learning wherein rats and pigeons were employed as subjects.

In fairness to Skinner's approach, we should note he is not alone in advocating IF in operant conditioning situations. Numerous investigators (Premack, 1959; Homme, deBaca, Devine, Steinhorst and Rickert, 1963; Krasner and Ullmann, 1967) have applied the learning principle of providing IF to facilitate the learning process to human subjects with a high degree of success. However, with respect to further investigations of human learning, to be discussed later in this review, we may be left with some questions as to whether the position of advocating IF over DF is actually considering some other important aspects of human learning.

Summarizing the positions presented above, of Hull, Spence, and Skinner, we find that, based on animal experimentation, IF as opposed to

DF is advocated in order to speed up or facilitate the learning process. We also find, in the discussion of Skinner's (1954, 1961) comments, that he encourages the use of IF for human learning situations.

As noted earlier in chapter one of this paper, Townsend and Burke (1962) and Blair, Jones and Simpson (1968) are a few of several educational psychologists who are in agreement with the experimentalists (Hull, Spence, Skinner) in advocating IF as opposed to DF for facilitating the learning process.

Although the main body of early investigations of the feedback issue has been conducted by using animals as subjects, some relatively recent studies have been conducted which used humans for subjects. The interesting aspect of these investigations, which used human subjects, is that results may be viewed as somewhat contradictory to the results of animal studies cited earlier. At the outset of this part of the discussion we should note studies with human subjects should be considered as only slightly comparable to the animal studies, in that, humans have the advantage of verbal cues to attend to while animals do not. However, the important comparative question is whether the basic generalizations available from the experiments with animals should be extended to apply to human learning situations.

Human Learning

In reviewing the literature which focuses on the feedback issue in human learning, it is notable that the types of studies may be divided into two categories: (1) studies which use verbal skills as learning tasks, and (2) studies which use performance skills as learning tasks.

We will first review those studies which used a performance skill

as a learning task. On simple motor tasks, DF does not appear to result in a performance decrement. Studies by Bilodeau and Bilodeau (1958), Denny, Allard, Hall, and Rokeach (1960), and Noble and Alcock (1958), demonstrated the crucial aspect of DF, with respect to simple motor tasks, is the time between responses, and not the time between responses and feedback. In other words, performance on a simple motor task is progressively reduced when the length of time between responses is increased. In addition, the time between a response and feedback did not appear to produce a significant effect. This means, where simple motor skills are needed, that delaying feedback, by itself, does not hinder performance unless the delay of feedback begins to effect the length of time between responses.

In experiments where verbal skill or some memory is involved, the results are somewhat contradictory with respect to the studies of simple motor tasks cited above. Saltzman (1951) and Bourne (1957) reported simple verbal and memory skills are inhibited by periods of DF. In these studies, the verbal skills required were not highly related to our everyday language since nonsense syllables were used for the material to be learned.

Following the studies by Saltzman (1951) and Bourne (1957), Brackbill and associates (Brackbill, Boblett, Davlin, and Wagner, 1963; Brackbill, Bravos, and Starr, 1962; Brackbill, Isaacs, and Smelkinson, 1962; Brackbill and Kappy, 1962; Brackbill, Wagner, and Wilson, 1964) found that with Grade 3 or kindergarten boys and verbal tasks and materials that are related to our everyday language (not nonsense syllables), that DF was superior to IF on a test of retention when the DF period was 10 seconds. These interesting results pointed the way toward

further research of the DF issue which involved older subjects and more complicated verbally related tasks.

In summarizing the results of the studies just cited which used human subjects, we can begin to draw an important inference which relates to the present study. When humans perform simple motor tasks, where no verbal skill or cues are directly involved, a DF situation does not appear to hinder performance. Likewise, a DF situation does not appear to reduce the rate of learning when verbal cues are present, and in fact, the DF condition was demonstrated to facilitate retention, in young children when DF time intervals were 10 seconds.

Results of these studies with humans appear to contradict results of the animal studies cited earlier where DF was demonstrated to inhibit the acquisition of a correct response. To understand this contradiction, we might consider the fact that humans can mediate or think about their response during the time interval during DF, and thereby, their performance on the learning task is not hindered. We should reinterate at this point that the studies which used humans, cited above, did not use materials or procedures which are typically found in the classroom (rote memory, performance and verbal experiments conducted in a controlled laboratory setting). It is due to the artificial settings, procedures, and materials used in the studies cited above, that we now turn to studies, closely related to the present study, that employed modified classroom settings, procedures, and materials to test for the effects of DF.

Sassenrath and Yonge (1968) ran an experiment to investigate the effects of feedback on the acquisition and retention of verbal material in a college classroom setting. Interest in this experiment was

primarily generated from the position that earlier investigations of the feedback variable with human subjects had used learning materials and criterion measures which are not typically associated with classroom learning situations. Another point of interest in this study was that measures of long term retention (retest after five days) of the learned material were included. The value of this measure is obvious since long-term retention of what is learned, rather than short-term recall, is usually the primary objective of school learning. The results of this study demonstrated that students receiving DF were able to score higher on achievement tests given five days after DF than the IF group.

Following the initial investigation by Sassenrath and Yonge (1968), which used verbal material in a classroom setting, Sassenrath and Yonge (1969) ran another experiment to investigate additional aspects of the feedback controversy. In this study, half of the subjects were provided with stimulus cues to aid in solving the problem. As in their earlier study cited above, the investigators used immediate and delayed feedback as one of the independent variables. The results of this study supported their earlier findings in that the DF group displayed the ability to retain more of the information after a period of time had passed. In addition, Sassenrath and Yonge found that stimulus cues, which were originally considered as an aid in learning the material, were not only superfluous, but actually interfered with the retention of material.

More (1969) was critical of the studies by Sassenrath and Yonge (1968, 1969) in stating that true experimental procedures of randomly assigning subjects to treatments were not followed. More's (1969) study was essentially a replication of the work by Sassenrath and Yonge (1968, 1969), but he was attempting to determine the optimal delay period for

facilitating retention. More employed verbal learning materials similar to those typically used in the classroom which eighth-grade students, and tried to overcome the problem of random assignment of subjects to treatments by using a covariance design. The results of this study again demonstrated that delay of feedback in a classroom setting produced an optimal amount of retention if the delay lasted for about one day. This study's implications to education are important to teachers who make a great effort to return graded tests to students as quickly as possible. The results indicated that the slow return of test results to students may actually be beneficial. In discussing his findings, More even stated that providing immediate feedback through the use of programmed materials and techniques "may not only be ineffective, but may actually inhibit retention learning."

Vandyke and Newton (1970) conducted an experiment which was related to the comments made by More (1969) where he stated that the use of programmed materials and techniques to achieve IF should be questioned. Vandyke and Newton used computer assisted instructional methods to determine the effects of IF and DF. The results of this study did not demonstrate any difference in performance between the IF and DF groups. The authors accounted for this lack of difference by explaining that the interest level of the students in the subject matter may have confounded the results.

Summarizing the preceeding studies, which used human subjects with classroom materials and testing techniques, we find there is apparently no clear-cut answer as to whether IF or DF should be used in the classroom. It is due to these inconsistancies that a modified replication of the studies by Sassenrath and Yonge (1968, 1969), More (1969), and

Vandyke and Newton (1970) was suggested for the present study.

Theoretical Foundations

A basic obligation in replicating any research is to revise, improve, and generally extend the investigation to gain further information to thus encourage additional research about the topic under consideration. It is for this purpose that we now briefly review the theories and studies which deal with the concept of retention. Specific relationships between the theories and studies to be presented and the present study will not be covered in this chapter. For review of the theories and studies as related to the feedback variable in the present study, the reader is referred to the Theoretical Approach to the Problems and Theoretical Focus sections of chapter one.

Hall (1966) points out that most contemporary investigators account for retention losses in terms of the concepts of proactive and retroactive inhibition. Prior to the use of the concept "inhibition," many early investigators supported the idea that "disuse" would account for why losses in retention take place. The experimental work of Jenkins and Dallenback (1924) and a replication of this study by Van Ormer (1932) were the initial attacks against such a position. In essence, these studies found that the disuse explanation was not adequate to explain specific decrements in retention.

These experimental findings were used as a basic point in McGeoch's (1932) now classic paper attacking disuse as a fundamental variable in explaining losses in retention. McGeoch considered the basic factor to account for losses in retention to be the activity which is interpolated between the original learning and the test for retention. This condition

has been given the name "retroactive inhibition." Specifically, this term refers to a retention decrement resulting from activity which has been interpolated between the original learning and the test for retention.

Melton and Irwin (1940), varied the amount of interpolated learning and found support for McGeoch's (1932) work. In their study, serial lists of nonsense syllables were used as the learning material. Five trials of original learning were provided, followed by either 5, 10, 20, or 40 trials of the interpolated material. The original list was then relearned to a criterion of two perfect recitations. Retroactive inhibition, as measured by recall scores on the first relearning trial, increased from 5 to 20 trials of interpolated learning and then showed a slight decline at 40 trials.

Thune and Underwood (1943) extended Melton and Irwin's findings to the paired associate learning situation. The original and interpolated lists consisted of ten paired-associated which were learned by the anticipation method. Five original learning trials were provided followed by either 2, 5, 10, or 20 trials of interpolated learning. The original list was then relearned to a criterion of two perfect trials. The results closely paralleled the findings of previous investigations in that an increase in the amount of interpolated learning resulted in increased retroactive inhibition as measured by recall scores.

Underwood (1945) demonstrated that increases in retroactive inhibition take place as a function of the number of interpolated lists which are learned, in contrast to the numbers of trials which previous experimenters have employed. In this study, paired two-syllable adjectives comprised the learning material, with the original lists being learned

to a criterion of six or more correct responses. Following this, subjects learned either zero, two, four, or six interpolated lists; each list was presented for only four trials. Following the presentation of the appropriate number of interpolated lists, subjects relearned the original list to a criterion of two successive errorless trials. Results indicated retroactive inhibition, as measured by the mean number of correct responses on the first relearning trial, increased as a function of the number of interpolated lists which were presented.

In summary, the studies on retroactive inhibition have generally shown that as the degree of interpolated learning increases, the amount of retroactive inhibition increases.

Many investigators have also acknowledged that learning which has taken place prior to the learning and recall of material may inhibit recall. The interference that such activity provides has been classed as proactive inhibition.

An early investigation of proactive inhibition as a function of degree of first list learning was conducted by Underwood (1949). In this study, subjects learned lists of ten paired two-syllable adjectives. For one group, the first list was presented until three or more responses were anticipated correctly on a single trial; whereas for the second group, the first list was presented until eight or more responses were correctly anticipated. The third condition consisted of presenting the first list until all ten items had been anticipated correctly on a single trial, after which five additional trials were given. A control group was employed which was not given any trials on the first list. Following presentation of the first list, the second list was presented until six or more responses were anticipated on a single trial. The

second list was recalled after either 20 or 75 minutes, and Underwood found that proactive inhibition increased as the degree of first list learning increased.

Thus, significant amounts of proactive inhibition were produced by the two highest degrees of first list learning when retention was measured 20 minutes after the learning of the second list. When proactive inhibition was measured after 75 minutes, the results revealed that only the highest degree of first list learning produced a significant amount of proactive inhibition.

Atwater (1953) also examined proactive inhibition as a function of the degree or amount of first list learning. Briefly, his findings supported those obtained by Underwood (1949), and indicated that proactive inhibition increased as the degree of first list or prior learning increased.

To summarize, the experimental evidence suggests the position that increasing the degree of first list learning will increase the relative amount of proactive inhibition. As noted earlier, the relationship of proactive inhibition to the present study may be referred to in chapter one of this paper.

To relate the concept of retention to only task oriented investigations of retroactive and proactive inhibition would leave out some major components where human learning is concerned. These obviously important factors are human emotion and/or motivation. Glickman (1961) has reviewed several relevant studies which focus on the contribution of emotion to retention ability; from his point of view, some instances of losses in retention are clearly tied to the emotional state of the individual.

An early study in support of Glickman which goes beyond the conventional inhibitory explanations was presented by Zeigarnick (1927). By giving children and adults simple but interesting tasks to work on, and interrupting half of these tasks before completion, Zeigarnick was able to demonstrate that interrupted tasks were better remembered than completed tasks. Zeigarnick explained these results by stating that uncompleted tasks left the subject in a state of tension, and when a task is completed, tension is correspondingly relieved. This need state, then, led to differential retention effects in subjects according to task completion or incompletion. Although the effects on retention are limited in this example to a specific set of conditions, it does illustrate that inhibition sources may exist in a complex relationship between the learner and the task requirements.

More recently, Martin and Davidson (1964) applied the completed and uncompleted task treatment to achievers and underachievers to determine whether differential effects might be found. The results of this study showed that achievers recalled more of the incompleted tasks than underachievers of similar ability. In concluding, the authors state that their results seem to indicate there may be reasons for losses in retention which, as yet, have not been investigated.

Recently, there has been what this writer views as an attempt to apply the Zeigarnick effect principle to classroom situations. The use of the Zeigarnick effect principle in the classroom means that dissatisfaction induced by an incomplete "discovery learning" session may predispose students to remember and want to return to a particular subject. In fact, some advocates of this approach (Postman and Weingartner, 1969) have urged teachers to deliberately cut off dicussions before closure is

achieved on the assumption that the participants will be more likely to remember what has been analyzed and more inclined to complete the learning experience on their own.

Summary Statement

In the preceeding review, we find: (1) studies of animal learning were the first to consider the IF versus DF controversy; (2) findings from these animal studies led to theorizing which has been applied to human learning situations; (3) the theorizing has recently been questioned and investigated by using human subjects and, in many cases, opposite effects of IF and DF have been found; (4) other related research apparently affirms the contradictory results found by researchers of the feedback issue who used humans as subjects, and suggest that some as yet not investigated factors may contribute to the effects of feedback.

CHAPTER III

METHOD AND PROCEDURE

Subjects

Subjects used in this study were 51 junior and senior students enrolled in two educational psychology classes taught at a large mid-western university. All students in both of the educational psychology classes served as the initial pool of subjects.

Treatment groups, into which subjects were placed, were considered to be homogeneous in terms of previously attained academic achievement and general intellectual ability. This judgment was predicated on the basis that: (1) attainment of the junior and senior level in college requires that students pass through several rigorous selection procedures, (2) that students in the study were viewed to be typical juniors and seniors in terms of attained achievement and intellectual ability, and (3) that random assignment procedures, to be discussed later, provided assurance that distributions of student achievement and ability within the two treatment groups (IF and DF) would be equal.

Methodology and Design

Cumulative grade point averages (GPAs) through the previous semester, were collected from the registrar's office for each student. In gathering the GPAs, precautions were taken to assure that students would not be aware that this information had been gathered. Students from

both of the educational psychology classes were combined for the purpose of rank ordering all 51 subjects according to their GPA. Following the rank ordering, the twenty-fifth, twenty-sixth, and twenty-seventh ranked subjects were dropped from the study leaving a total of 48 subjects. The 48 subjects which remained were then divided into two groups by using the median-break method with 24 high GPA subjects in one group and 24 low GPA subjects in the other group.

By using a table of random numbers (Zimny, 1961), each member of the high GPA group and each member of the low GPA group was randomly assigned to one of two treatment conditions, IF or DF. This resulted in each of the treatment groups (IF and DF) containing 12 high GPA subjects and 12 low GPA subjects. The subjects within each of the above described categories (IF high GPA, IF low GPA, DF high GPA, DF low GPA) were approximately equally distributed within the two classes.

The fixed-effect model was employed (Edwards, 1968, p. 308) and the independent variable consisted of providing subjects with either IF (feedback the first class period following the first test) or DF (feedback the fifth class period following the first test). As a check for interactive effects, GPA was used as an organismic variable.

To measure the effects of the independent variable (IF and DF) and the organismic variable (high and low GPA), three dependent measures were used in the experiment. By employing three dependent variables, three separate checks on the effects of the treatment variables were possible. Dependent measures consisted of achievement scores obtained from three tests, given altogether as one test on the sixth class period following DF.

In addition, two personality measures (OPI and TICA) were taken

near the end of the semester. Pearson r correlational techniques (Edwards, 1968) were used between these personality measures and the treatment effects of IF and DF to gain further insights for understanding the experimental portion of this study.

Procedures

In discussing the procedures employed in this study, it is important to note that a chronological ordering of material presentation, treatments, and data gathering will be followed. Describing events as they happened becomes important to preserve and examine the effects of the treatments as they relate to the Theoretical Focus and Theoretical Approach to the Problem sections of chapter I.

Two educational psychology classes were used, and conscious efforts were made to keep classroom procedures and material presentations identical and equal between both classes. The only exception to usual teaching procedures was the presentation of treatment variables (IF and DF) to subjects.

Table I illustrates the chronological sequence of class periods as related to the procedure of material presentation for all subjects.

The following discussion is provided as an aid for explaining in depth the contents of Table I.

Handout: During the first class meeting, all students in both sections were given a handout which contained pertinent information for course testing and evaluation procedures. The following list contains items covered in this handout which are relevent to the present study.

I. Testing

Table I

CHRONOLOGICAL SEQUENCE OF CLASS PERIODS,

PROCEDURES, AND METHODS

Fall Semester, 1970 Begins		
Class Period(s)	Procedure	Method
1	Handout	Description of exams and evaluation process
1 to 10	Old Material	Instruction constant for all subjects
11	Test #1	30 multiple choice items covering Old Material given to all subjects
12	IF	Raw scores and letter grades returned to the IF group
12 to 16	New Material	Instruction constant for all subjects
16	DF	Raw scores and letter grades returned to the DF group
16 to 21	Post DF Material	Instruction constant for all subjects
22	Test #2	30 multiple choice items covering Old Material, 30 multiple choice items covering New Material, 30 multiple choice items covering Post DF Material
33	OPI(Personality test)	Given as instructional material for the course
35	TICA(Tolerance Intolerance of Ambiguity test)	Given as instructional material for the course
37	Desensitization	Discussion of experiment as a learning experience

A. Four one hour exams will be given during the semester.
   1. exams 1 and 2 will be multiple choice
   2. exams 3 and 4 will contain multiple choice, completion, and matching items.
B. Only the raw score of your test performance and the accompanying letter grade (A, B, C, D, F) will be returned to you after taking a test.
C. No make up exams will be given.

II. Evaluation

A. Final grades will depend on the total number of points accumulated by the student.
B. Later in the semester, we will discuss the measuring and evaluation procedures used in this course in relation to "good" and "bad" teaching practices.

III. Texts

A. Educational Psychology: A Programmed Text by Gibson (1968)
B. Educational Psychology: Selected Readings by Sprinthall and Sprinthall (1968)

IV. Assignments

A. All assignments made in the texts will be made as the semester progresses.
B. You should make an effort to review old assignments on a periodic basis since some of the tests may cover material from old assignments.

In regard to the testing portion of the handout, students were advised that tests would be announced a week in advance, and that only excused absences (written excuse by a doctor, etc.) would be accepted to avoid getting an F for a particular exam grade.

Old Material: The first ten class meetings before the first test were devoted to covering material that dealt with: (1) the scientific method in the behavioral sciences, (2) the scientific method as applied to classroom teaching, and (3) the use of statistics in the behavioral sciences and classroom teaching. All of the material presented in class during the first ten class periods was specifically related to the first

four chapters assigned to students from Gibson's (1968) text, Educational Psychology: A Programmed Text. The present study refers to the material covered in class and in Gibson's text during the first ten class meetings as Old Material.

Test #1: The first test consisted of 30 multiple choice items taken specifically from Gibson's (1968) instructor's manual that accompanies the text Educational Psychology: A Programmed Text. The content of these test items dealt only with Old Material; presentations and discussions in the first ten class meetings and the initial text book assignment. Subjects were told that "due to a busy schedule," the instructor might not finish grading all of the test papers by the following class meeting.

IF: The class period following test #1, only the IF subjects in both sections were given feedback. As noted earlier, only raw scores of student achievement and an indication of the corresponding letter grades were returned to students. The test items, as such, were not returned, but a general discussion of the test, lasting roughly fifteen minutes, did take place.

New Material: The five class periods following the first testing period were devoted to text assignments and classroom presentations that covered topics which this paper has titled New Material. The New Material consisted of: (1) material related to human development, and (2) material showing the relationship between early human development, and subsequent classroom achievement and socialization processes. The material presented during these five class periods following IF was

specifically related to chapters 5, 6 and 7 assigned from Gibson's (1968) text, Educational Psychology: A Programmed Text.

DF: Near the end of the fifth class meeting following the first test, raw scores and corresponding letter grades from the first test were returned to the DF group. Again, as with the IF subjects, test items were not returned, but a short discussion of the test did take place.

Post DF Material: During the five class periods following DF, subject matter titled Post DF Material was presented. Post DF Material consisted of: (1) various stage theories of human development and (2) the relationships between stage theories and classroom situations. Material presented during the five class periods following DF was specifically related to the reading assignment; chapters 8, 9, and 10 from Gibson's (1968) text, Educational Psychology: A Programmed Text.

Test #2: The second test consisted of 90 multiple choice items. The first thirty items were the same items given in test #1. The remaining 60 items were: (1) thirty items covering the New Material and (2) thirty items covering the Post DF Material, All of these test items were taken from Gibson's (1968) text Educational Psychology: A Programmed Text. Following test #2, all subjects received feedback on their test achievement in terms of a raw score and the corresponding letter grade. In addition, all of the students in both sections were instructed that they might retake either of the exams (Test #1 or #2) if they were not completely satisfied with their past test achievement.

OPI Personality Test: Near the end of the semester, a personality inventory test (OPI) was given to all of the students in both classes as a

learning exercise. The following instructions were read aloud to all of the students prior to handing out the testing materials.

> You are about to take a personality test which we will use as a learning experience in conjunction with our discussions on personality during the coming week. The primary reasons for you to take this test are: (1) the experience of taking a group administered personality test, (2) observing the necessity of administrator control in group administered test, and (3) observing how questions which arise in group administered tests are handled. Before we begin, I should like to request that you faithfully respond to the questions on this inventory as if it were being taken to gain information about you as an individual. In short, try to make honest responses, you have nothing to fear in terms of your grade or anything else connected with your performance in this course. All responses on this test will be handled in an ethically proper and confidential way. The next time we meet, we will discuss some of the strengths and weaknesses of personality tests and some of the purposes behind their use.

It is important to note that a part of the preceding class period, before students were given the OPI, was devoted to discussing ethical practices in handling various test and otherwise confidential material. It was felt that this discussion of ethical practices might make honest responses more of a reality.

The class period following administration of the OPI was devoted to generally discussing the structure and content of personality tests. In addition, strengths and weaknesses of these kinds of testing materials were covered, but no specific interpretations of any test results were provided.

TICA (Tolerance Intollerance of Cognitive Ambiguity): The class period following the discussion of the OPI, the TICA was administered to all of the students. This test was introduced by reading the same introduction that was used for the OPI, except the initials TICA were substituted, where necessary, for the initials OPI. The class period following the

TICA administration period was devoted to a further discussion of test construction and administration. Again, students were not provided with any specific interpretations of the test results.

Desensitization: One class period, following all experimental treatments and tests, was spent discussing the fact that the student's test scores had served as data in an investigation of variables that might influence student achievement. It was further explained that each of the treatment groups (IF and DF) would be evaluated separately in order to derive a letter grade for each individual in the course. Students were encouraged to retake any of the course exams in the event that they felt their achievement record had suffered because of the treatment variables, IF and DF. We may note that no retakes were requested by any of the students.

In addition, students were questioned as to whether or not they were aware that they were serving as subjects in an experimental study. The response was unanimous that they were not aware a study was being conducted.

Instrumentation

The measurement of student achievement on subject matter content in the present study was confined to multiple choice type examinations. The items used in these exams were taken from Gibson's (1968) instructor's test manual that accompanies the text, Educational Psychology: A Programmed Text. Test items were presented to subjects in the same form and order as published in the instructor's test manual. Duplicate copies of the instructor's manual may be acquired by identifying one's

need or concern for obtaining these materials in writing to Appleton-Century-Crofts: New York, N. Y.

The thirty Old Material test items, used in this study, represented material that was covered during the first ten class periods after the beginning of the semester. These items were presented to all of the students in the first and second exams.

The thirty New Material test items, used in this study, represented material that was covered during the five class periods between IF and DF. These items were presented to all students during the second exam period.

The thirty Post DF Material test items, used in this study, represented material that was covered during the second exam period. Only raw scores (one point for each correctly marked answer) were used for all three of the dependent measures (Old, New, and Post DF Material).

Form F of the Omnibus Personality Inventory (OPI) was presented to all students during the thirty-third class meeting. Interested persons, qualified to inspect and use OPI materials may obtain duplicates of the OPI testing instrument by writing The Psychological Corporation, 304 East 45th Street, New York, N. Y., 10017. A description of each of the 14 scales used in form F of the OPI testing instrument are summarized in appendix A of this paper.

The Tolerance Intolerance of Cognitive Ambiguity (TICA) test was presented to all subjects during the thirty-fifth class meeting. As this test is not formally published for distribution, a copy of this instrument with directions for administering and scoring may be found in appendix B of this paper. Questions regarding the practical and ethical use of this instrument should be directed to Dr. John Hampton, Professor

of Educational Psychology, Oklahoma State University.

Statistical Treatment of Data

To facilitate the application of statistics to the data, experimental hypotheses in the null form were stated. The resulting experimental hypotheses are as follows:

(1) The DF group will not recall more, in terms of achievement test scores, of the Old Material than the IF group.

(2) The high GPA group will not recall more, in terms of achievement test scores, of the Old Material than the low GPA group.

(3) Achievement test scores over the Old Material will not be significantly influenced by an interaction of the feedback treatments and GPA.

(4) The IF group will not recall more, in terms of achievement test scores, of the New Material than the DF group.

(5) The high GPA group will note recall more, in terms of achievement test scores, of the New Material than the low GPA group.

(6) Achievement test scores over the New Material will not be significantly influenced by an interaction of the feedback treatments and GPA.

(7) There will be no significant difference, in terms of achievement test scores over Post DF Material, between the IF and DF groups.

(8) The high GPA group will not recall more, in terms of achievement test scores, of the Post DF Material than the low GPA group.

(9) Achievement test scores over Post DF Material will not be

significantly influenced by an interaction of the independent variable feedback and the organismic variable GPA.

(10) There will not be a significant relationship between a test of personality (OPI) and the treatment variables (IF and DF).

(11) There will not be a significant relationship between a test for the need for closure or the lack of this need (TICA) and the treatment variable (IF and DF).

Following the collection of data, hypotheses One through Three, Four through Six, and Seven through Nine were each tested by means of a 2x2 analysis of variance (ANOVA) design (Bruning and Kintz, 1968, pp. 25-30). Using the one tailed test for significance, the .05 alpha level was prescribed for accepting or rejecting hypotheses One, Two, Three, Four, Five, Six, Eight, and Nine. The two tailed test for significance was prescribed for accepting or rejecting hypotheses Seven. The alpha level for the two tailed test was set at the .05 level.

The Pearson product-moment correlation (r) (Bruning and Kintz, 1968, pp. 152-155) was used to determine if there was a significant relationship between the two personality measures (OPI and TICA) and the treatment variable (IF and DF). It is important to note that comparisons were made between the personality measures and each set of dependent variable scores (Old, New, and Post DF Material).

Summary

This chapter has presented: (1) the sample used in this study, (2) the procedure of randomly assigning subjects to treatment groups, (3) the sequence and basic content of classroom presentations, (4) the measuring instruments employed, and (5) the techniques used in statistically

testing the various hypotheses. Hypotheses 1-11 were stated in the null form and confidence limits were established at the .05 level.

CHAPTER IV

ANALYSIS OF THE DATA

This chapter presents and discusses the results derived from the analyses of the data. As indicated in chapter II, the present study was an experimental investigation which employed an independent variable (IF and DF), an organismic variable (high and low GPA), and three dependent variables (Old, New, and Post DF Material achievement tests). Secondary questions consisted of determining whether a relationship existed between the treatment effects and two cognitive measures, OPI and TICA.

Three separate 2x2 analyses of variance designs were used to analyze differences in performance among the various treatment groups. The first 2x2 analysis was performed as a check for retroactive inhibition by using the data collected from the Old Material achievement scores of test #2. The second 2x2 analysis was performed as a check for proactive inhibition by using the data collected from the New Material achievement scores of test #2. The third 2x2 analysis was performed by using the data collected from the Post DF Material achievement scores of test #2, but since no theoretical basis was available from the literature, a directional hypothesis for the main effect IF and DF was not made.

A Pearson product-moment correlation (r) technique was used to determine whether the two personality measures (OPI and TICA) were related to the treatment variables (IF and DF). Two hypotheses were generated

for testing this relationship and correlations were computed for the following:

(1) OPI relationship to Old Material achievement

(2) OPI relationship to New Material achievement

(3) OPI relationship to Post DF Material achievement

(4) TICA relationship to Old Material achievement

(5) TICA relationship to New Material achievement

(6) TICA relationship to Post DF Material achievement

Findings Pertaining to Hypotheses One, Two, and Three

H_1: The DF group will not recall more, in terms of achievement test scores, of the Old Material than the IF group.

H_2: The high GPA group will not recall more, in terms of achievement test scores, of the Old Material than the low GPA group.

H_3: Achievement test scores over the Old Material will not be significantly influenced by an interaction of the feedback treatments and GPA.

The analyses of raw scores from the Old Material which pertain to hypotheses One, Two, and Three will now be presented. Table II shows the sum of squares (SS), degrees of freedom (df), mean squares (ms), F ratios (F), and probability (p) of significance for hypotheses One, Two, and Three.

Results presented in Table II show effects produced by the independent variable feedback were not significant. Hypothesis One therefore was not rejected.

Table II also shows effects produced by the organismic variable GPA

Table II

ANALYSIS OF VARIANCE SOURCE TABLE OF

"OLD MATERIAL" TEST SCORES

Source	SS	df	ms	F	p
Feedback	1.3234	1	1.3234	0.0957	n.s.
GPA	120.3334	1	120.3334	8.7059	$<.01$
FXG	2.0931	1	2.0931	0.1514	n.s.
Error	608.1668	44	13.8220		
Total	731.967	47			

were significant at the .01 level of confidence. Consequently, hypothesis Two was rejected. In other words, high GPA subjects scored significantly higher on the Old Material achievement test than the low GPA subjects. This relationship may be seen more clearly in Table III.

The results of the statistical test for the third hypothesis, which was concerned with interactive effects, is also shown in Table II. It may be seen that the influence on achievement by the interaction of feedback and GPA was not significant. Based on this fact, hypothesis Three was not rejected.

Inspection of Table III shows sums of the mean scores for the DF group are slightly higher than the sums of mean scores for the IF group. As noted earlier from results presented in Table II, the difference, shown below, between the IF and DF groups was not significant.

Table III also shows the sums of the mean scores for the high GPA students were higher, as predicted in hypothesis Two, than sums of the

mean scores for low GPA students. By referring back to results shown in Table II, we may again note differences between high and low GPA students were significant ($p. < .01$).

Table III

MEANS AND STANDARD DEVIATIONS OF

"OLD MATERIAL" TEST SCORES

	IF		DF		Sums	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
High GPA	24.4167	2.7784	24.3333	2.4618	24.3750	2.5675
Low GPA	20.8333	4.2391	21.5833	4.5816	21.2083	4.4719
Sums	22.6250	3.9542	22.9583	4.0160	22.7917	3.9462

In addition, Table III shows low GPA raw scores were more widely distributed than the high GPA group (low GPA S.D. sum = 4.4719, high GPA S.D. sum = 2.5675). However, an F-Maximum Test for Homogeneity of Variances was computed (Bruning and Kintz, 1968, pp. 110-111), and results, summarized below, indicate groups were homogeneous in their achievement of Old Material.

From a table of F_{max} values (Bruning and Kintz, 1968, p. 235) we find with 4 variances and 11 degrees of freedom, values larger than 4.79 will be significant at the .05 level.

$$F_{max} \text{ Test} = \frac{23.5379}{6.0606} \simeq 3.8837 \text{ n.s.}$$

Figure 1 illustrates how achievement scores on Old Material were

influenced by feedback and GPA.

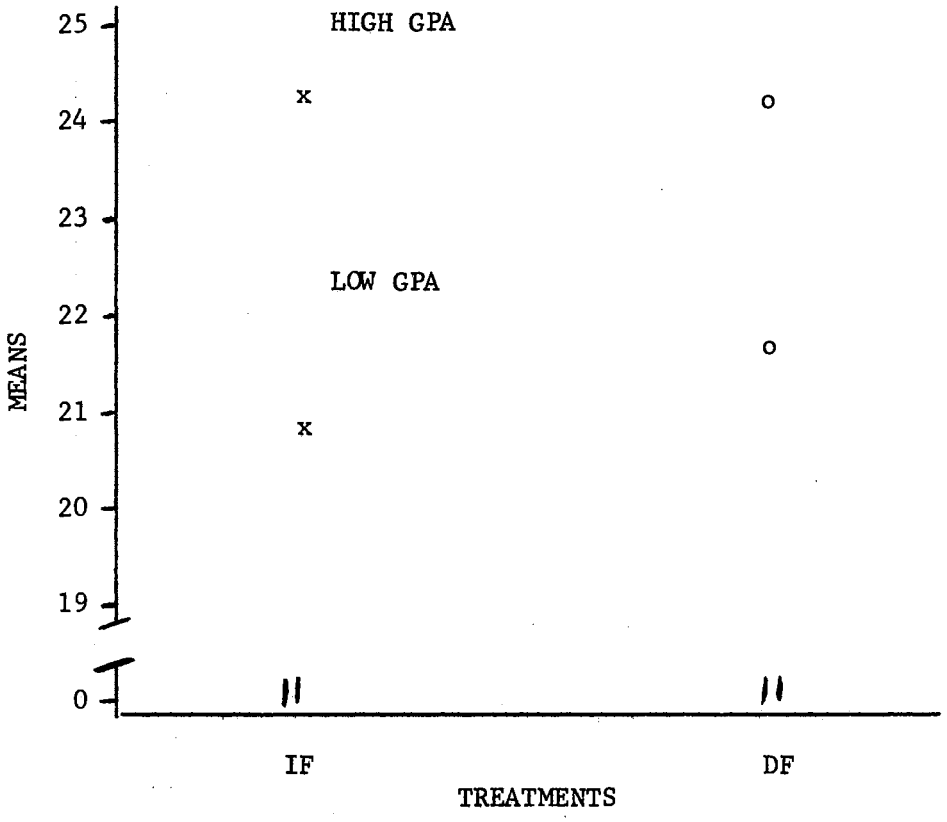

Figure 1. Graphic Representation of Effect of Feedback and GPA on Academic Achievement of Old Material

Figure 1 reveals the relationship between the independent variable (IF and DF) and organismic variable (high and low GPA). As noted earlier in the discussion of Table II, significant interactive effects were not found.

Findings Pertaining to Hypotheses Four, Five, and Six

H_4: The IF group will not recall more, in terms of achievement test scores, of the New Material than the DF group.

H_5: The high GPA group will not recall more, in terms of

achievement test scores, of the New Material than the low GPA group.

H_6: Achievement test scores over the New Material will not be significantly influenced by an interaction of the feedback treatments and GPA.

Analyses of raw scores from New Material which pertain to hypotheses Four, Five, and Six will now be presented. Table IV shows the sum of squares (SS), degrees of freedom (df), mean squares (ms), F ratios (F), and probability (p) of significance for hypotheses Four, Five, and Six.

Table IV

ANALYSIS OF VARIANCE SOURCE TABLE OF "NEW MATERIAL" TEST SCORES

Source	SS	df	ms	F	p
Feedback	22.6875	1	22.6875	2.0397	n.s.
GPA	54.1875	1	54.1875	4.8716	$<.025$
F G	7.5207	1	7.5207	0.6761	n.s.
Error	489.4168	44	11.1231		
Total	573.8125	47			

Results presented in Table IV indicate treatment variable, IF and DF, did not produce significant effects. Therefore, hypothesis Four was not rejected.

Effects on achievement of New Material by the organismic variable

(high and low GPA), presented in Table IV, were significant ($p < .025$). Thus, hypothesis Five was rejected as there was a difference, in terms of achievement of New Material, between the high and low GPA groups.

Results of the test for the Sixth hypothesis, which dealt with interactive effects, may also be seen in Table IV. Table IV shows the influence on achievement of New Material by an interaction of feedback and GPA was not significant. Consequently, the Sixth hypothesis was not rejected.

Table V shows the computed means and standard deviations for New Material data. The findings shown in Table V are to accompany Table IV in explaining effects of independent and organismic variables.

Table V

MEANS AND STANDARD DEVIATIONS OF

"NEW MATERIAL" TEST SCORES

	IF		DF		Sums	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
High GPA	22.3333	3.3121	22.9167	2.3533	22.6250	2.8255
Low GPA	19.4167	3.5280	21.5833	3.9413	20.5000	3.8221
Sums	20.8750	3.6631	22.2550	3.2471	21.5625	3.4941

Table V shows sums of mean scores for IF and DF groups differ in the opposite direction of the hypothesized result. In other words, hypothesis Four, which is based on the proactive inhibition theory, predicted the IF group would achieve more of the New Material than the DF

group, but the opposite of this predicted effect occurred (IF sum of mean scores = 20.8750; DF sum of mean scores = 22.2550). However, by referring to Table IV, we may note again the effects of feedback were not significant.

Table V also shows sums of the mean scores for the GPA students were higher, as predicted in hypothesis Five, than sums of mean scores for low GPA students. Referring again to Table IV we find effects of GPA were significant at the .025 level of confidence.

Inspecting the computed standard deviation values presented in Table V shows there were only slight differences in dispersion between the experimental groups (IF S.D. sum = 3.6631, DF S.D. sum = 3.2471, high GPA S.D. sum = 2.8255, low GPA S.D. sum = 2.8221). Another F-Maximum Test for Homogeneity of Variances was computed, and results, presented below, indicate groups were homogeneous in their achievement of New Material.

From a table of F_{max} values we find that with 4 variances and 11 degrees of freedom, values larger than 4.79 will be significant at the .05 level.

$$F_{max} \text{ Test} = \frac{15.5379}{10.5435} = 1.4737 \text{ n.s.}$$

Figure 2, is a graphic representation of how achievement scores on New Material were influenced by feedback and GPA.

Figure 2 illustrates the relationship between effects of independent variable (IF and DF) and effects of organismic variable (high and low GPA). As noted earlier in the discussion of Table IV, significant interactive effects were not found.

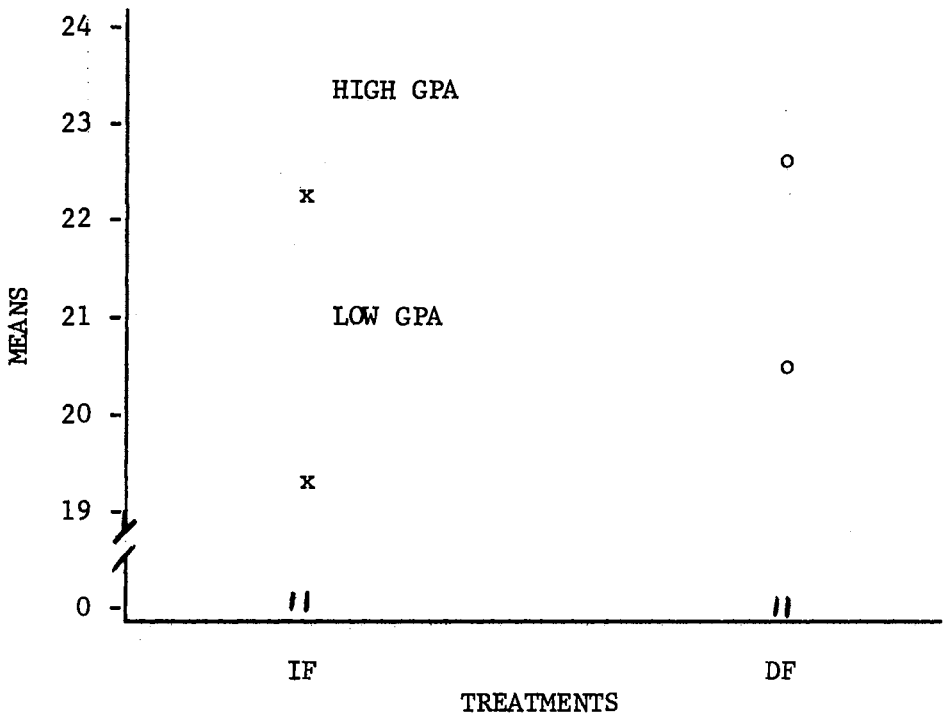

Figure 2. Effect of Feedback and GPA on Academic Achievement of New Material

Findings Pertaining to Hypotheses Seven, Eight, and Nine

H_7: There will be no significant difference, in terms of achievement test scores over Post DF Material, between the IF and DF groups.

H_8: The high GPA group will not recall more, in terms of an achievement test scores, of the Post DF Material than the low GPA group.

H_9: Achievement test scores over Post DF Material will not be significantly influenced by an interaction of the independent variable feedback and the organismic variable GPA.

The analyses of raw scores from the Post DF Material, which pertain to hypotheses Seven, Eight, and Nine, are presented below. The sum of squares (SS), degrees of freedom (df), mean squares (ms), F ratios (F), and probability (p) of significance for hypotheses Seven, Eight, and Nine are shown in Table VI.

Table VI

ANALYSIS OF VARIANCE SOURCE TABLE OF

"POST DF MATERIAL" TEST SCORES

Source	SS	df	ms	F	p
Feedback	0.0834	1	0.0834	0.0095	n.s.
GPA	33.3334	1	33.3334	3.7980	$<.05$
F G	0.3331	1	0.3331	0.0380	n.s.
Error	386.1668	44	8.7765		
Total	419.9167	47			

Statistical results presented in Table VI show that independent variable (IF and DF) did not produce significant effects. Consequently, hypothesis Seven was retained.

Effects on achievement of Post DF Material by the organismic variable (high and low GPA) was significant ($p. < .05$). Therefore, hypothesis Eight was rejected since a difference, in terms of Post DF Material achievement, was demonstrated between high and low GPA groups.

Interactive effects, which were examined for hypothesis Nine, are also presented in Table VI. Results of the test for hypothesis Nine

show the influence on the achievement of Post DF Material by an interaction of feedback and GPA was not significant.

Table VII shows computed means and standard deviations for Post DF Material data.

Table VII

MEANS AND STANDARD DEVIATIONS OF

"POST DF MATERIAL" TEST SCORES

	IF		DF		Sums	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
High GPA	17.9167	1.5051	17.8333	3.3799	17.8750	2.5591
Low GPA	16.0833	3.9648	16.3333	2.3868	16.2083	3.2030
Sums	17.0000	3.0787	17.0833	2.9623	17.0417	2.9890

Table VII shows sums of mean scores for the IF group are slightly higher than sums of mean scores for the DF group (IF X sums = 17.0000, DF X sums = 17.0833). As noted earlier in Table VI, differences in achievement scores on Post DF Material was not significant, and hypothesis Seven was not rejected.

Table VII also shows sums of mean scores for the high GPA group are higher, as predicted, than sums of mean scores for the low GPA group. By again referring back to Table VI, we may note that differences in Post DF Material achievement between the high and low GPA subjects was significant ($p < .05$).

Results presented in Table VII indicate differences in dispersions

of Post DF Material scores between various treatment groups (IF S.D. sum = 3.9542, DF S.D. sum = 4.0160, high GPA S.D. sum = 2.5675, low GPA S.D. sum = 4.4719). An F-Maximum Test for Homogeneity of Variances was computed, and results, summarized below, indicate groups were not homogeneous in their achievement of Post DF Material.

From a table of F_{max} values, with 4 variances and 11 degrees of freedom, we find values larger than 6.9 will be significant at the .01 level.

$$F_{max} \text{ Test} = \frac{15.7197}{2.2652} = 6.9397 \text{ significant}$$

Although the F_{max} test demonstrated a between group difference in variances, theoretical assumptions underlying the use of ANOVA designs were not violated as an equal number of subjects were assigned to treatment conditions.

Figure 3 is a graphic representation of how achievement scores on Post DF Material were influenced by feedback and GPA.

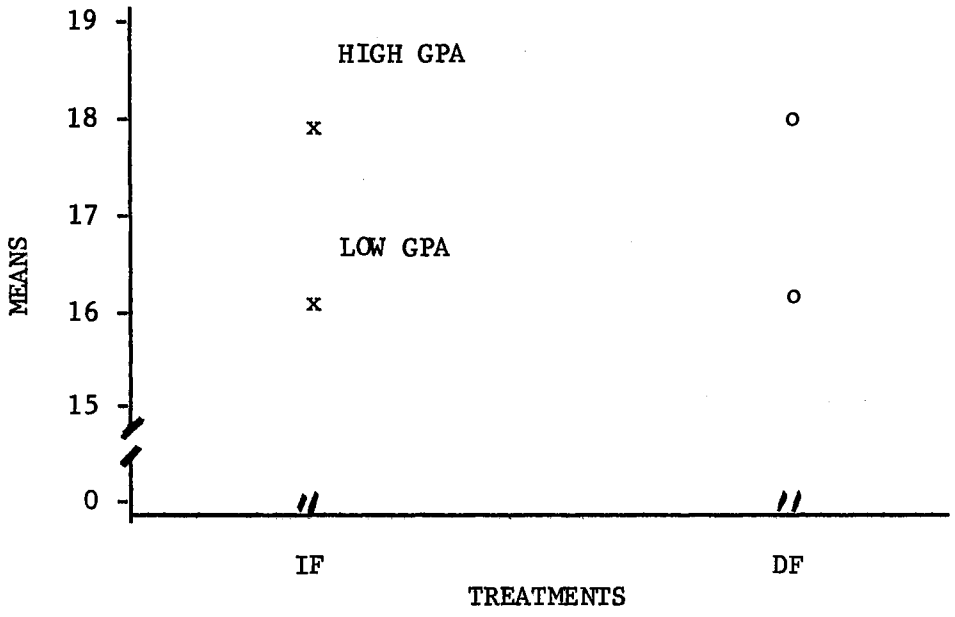

Figure 3. Effects of Feedback and GPA on Academic Achievement of Post DF Material

Figure 3 shows relationships between the effects of independent variable IF and DF and the effects of organismic variable high and low GPA. Significant interactive effects, as indicated earlier in the discussion of Table VI, did not result.

Findings Pertaining to Hypotheses Ten and Eleven

H_{10}: There will not be a significant relationship between a test of personality (OPI) and the treatment variable (IF and DF).

H_{11}: There will not be a significant relationship between a test for the need of closure or the lack of this need (TICA) and the treatment variable (IF and DF).

Table VIII shows computed mean scores and standard deviations for all variables considered in the investigation of hypotheses Ten and Eleven. Summarized descriptions of variables contained in the two tests (OPI and TICA) may be viewed in appendixes B and C of this paper. Following Table VIII, Table IX presents a matrix of relevent Pearson-product moment correlations (r) of the above mentioned variables.

By inspecting the correlation coefficients shown in Table IX we find there are no positive or negative correlations exceeding .24016. Using a table of critical values for Pearson's r Correlation Coefficients (Bruning and Kintz, 1968, p. 229) we find: when n = 48, r must be larger than .2875 to be significant beyond the .05 level. Consequently, hypotheses Ten and Eleven are retained as there appears to be no significant correlations between achievement and OPI or TICA test scores.

Table VIII

MEANS AND STANDARD DEVIATIONS OF

CORRELATED MEASURES

	VARIABLE	MEAN	STANDARD DEVIATION
1.	Thinking Introversion	21.7083	6.3008
2.	Theoretical Orientation	17.5208	5.4265
3.	Estheticism	12.4792	4.2776
4.	Complexity	14.9583	5.6227
5.	Autonomy	25.7500	6.4955
6.	Religious Orientation	10.3958	5.5801
7.	Social Extroversion	23.1458	7.0379
8.	Impulsive Expression	28.1042	9.2535
9.	Personal Integration	33.9375	10.4381
10.	Anxiety Level	13.0417	4.8858
11.	Altruism	21.4375	5.0060
12.	Practical Outlook	14.5000	5.4850
13.	Masculinity-Femininity	25.2083	6.3479
14.	Response Bias	12.2917	3.9300
15.	TICA	60.0833	29.1466
16.	Old Material	22.9583	3.5308
17.	New Material	21.5208	3.3005
18.	Post DF Material	17.3333	3.2442

n = 48

Table IX

PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN MEASURES OF PERSONALITY AND OLD, NEW, AND POST DF ACHIEVEMENT SCORES

PERSONALITY VARIABLES	ACHIEVEMENT VARIABLES		
	OLD	NEW	POST DF
1. Thinking Introversion	0.04248	0.23050	0.04441
2. Theoretical Orientation	-0.20651	0.08313	-0.12368
3. Estheticism	-0.19869	-0.18383	0.01431
4. Complexity	-0.24016	0.01725	0.01944
5. Autonomy	0.00232	0.22951	0.06361
6. Religious Orientation	-0.21945	0.12142	-0.09677
7. Social Extroversion	0.09015	-0.01067	0.10219
8. Impulse Expression	-0.19291	-0.00878	-0.18262
9. Personal Integration	0.10789	-0.01818	0.12692
10. Anxiety Level	0.02970	0.14640	-0.04385
11. Altruism	0.13708	0.09666	0.19652
12. Practical Outlook	0.07141	-0.21802	-0.03946
13. Masculinity-Femininity	-0.03947	0.02213	-0.18424
14. Response Bias	0.11589	0.11434	-0.09623
15. TICA	-0.01899	0.14463	-0.05903

With n = 48, r must be larger than .2875 to be significant beyond the .05 level of confidence.

Summary of Findings

No significant effects of IF and DF were observed in any of the 2x2 statistical analyses. Significant effects on achievement of Old, New, and Post DF Material were observed as a result of GPA. High GPA students had significantly higher mean scores, as predicted, than low GPA students on all three analyses. Achievement of Old, New, and Post DF Material was not demonstrated to be significantly influenced by an interaction of feedback-GPA in any of the 2x2 analyses.

In addition, the hypotheses concerning relationships between the treatment variable (IF and DF) and two personality measures (OPI and TICA) were not viewed as significant. The largest correlation coefficient, either positive or negative, was 0.24016 and this numerical value of r was below the .05 level of confidence.

A more detailed discussion of these findings along with theoretical implications are presented in Chapter V.

CHAPTER V

SUMMARY, DISCUSSION AND RECOMMENDATIONS

The present study was an experimental investigation of the effects of differential feedback on academic achievement. Forty-eight junior and senior students enrolled in educational psychology courses taught at a large midwestern university were employed as subjects in the experimental design. By means of random assignment, the forty-eight subjects were placed, without their knowledge, into one of four treatment groups (IF high GPA, IF low GPA, DF high GPA, DF low GPA).

The experiment was conducted using materials and procedures which are typically employed in college teaching situations. Students were not informed of their participation in the study until after its conclusion. The only exception to maintaining normal methods of instruction was the manipulation of feedback of the first test result by the instructor. The present study's purpose was to determine whether results from more rigidly controlled experiments, found in the literature, should be applied to college classroom settings.

The text Educational Psychology: A Programmed Text by Gibson (1968) was the primary source of instructional material for the experiment. All three of the dependent measures (Old, New, and Post DF Material tests) were taken specifically from the instructor's manual that accompanies Educational Psychology: A Programmed Text. Old, New, and Post DF Material achievement scores were each analyzed, with respect to nine

primary hypotheses, by means of a 2x2 analysis of variance statistic. The primary hypotheses dealt with single main effects and interactive effects on achievement of feedback and GPA.

Near the end of the semester, the entire sample was administered two personality tests (OPI and TICA) using standard administration and scoring procedures. Two secondary hypotheses had been generated to determine relationships between these personality measures and effects of feedback. To test these hypotheses, results of the two personality measures were correlated, using a Pearson-product moment correlational technique (r), with effects of feedback on the three dependent measures (Old, New, and Post DF Material achievement scores).

Results of these statistical analyses are discussed in the section which follows. In addition, some of the theoretical implications of the results will be presented.

Conclusions and Implications

The present study attempted to determine whether differential feedback of test results, in terms of raw scores and letter grades, would influence academic achievement in college classroom settings. Nine primary hypotheses were developed to investigate effects of the feedback variable, and an organismic variable GPA was also employed to determine whether interactive effects might result. Two secondary hypotheses were generated to determine whether a relationship existed between achievement under IF or DF and two personality measures (OPI and TICA).

Hypothesis One concerned the effects of IF and DF on academic achievement of Old Material. The review of the literature and the theoretical basis presented in chapters one and two of this study

predicted DF subjects would retain a significantly greater proportion of Old Material than IF subjects. Recent studies demonstrated DF would facilitate retention of previously learned material, and the present study noted this result might be interpreted by using the theoretical concepts retroactive inhibition and the Zeigarnick effect. It was hypothesized that DF, as opposed to IF, creates an incompleted task situation which will facilitate retention of Old Material (Zeigarnick effect). Retention of Old Material would not be facilitated for the IF group, as compared to the DF group. This lack of retention of Old Material by the IF group would result in their attainment of significantly higher achievement scores on New Material tests than the DF group. In turn, the greater amount of learning of New Material would interfere with retention of Old Material (retroactive inhibition). However, significant differences in achievement of Old Material, in the present study, were not demonstrated (see Tables II & III).

The second hypothesis dealt with effects of high and low GPA on achievement of Old Material. As expected, high GPA subjects scored higher on the achievement test of Old Material than the low GPA subjects ($p < .01$).

The purpose of hypothesis Three was to check the possibility that achievement of Old Material might be influenced by an interaction of feedback and GPA. Results show no significant interactive effects were present.

Hypothesis Four was generated to determine the effects of IF and DF on achievement of New Material. Theoretical concepts proactive inhibition and Zeigarnick effect provided the basis for this hypothesis. It was theorized that unfinished tasks would produce greater amounts of

retention of Old Material for the DF group (Zeigarnick effect), and thereby, proactive inhibition in the DF group might result (retaining more of the Old Material would interfere with learning New Material). However, differential effects of feedback on the subsequent achievement measures of New Material did not result.

Hypothesis Five concerned effects of GPA on academic achievement of New Material. As expected, the high GPA group achievement of New Material was significantly greater than the low GPA group ($p < .025$).

Investigation of the interactive effects of GPA and feedback on achievement of New Material was the focus of hypothesis Six. Table IV and Figure 2 indicate significant interactive effects were not present.

The effects of IF and DF on achievement of Post DF Material were investigated in hypothesis Seven. As no theoretical basis for predicting specific results was available from the review of the literature, a non-directional hypothesis was formulated. Analysis of data shown in Tables VI and VII indicate no significant effects were produced by IF or DF on achievement of Post DF Material.

Hypothesis Eight dealt with effects of GPA on academic achievement of Post DF Material. As expected, achievement of Post DF Material was significantly greater for high GPA subjects than for low GPA subjects ($p < .05$).

Effects of GPA and feedback on achievement of Post DF Material were checked on in hypothesis Nine. Tables VI and Figure 3 indicate significant interactive effects did not result. The formulation of Hypotheses Ten and Eleven was to determine whether relationships existed between achievement scores for IF and DF subjects on Old, New, and Post DF Material and two personality measures (OPI and TICA). Inspection of the

correlation coefficients shown in Table IX indicate the largest correlation, either positive or negative, was .24016. As correlation coefficients of this size account for only a small proportion of the total variance (less than 5%), hypotheses Ten and Eleven were retained.

It is clearly evident from this discussion that IF and DF do not differentially effect achievement of Old, New, or Post DF Material to any significant degree when using the methods and materials described in chapter three. Based on these results and in light of findings in the literature, it appears that contradictions still exist with respect to the use of IF or DF to facilitate the learning process in the classroom. As the IF versus DF issue remains unresolved, the need for further investigation is therefore indicated.

Recommendations

(1) This study used programmed materials which were, as in the study by Vandyke and Newton (1970), readily accessible to subjects. This factor may have rendered the treatment variables ineffective in producing the expected results (all of the subjects could "cram" the day before the second exam by reading their programmed texts, and the possibility exists that group differences were thereby eliminated). Therefore, a further investigation might be advisable in which programmed materials are not available to subjects.

(2) In conjunction with the first recommendation, test items could be constructed from the instructor's lectures. In this way, the likelyhood of subjects eleminating the effects of IF and DF would be reduced, as programmed materials or texts would

not be available for "cramming" before an exam.

(3) Although GPA significantly influenced performance in the present study, an organismic variable more closely related to dependent measures might facilitate or aid investigations of interactive effects (eg. high and low lecture content extracting ability).

(4) The split half reliability of thirty item multiple choice tests, such as those used in the present study, is typically very low. Increasing the length of each of the dependent measures to 90 multiple choice items should facilitate detecting effects of IF and DF. We should note that three tests of this length (90+90+90=270) would be too long for students to complete during the usual time provided for testing in normal classroom situations. Therefore, one solution might be to break the present study into three separate experiments: Academic Achievement of Old Material as a Function of Feedback, Academic Achievement of New Material as a Function of Feedback, Academic Achievement of Post DF Material as a Function of Feedback.

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APPENDIX A

DEFINITIONS OF THE FOURTEEN SCALES ON THE OPI

1. Thinking Introversion (TI) 43 items: Persons scoring high on this measure are characterized by a liking for reflective thought and academic activities. They express interests in a broad range of ideas found in a variety of areas, such as literature, art, and philosophy. Their thinking is less dominated by immediate conditions and situations, or by commonly accepted ideas, than that of thinking extroverts (low scorers). Most extroverts show a preference for overt action and tend to evaluate ideas on the basis of their practical, immediate application, or to entirely reject or avoid dealing with ideas and abstractions.
2. Theoretical Orientation (TO) 33 items: This scale measures an interest in, or orientation to, a more restricted range of ideas than is true of TI. High scorers indicate a preference for dealing with theoretical concerns and problems and for using the scientific method of thinking; many are also exhibiting an interest in science and in scientific activities. High scorers are generally logical, analytical, and critical in their approach to problems and situations.
3. Estheticism (ES) 24 items: High scorers endorse statements indicating diverse interests in artistic matters and activities

and a high level of sensitivity and response to esthetic stimulation. The content of the statements in this scale extends beyond painting, sculpture, and music, and includes interests in literature and dramatics.

4. Complexity (Co) 32 items: This measure reflects an experimental and flexible orientation rather than a fixed way of viewing and organizing phenomena. High scorers are tolerant of ambiguities and uncertainties; they are fond of novel situations and ideas. Most persons high on this dimension prefer to deal with complexity, as opposed to simplicity, and very high scorers are disposed to seek out and to enjoy diversity and ambiguity.

5. Autonomy (Au) 43 items: The characteristic measured by this scale is composed of liberal, nonauthoritarian thinking and a need for independence. High scorers show a tendency to be independent of authority as traditionally imposed through social institutions. They oppose infringements on the rights of individuals and are tolerant of viewpoints other than their own; they tend to be realistic, intellectually and politically liberal, and much less judgmental than low scorers.

6. Religious Orientation (RO) 26 items: High scorers are skeptical of conventional religious beliefs and practices and tend to reject most of them, especially those that are orthodox or fundamentalistic in nature. Persons scoring around the mean are manifesting a moderate view of religious beliefs and practices; low scorers are manifesting a strong commitment to Judiac-Christian beliefs and tend to be conservative in

general and frequently rejecting of other viewpoints.

7. Social Estroversion (SE) 40 items: This measure reflects a preferred style of relating to people in a social contex. High scorers display a strong interest in being with people, and they seek social activities and gain satisfaction from them. The social introvert (low scorer) tends to withdraw from social contacts and responsibilities.

8. Impulse Expression (IE) 59 items: This scale accesses a general readiness to express impulses and to seek gratification either in conscious thought or in overt action. High scorers have an active imagination, value sensual reactions and feelings; very high scorers have frequent feelings of rebellion and agression.

9. Personal Integration (PI) 55 items: The high scorer admits to few attitudes and behaviors that characterize socially alienated or emotionally disturbed persons. Low scorers often intentionally avoid others and experience feelings of hostility and aggression along with feelings of isolation, loneliness, and rejection.

10. Anxiety Level (AL) 20 items: High scorers deny that they have feelings or symptoms of anxiety, and do not admit to being nervous or worried. Low scorers describe themselves as tense and high-strung. They may experience some difficulty in adjusting to their social environment, and they tend to have a poor opinion of themselves.

11. Altruism (Am) 36 items: The high scorer is an affiliative person and trusting and ethical in his relations with others.

He has a strong concern for the feelings and welfare of people he meets. Low scorers tend not to consider the feelings and welfare of others and often view people from an impersonal, distant perspective.

12. Practical Outlook (PO) 30 items: The high scorer on this measure is interested in practical, applied activities and tends to value material possessions and concrete accomplishments. The criterion most often used to evaluate ideas and things is one of immediate utility. Authoritarianism, conservatism, and non-intellectual interests are very frequent personality components of persons scoring above the average.

13. Masculinity-Femininity (MF) 56 items: This scale assesses some of the differences in attitudes and interests between college men and women. High scorers (masculine) deny interests in esthetic matters, and they admit to few adjustment problems, feelings of anxiety, or personal inadequacies. They also tend to be somewhat less socially inclined than low scorers and more interested in scientific matters. Low scorers (feminine), besides having stronger esthetic and social inclinations, also admit to greater sensitivity and emotionality.

14. Response Bias (RB) 28 items: This measure, composed chiefly of items seemingly unrelated to the concept, represents an approach to assessing the student's test-taking attitude. High scorers are responding in a manner similar to a group of students who were explicitly asked to make a good impression by their responses to these items. Low scorers, on the

contrary, may be trying to make a bad impression or are indicating a low state of well-being or feelings of depression.

APPENDIX B

The Tolerance Intolerance of Cognitive Ambiguity test (TICA) is reproduced in its entirety on the pages that follow. Instructions, appearing at the top of the second page, are read aloud by the test administrator. Any questions which arise concerning the task are handled by directing the individual's attention back to the instructions which are provided; the administrator re-reads the relevant part of the instructions to the subject. No other information is provided to the subjects.

Briefly, scoring and interpretation are as follows:

1 point for "Very Uncertain"

2 points for "Uncertain"

3 points for "Slightly Uncertain"

4 points for "Unsure"

5 points for "Slightly Certain"

6 points for "Certain"

7 points for "Very Certain"

Points are totaled and mean scores computed for each individual. The mean scores represent the individual's raw score on the text. High scores are interpreted as indicating an individual needs cognitive closure in ambiguous situations. Likewise, low scores are interpreted as indicating an individual does not need cognitive closure in ambiguous situations.


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PICTURE - STATEMENT EVALUATION

Instructions:

You have been given a group of pictures and this sheet of statements. If you feel that any of the persons pictured on the other sheet made one of the statements on this sheet, put the number of that picture on the line provided beside that statement. If you do not associate a particular statement with a particular picture, leave that line blank.

ARE THERE ANY QUESTIONS? Then, please start in and follow directions.

___ A. "Yesterday, you may have had a reason."

___ B. "We knew that it would make news."

___ C. "Most people get pretty much what they deserve."

___ D. "I can't agree to any rushing of this question."

___ E. "When the light is green, go."

___ F. "TV is killing us--costs are rising."

___ G. "Then I'm not going."

___ H. "The future of the world is being shaped by machines."

___ I. "Are we half through, finished or what?"

___ J. "I've seen him fall asleep many times."

___ K. "I am delighted to be here today."

___ L. "For the first time in your life, you are wrong."

___ M. "This is a strange kind of thing."

___ N. "I never look backward."

___ O. "The news was too good to be kept quiet for long."

___ P. "I don't understand any of you."

PLEASE TURN TO THE NEXT PAGE AND CONTINUE!

Picture-Statement Evaluation (Continued)

On the previous page you were asked to match pictures and statements; you may have many, or only a few, or no matches. On this page--only for the matches you made on the previous page--show how certain you feel that the person in the picture made the statement that you matched it with.

Please make a check mark on only those scales which are next to the matches you made. Place the check mark in the box on the scale to show how certain you are about the match you made. Remember, do only the matches you actually made. Do not mark the scale where there are no matches.

Please use the following scale as a guide.

	Very Certain	Certain	Slightly Certain	Unsure	Slightly Uncertain	Uncertain	Very Uncerta
A.							
B.							
C.							
D.							
E.							
F.							
G.							
H.							
I.							
J.							
K.							
L.							
M.							
N.							
O.							
P.							

VITA

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Candidate for the Degree of

Doctor of Education

Thesis: ACADEMIC ACHIEVEMENT OF SUBJECT MATTER CONTENT AS A FUNCTION OF DIFFERENTIAL FEEDBACK

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