THE EFFECT OF ACCESS TO TEST ITEM POOLS ON STUDENT ACHIEVEMENT AND STUDENT STUDY HABITS

by

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(ABSTRACT)

This study investigated the effects of access to a test item pool on student achievement and study habits in an **Introduction to Microcomputers** class at Southwest Virginia Community College. The class was planned, delivered, and evaluated using Vogler's Curriculum-Pedagogy-Assessment (CPA) model.

The study was designed as a quasi-experimental study. Three groups were used in the study: two treatment groups and a control group. A test item pool was furnished as study questions for the two treatment groups defined as ***unlimited access*** and ***just-in-time access*** groups. A control group did not have access to the study questions. The unlimited access group received all questions on computer disk at the beginning of the course. The questions were not grouped by topic but rather were grouped by question type. The just-in-time access group received a group of questions each week that pertained to the topic being studied for the week.

The planning, delivery, and evaluation for the course for each of the three groups were held constant. An artificial intelligence software suite from Instructional Performance Systems, Inc. was used to develop content goals, performance objectives, lesson plans, and a test item pool. The test item pool containing 446 items was used to construct the achievement test used in the study as well as to provide the study questions for the two experimental groups. Ninety items were extracted from the achievement test and the remaining 356 items were provided as study questions.

To control for delivery, the same instructor taught all three groups. Student achievement was measured using a teacher developed criterion-referenced final examination. Study habits analyzed in this study were use of class handouts, class notes, class tutor, library books, personal books, and class textbook for all groups, and study questions provided to two of the groups. Students recorded time spent studying each week on a scale of 1 to 5.

The study tested the null hypothesis that access to test item pools have no significant effect on student achievement at the 0.05 level. In addition, the study tested the null hypothesis that access to test item pools have no significant effect on student study habits as defined in the study.

Analysis of variance (ANOVA) was used to analyze both the student achievement data on the achievement exam and the student reported data on study habits. Chi square was used as a goodness-of-fit test for equivalency of groups on gender, student status, and previous computer use, while analysis of variance was used to test equivalency of groups on age.

ANOVA for the achievement test yielded results leading to the conclusion that it is better to have access to study questions than not to have access. Both the unlimited and just-in-time access groups scored significantly better than the control group. However, the difference between the two experimental groups was not significant.

Significant differences were found for use of certain study methods between groups. The just-in-time access group used class handouts, class notes, and the study questions more than the unlimited access group. It is possible that subjects in the just-in-time access group thought that they would benefit more from concentrating on the study questions, class handouts, and class notes than by using any of the books to a significant extent. The control group used all types of books significantly more than the just-in-time access group. The control group also used class notes and the textbook more than the unlimited access group. The unlimited access group used both library books and personal books more than the just-in-time access group. There was not any instance in which either of the two experimental groups used any study technique significantly more than

the control group. This led to the conclusion that because the control group did not have access to the study questions, they used a wider variety of the remaining techniques than did the other two groups.

Two important conclusions from this study are significant. First, access to an item pool does improve learning as measured on an achievement test. Therefore, it is recommended that item pools be used as tools for improving instruction. Second, students in the study adapted their use of study techniques according to the methods and materials available to them. Because of this finding, it is recommended that the instructor carefully consider any pedagogical reasons for using study questions in the manner utilized in this study.

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always be there for them, I know they have understood. Again I thank them and hope that they will look ahead to the many good times we have ahead of us.

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CHAPTER 1

INTRODUCTION

Students learn for many reasons. Educators are constantly searching for more effective methods to assist students in learning. One technique used to improve student learning is criterion-based instruction. Criterion-based instruction has been advocated for some time now as a preferred instructional method (Mager, 1962; Gronlund, 1965, 1973, 1976, 1985; Green, 1975; Henak, 1980; Vogler, 1991, 1995).

The literature review in chapter two will establish that for criterion-based instruction, methods are already in place for planning, delivering, and evaluating instruction. A substantial amount of work has already been done in each of these three phases of the instructional design process. In this era of intense assessment activity in program areas, there is considerable interest in the evaluation component. Instructors have invested much of their time in developing test items to be used for evaluation. However, as is revealed in chapter two, the literature indicates that test items can be used for both evaluation and instruction. While some research has been done concerning the effectiveness of certain types of test items for evaluation, there are no exhaustive studies that can guide educators in how to best use the test item pools they have developed for instruction.

A second, and equally important, consideration is that computers are readily available in colleges and universities for instructional purposes. Test item pools could be used efficiently because of the characteristics inherent in the use of technology for instruction.

This study determined the efficacy of using test item pools for instructional purposes. Thus, the study will assist educators in determining the best use of criterion-based components and the technology that can be used to deliver those components.

Conceptual Framework

The primary anchor for this study is criterion-based instruction as advocated by Vogler (1995) and Gronlund and Linn (1995). Criterion-based instruction is advocated as the preferred method for planning, delivering, and evaluating course content (Mager, 1962; Gronlund, 1965, 1973, 1976, 1985; Gronlund & Linn, 1995; Green, 1975; Henak, 1980; Vogler, 1995). This method is based on the claim that the teaching-learning process involves three fundamental steps: (a) the identification and definition of instructional objectives in behavioral terms, (b) construction and selection of evaluation instruments that are most effective in appraising the specific learning outcomes, and (c) utilization of the results to improve learning (Gronlund, 1976). Further, there has been an increased emphasis on the use of tests and other evaluation instruments in the improvement of learning and instruction (Gronlund, 1976).

Linn and Gronlund (1995) and Vogler (1995) have written about tests and testing for the purpose of evaluation. Linn and Gronlund (1995), Gronlund (1973, 1976), Bragstad and Stumpf (1987), Vogler (1995), and Jacobs and Chase (1992) advocate the use of tests and test items for motivational and diagnostic purposes. Test items, especially, are useful tools for diagnosis. However, tests and test items can be used both for evaluative and instructional

purposes (Gronlund, 1976; TenBrink, 1974). There is a scarcity in the literature concerning the use of tests and test items for the purpose of instruction.

A second grounding for this study, therefore, is the use of test item pools as advocated in criterion-based instruction (Vogler, 1995). Many teachers design "tests that measure objectives other than those that have been designed in the classroom" (Green, 1975). Criterion referenced, teacher-made tests offer a technique to guard against this situation.

Finally, a rather recent proposal in education involves allowing student access to certain information and concepts on a just-in-time basis. Hudspeth (1992) advocates that just-in-time education "is a concept whose time has come to provide instruction with less cost and much higher quality than current practice."

Statement of the Problem

Educators are constantly searching for techniques/methods for improving the learning process. Materials used for instruction are often subject to criticism because they are mediocre, inflexible, and often not developed under the control of local teachers/instructional designers (Komoski, 1985). Jacobs and Chase (1992), Gronlund and Linn (1990), Vogler (1995), and Gronlund (1985) advocate the development of tests and test items that are linked to the instructional objectives for a course and what is actually taught in the course. Considerable work is invested in these test item pools to be used only for evaluative purposes. Gronlund (1993) advocates that tests and other evaluation techniques are "indispensable tools to the teacher." If that is the case, simply allowing students to have

access to test item pools in some controlled manner might actually enhance learning. The procedural problem for this study was to analyze the effects of student access to a test item pool on student achievement and student study habits.

Purpose

The general purpose of this study was to determine how access to a test item pool affects student achievement and study habits in a criterion-based learning situation. Specifically, the investigator: (a) synthesized the extant literature, (b) assessed effectiveness of levels of access to test item pools, (c) determined effect of time spent using test item pools, and (d) identified student study habit changes.

Research Questions

Three major questions were addressed in order to fulfill the purpose of this study. The literature review guided the general questions and lent support to the structure that frames the research. The study addressed other ancillary questions to allow further investigation of the major questions.

1. What is known about testing and how tests are used in education?
    a. How are test items currently being used to promote/reinforce learning?
    b. How are tests currently used for assessment?
    c. How available are criterion-based tests?

2. Is there a difference in achievement between groups that have access to test item pools versus those that do not have access?
    a. What is the difference in achievement for access versus non-access?
    b. What is the difference in achievement for unlimited access versus just-in-time access?
3. What effect does the providing of test item pools have on student study habits?

Assumptions

Three assumptions determined a starting point for this study. A first assumption was that criterion-based methodology can be properly applied in a course as used in this study. A second assumption was that criterion-referenced testing is an appropriate means for evaluating instruction. Finally, the expert system used to develop objectives, plans, and test items in this study is based on sound pedagogical principles.

Delimitations and Limitations

The boundaries for this study were established by a number of factors. First, it focused on access defined as unlimited versus just-in-time access. Second, it focused on test item pools developed using a criterion-based instructional design. Third, it targeted access to test item pools by community college students enrolled in an introductory microcomputer course. Finally, it was delimited to the planning and evaluation phases of performance instruction as defined by Vogler (1995).

The delimitations set for this study establish limitations to be recognized when interpreting the findings. First, because the study was conducted with community college students, the results must be cautiously generalized to a population that includes students not typical of the community college student population. Second, because the study was based on criterion-based instructional methodology, caution must be used in interpreting the results to have meaning in other non-criterion-based methodologies. Third, because of the type of course used in this study, the affective domain for learning was minimal. Therefore, while the results are applicable to the cognitive and psychomotor learning domains, the affective domain remains untested.

Definitions

The following definitions refer to terms as they are used in this study:

1. Criterion-based instruction - an instructional design which states instructional objectives as intended learning outcomes and defines the objectives in terms of student performance (Gronlund, 1985). This design methodology links the planning, delivering, and evaluating of instruction. Vogler (1995) uses the term performance instruction to describe this design methodology.
2. Content goals - simple and effective written statements that communicate curricular intent and content (Vogler, 1995).

3. Just-in-time access - a method of providing content to be studied on a basis that limits content in a controlled manner that is immediately relevant to the student based on instructional delivery.
4. Study habits - use of instructional materials or study techniques by students. Study habits employed in this study are use of class handouts, class notes, class tutor, library books, personal books, class textbook, and study questions.
4. Test item pool - a collection of all questions that could be used to evaluate performance of content goals for a particular course.
5. Unlimited access - a method of providing content to be studied in a manner that neither limits the material available to the student nor allows the student the ability to immediately determine the content currently being addressed.

Need for the Study

Educators in community colleges work with students who come from all walks of life. Some hold jobs in business and industry, others work as homemakers. Many already have jobs while others are attending class to obtain employable skills.

Curricula and materials often already exist for courses designed using criterion-based instructional methods. Objectives are already in place, lessons have been planned around these objectives, and testing is keyed to the objectives. Students are tested on what is taught.

Faculty have invested much time and effort in developing test item pools for classes. It would be useful to determine if test item pools, or a substantial portion of them, could be

used in some manner to improve achievement scores, thereby improving instructional effectiveness. If tests could be used to improve effectiveness, it would be useful to determine the best method for utilizing a test item pool with students. It is not known whether access to test item pools would affect achievement levels of students. Even if access to the test item pools does increase the achievement level of students, it is not known what type of access is best. Would it be better to give all the questions to the students on the first day of class, or would it be better to give only those items that relate to the topics being taught currently, and give additional items only as new topics are being taught?

The notion of mass presentation of study questions is appropriate for this study in light of current practice in many professions. For example, the licensing agencies for the health professions provide masses of materials to study for licensure exams. Study materials for college board exams are often grouped only by subject. The student is left on her/his own to decide how, or when, to use the materials.

TenBrink (1974) maintains that "evaluation, properly used, can aid learning." Storey (1970) posits that "minute for minute, testing is the best of all teaching techniques." There is a need, therefore, to use available resources to improve effectiveness in instruction. This study determined whether test item pools presently available in criterion-based courses can be a tool for the teacher who wants to improve student achievement.

Organization of the Study

Chapter Two contains a literature review centering on criterion-based instruction, testing, practice and review, and test item pools. Just-in-time is introduced as a useful instructional concept.

Instrumentation and design of the research are presented in Chapter Three. This is a quasi-experimental study that utilized factorial design, with ANOVA, and chi squares to analyze the data. Test item pools, the student study habits, and student demographic data are described.

The data analysis and results are presented in Chapter Four. Appropriate tables, demographics, and data tabulated from student journals are presented.

Chapter Five is an interpretation of findings for the study. Experimental analysis using factorial design, with ANOVA, and chi squares is the basis for interpretation and conclusions. Implications and recommendations are presented.

CHAPTER 2

LITERATURE REVIEW

This chapter presents a review of the literature concerning factors that impact this study. These factors fall into the categories of performance instruction, factors that have been found to impact learning, testing and test item pools, and just-in-time as a concept in education. It presents first the literature concerning performance instruction. It then presents literature on testing and how it can impact student learning. Included in this section is the literature on practice and review and the spacing effect. The spacing effect has been found to be robust in the testing, practice and review literature. The theory behind using test item pools to promote learning is presented. Finally, just-in-time is introduced as a concept whose time has come in education to increase student learning.

Performance Instruction

The instructional model used in this study is based on the criterion-based instruction model. The criterion-based instruction model provides for the planning, delivering, and evaluating of instruction. Vogler (1995) uses the term performance instruction in his Curriculum-Pedagogy-Assessment (CPA) model. The model delineates the steps to be used in all three stages of instruction. Performance instruction can be developed manually or with the assistance of a software suite that uses an intelligent system to guide the developer in designing a course. The advantage offered by the software available to the designer of this

course was its ability to monitor and guide decisions in the design process. Once a course was designed, a test item pool was created to assess instructional effectiveness.

The primary components utilized in the design of the course used in this study were the *planning* component and the *evaluation* component. While the delivery of instruction is an extremely important component, this study focused on the planning and evaluation of instruction and how an evaluation tool can be used to improve instruction.

The intelligent system for the planning and evaluation phases is embedded in the *CourseBuilding* and *ExamBuilding* software applications. This portion of the literature review explains the features of these two software applications and their importance in developing criterion-referenced tests.

Instructional Planning

In the instructional planning process, the intelligent system guides the course developer in writing correct and appropriate content goals utilized in the course and holds the developer accountable for evaluating the content goals as stated. It accomplishes this task by using a default-based decision-making process which prescribes the order and appropriateness of tasks to be performed. The software is flexible to ensure that the user can effectively accomplish an appropriate course design by allowing the user to override default-based decisions.

The planning process yields content goals that define the content of the course to be delivered. It allows the user to establish credit parameters, develop content goals, and sort the content goals. These components are described below according to Vogler's CPA Model (Vogler, 1995).

Credit and Content Goals

The CourseBuilding software guides the user in determining the number of content goals needed in a course. It follows recommendations of accrediting agencies concerning the amount of in-class and out-of-class time needed to determine a unit of credit. The user specifies the number of weeks in the term, the number of lecture hours per week, the number of lab hours per week, and the number of clinical hours per week. The software then uses a formula to compute the number of content goals by using the information the user has just provided. A three-credit, fifteen week course having two lecture hours and two lab hours per week, no clinical hours, three hours outside of class study per week, and three hours instructional length per goal would calculate to approximately 45 content goals for the course. The formula uses 30 lecture hours + 30 lab hours + 0 clinical hours + 75 study hours to yield a total of 135 hours time required for the course during the semester. This number is divided by 3 (the number of credits for the course) to yield the number of content goals to be 45.

Content goals communicate to the student the curricular intent and content of the course to be delivered (Vogler, 1995). They are communication devices that focus on the learner. By reading the content goals, the learner should have a clear understanding of the knowledge, skills and attitudes required to successfully complete the learning tasks. A content goal contains a present tense action verb, a direct object, and zero to four adjectives which modify the goal for the specific action intended. For example, a content goal may be stated as: define electronic spreadsheet terms. The final form of the content goal statement as defined by the software is a sentence with a subject followed by a future tense action verb, zero to four adjectives, and a direct object. The content goal statement described above becomes: *The student will define electronic spreadsheet terms.*

Once content goals are completed, they are sorted according to domain/level, frequency/difficulty, purpose, and chronology. These sorts are performed to determine how content is to function, how much should be taught, what should not be taught, why something should be taught, and when something should be taught (Vogler, 1995).

For each content goal, the course designer first decides whether the learning domain for the content is cognitive, psychomotor, or affective. For each domain specified, the level is identified as one of three levels. For the cognitive domain, the three levels are fact, understanding, and application. For the psychomotor domain, the three levels are imitation, practice, and habit. For the affective domain, the three levels are awareness, distinction, and integration. As described, the three levels for each domain proceed from the simplest to more complex. More learning time is required as the level moves toward the more complex.

The next task for the course designer is to consider the frequency and difficulty level of the content goal. This process accomplishes three purposes: It allows the user to determine how much should be taught and what should not be taught, it can be used to force decisions about where content belongs and what content should be omitted, and it identifies overlap and voids in the course.

The principal reason for the purpose sort is to clarify why certain content is included in the curriculum. The course designer must specify whether each content goal is crucial, foundation, remedial, or enrichment. Crucial content goals are judged to be absolutely essential. Foundation content goals are central to the course or curriculum. The foundation content should comprise about 80% of the course. Remedial content goals serve as prerequisites to other content. Enrichment content goals extend beyond the normal scope of the course. Remedial and enrichment goals should comprise less than ten percent of the course.

The purpose of the chronology sort is to identify the sequence of learning content in the course. This is the point at which the question is answered concerning when the content should be taught in relation to all the other content. Each content goal is considered in light of another content goal to determine whether it should precede, follow, or be taught simultaneously with that content goal. If the content goal under consideration is to be taught first, it is a prerequisite for the second content goal. On the other hand, if is to be taught after the second, then the second goal becomes a prerequisite to the first. This vertical ordering of content goals establishes the best logical order for teaching the content of the

course. If neither content goal is required as a prerequisite to the other, then the decision becomes a preference rather than a prerequisite. Preferences produce a horizontal order based on an instructor's decision about which should be taught first. The order is determined by the instructor rather than by the content. A course that is more horizontal gives more flexibility than one that is vertically oriented.

Performance Objectives

In the software suite used to develop this course, performance objectives are written as communication devices that build upon the earlier decisions concerning content goals. Vogler (1995) specifies the three key parts of the performance objective as *outcomes*, *standards*, and *conditions*.

The software uses the content goal entered earlier as the outcome for the performance objective. Quality, efficiency, and durability criteria are specified next along with any conditions under which the performance is to occur. The software manipulates the content goal verb and the direct object and requests that the user enter the comparison criteria to yield a statement of quality to be achieved. The user is prompted next for any time constraints that need to to be placed on the students to adequately achieve the objective. This efficiency standard is usually specified in the amount of time that the student is allowed to complete the objective.

If a durability standard is to be applied, it states how long or how strong a particular outcome will to be. It communicates the strength-lasting dimension of the outcome (Vogler,

1995). Conditions specify any resources or settings that will be available to the learner. It is specified last but read first in the performance objective. The software's expert system uses the content goal, *The student will define electronic spreadsheet terms*, along with user input to yield a performance objective as follows.

> ***The student will not be allowed references. The student will define electronic spreadsheet terms. Performance will be satisfactory if terms are defined and the definitions are consistent with the textbook and a test can be completed in 50 minutes.***

A performance objective can be written for each content goal or content goals can be aggregated to achieve an outcome, usually the action portion of the last content goal in the aggregated group. This multiple content goal format for performance is probably more appropriate for a course such as the one used in this study. However, the designer of the course wanted to allow as much flexibility for the instructor in the delivery and evaluation phases as possible. In particular, performance objectives may be aggregated for the purposes of test administration in the cognitive learning domain or completion of multi-part or multi-session class assignments in the psychomotor learning domain. Therefore, upon consultation, the instructor grouped performance objectives for the course in this study for evaluation of both cognitive and psychomotor content goals.

The Course Syllabus

The course syllabus is the primary product that incorporates the content goals, performance objectives, institutional requirements, and instructor defined components into a single document to be delivered to the student. Vogler (1995) delineates seventeen possible functions of a course syllabus. While these functions are important, they will not be addressed in this literature review. The course syllabus will be considered as the final product of the planning phase for the purpose of this study.

The syllabus typically contains a header component, seven major components, and one addendum. The major components are the content goals, student contributions, description of how the student is evaluated, a course schedule, course description, course focus, and a list of any textbooks and/or references required. Appendix A contains the course syllabus used in this study. Only familiarity with the content goals is necessary and sufficient for the reader to continue to the evaluation phase of this review. While evaluation for grading purposes is important in the design of a course, grading was not a factor in this study. This study only considered the effect on an achievement test that was not considered in the assignment of a course grade and study habits which, also, did not affect student grades.

Delivery of Instruction

The foundation for delivery of instruction in Vogler's (1995) performance instruction system rests on five key theories. The theories as incorporated into the expert system used in this study are association, task development, goal seeking, stimulus-response-reinforcement, and problem solving. The theories, as described by Vogler (1995), are sequenced from simplest to complex with each theory building upon the previous one.

Delivery of instruction is fundamental to the teaching process. Students can gain knowledge, skills, and affect in many ways. Delivery of instruction can take place in any mode varying from lectures to group assignments to individual projects or assignments. It can occur in a traditional classroom or in educational settings that may be considered by many as very non-traditional. For the purpose of this study, the delivery of instruction was a controlled factor. The same instructor was used in all sections and the content was delivered in the same manner for all sections of the course. For this reason, the remainder of this section of the literature review will focus on the evaluation component, especially as it relates to testing and the use of test items.

Evaluating Instruction

Vogler (1995) defines performance evaluation as "a process that seeks to make judgments about the relative value of instruction." In contrast, he defines testing as "a process that seeks to measure" in assisting to make value judgments. Evaluation, the

importance of test items, and the consequences of testing in a criterion-based instructional system are reviewed here. For the course used in this study, development of a test item pool was the most important outcome of the evaluation phase.

The basis for the testing portion of this review is Vogler's *ExamBuilding* software (1993) which is supported by a number of writers in the testing field. The software provides for integrity between the planned course and the evaluation or testing used in the course. Criterion-based instructional design methodology links the planning, delivering, and evaluating of instruction. Testing is an important component of the evaluation phase.

Testing and Test Items

Students state that their primary reason for studying is to make good grades (Milton, 1982). Both faculty and students maintain that tests are given for the purpose of assigning grades. While students often state that the reason they study is to get a good grade, tests undoubtedly serve other purposes.

Testing impacts learning in important ways. Eble (1976) maintains that tests impact student learning by motivating them to study. Undoubtedly, motivation is an important aspect of testing. Albas and Albas (1984) posit that exams stimulate students to study because their degree of preparedness determine their anxiety level when taking an exam. Jedrey (1984) maintains that grading and testing have a positive educational role in motivating students to their best efforts. Mehrens and Lehmann (1984) advocate testing to increase motivation and encourage good study habits. As early as 1946, Stroud took the

position that "It is probably not extravagant to say that the contribution made to a student's store of knowledge by the taking of an examination is as great, minute for minute, as any other enterprise he engages in".

It is important for faculty to know how to use tests and test items to increase learning. Gronlund (1977) takes the position that the main purpose of testing is to improve learning. He advocates making testing strategies an integral part of the instructional process. Tests can serve to identify the important content in a course. According to Eble (1976), tests serve to select the most crucial facts, concepts, theories, and opinions from a large body of information. Students will be motivated to learn important points within the content areas.

Vogler (1995) and Jacobs and Chase (1992) illustrate the necessity of well designed test items and the importance of linking test items to the goals of the course. The six test item types as defined by Vogler (1995) are true-false items, matching items, multiple-choice items, completion items, short-answer items, and essay items. Jacobs and Chase (1992) list five item types by excluding short-answer from this list.

Using Vogler's item types, it is useful to classify test items according to their cognitive difficulty. According to Milton, Pollio, and Eison (1986), tests can be classified as recognition tests, recall tests, or some combination of the two. The type of test is determined by the type of test items used on the test. True-false, matching, and multiple-choice items are considered to be recognition items. That is, the student need only to recognize the appropriate response since it is provided in some manner within the question or as possible responses to the question. Completion, short-answer, and essay items are

categorized as recall items because the student must provide the answer to the question by filling in a blank, making a list, describing or explaining something, or by comparing and/or, contrasting elements within a question.

The software suite used in this study was useful in that it guided the course developer in writing potential test items. Only cognitive test item types were considered for this review. Both the test item pool and the achievement test used in this study utilized only cognitive test item types. The designer wrote a total of 446 items for use in the course, 356 items to be used as study questions and 90 items for the achievement test. Each item was correlated with a content goal to ensure that it was relevant to the course as presented. The software maintained the integrity of test items by preventing the designer from falling into common traps or pitfalls that haunt so many writers of test items.

The expert system provided item stems, patterns for writing test items, sorting of possible responses, uniform length of blanks, and other features to assist the designer in maintaining integrity of test items in the test item pool. Vogler (1995) lists eleven common pitfalls for test designers that allow students to raise their performance scores without knowing the answers, having skills, or possessing the desired affect.

Testing Factors

A number of testing factors that promote learning are identified in the literature. The relevant factors for this study are test expectancy and frequency of testing.

The literature on test expectancy supports the contention by Milton, Pollio, and Eison (1986) that tests greatly influence how students study and what they learn. Terry (1934) and Douglass and Talmadge (1934) reported that students studied differently for different types of tests. These researchers found that students focused on details and exact wording for recognition tests, while they tried to determine relationships and trends for recall tests. Meyer (1934) reported the same finding but, in addition, found that students who expected to take either a completion or essay test outperformed students who expected to take true-false or multiple-choice tests. The finding was true for the test administered at the time of studying (immediate test) and one administered five weeks later (delayed test).

These early findings are supported by later studies. Thomas and Augstein (1970) found that students who studied with the expectation that they would be required to summarize content performed better than those who expected a multiple-choice or a completion test. Again, this was true both immediately and one week after the original study session. Findings such as these have prompted psychological research into encoding strategies (Neely & Balota, 1981) and item processing (Schmidt, 1988) that can be used to explain how processing of information occurs.

Milton (1982) explains this phenomenon in terms of test expectancy. He reasons that it is easier to recognize a date or name than it is to recall one. Students do not need to know something as well for recognition purposes as they do for recollection ones. As a result, students study harder when they anticipate recall tests such as those containing essay questions.

A second testing factor that influences learning is frequency of testing. Milton (1982) concludes that, within limits, frequent testing results in higher student performance. Gaynor and Millham (1976) conducted a study in which students in one group took tests during each week of the term. A second group of students took only a mid-term and a final exam. Students in the first group outperformed those in the second group. Mehrans and Lehmann (1984) maintain that testing and review facilitate learning. Frequent review for tests produce good study habits. According to Mehrens and Lehmann, frequent testing encourages frequent review.

Practice and Review

Practice and review of material to be learned are important to student learning. Students spend much of their time practicing and reviewing material to be learned in preparing for tests and exams. Practice and review phenomena identified in the literature that are relevant to this study are the distribution effect and spacing effect.

Distribution Effect

The most common form of practice and review among students is cramming (Sommer, 1968). Students postpone learning material to be tested until a short time before the test is to be administered. In a retesting situation, Elbrink (1973) found that students tended to put off studying as long as possible for a test that counted for grading. Cramming tends to

inspire a false sense of knowing or confidence among students when they are preparing for a test (Zechmeister and Shaughnessy, 1980).

Cramming is identified in the literature as massed practice or review. Dempster (1991) concluded, in a review of the research on practice and review, that the use of repetition is important to learning. When a student is confronted with material to be learned, the material is repeated until learned. If the time between repetitions is short, the repetitions are said to be massed. If the interval between repetitions is relatively lengthy, the repetitions are said to be spaced. Dempster (1991) concludes that "with study time constant, two or more opportunities to study the same material are more effective than a single opportunity." (p. 71) Reviews are more effective when distributed over lengthier periods of time.

Spacing Effect

While repetition seems to be important in reviewing material to be learned, the most effective aspect of review is the "spacing effect" (Dempster, 1991). Students have reported that they perceive massed repetitions as "boring" and unnecessarily repetitive (Dempster, 1986). Dempster (1988), Hintzman (1974), and Melton (1970) found that reviews are more effective when spread out or distributed over lengthier periods of time. In fact, Dempster (1991) identifies the "spacing effect" as one of the most robust and dependable phenomena yet documented by psychologists. Research subjects have consistently reported that spaced repetitions are more interesting and enjoyable than either massed repetitions or single presentations (Burns, 1970; Dempster, 1986; Elmes, et. al., 1983).

There is evidence in the literature to suggest that short, spaced periods of practice give better results than long concentrated practice periods (Anderson, 1980). The probability of recall of items increases proportionally with the spacing between practice periods (Gay, 1973; Madigan, 1969). The reason spaced practice is considered to be more effective than massed practice is that the learning context on each occasion is somewhat different thus causing the information to be encoded somewhat differently each time. Also, by breaking up practice sessions into several spaced sessions, students experience less fatigue and boredom. Spaced review has been shown to be a significant means of enhancing retention of learned material (Tiedeman, 1948; Gay, 1973; Ausubel and Youssef, 1965; Peterson, Ellis, Toohill, and Kloss, 1935; Saxon, 1981).

Test Item Pools

Faculty write test items for many reasons. These include the making of tests, determining course content, quiz construction, and building of study guides. Regardless of the reasons for writing test items, most of the items eventually show up on exams, tests or quizzes.

For the purpose of this study, a distinction must be made between test item banks and test item pools. The term "item bank" refers to a collection of test items organized and catalogued to take into account the content of each test item as well its measurement characteristics (Choppin, 1985). Item banks are used by experts in construction of such tests as standardized achievements or tests of ability that must have high validity and reliability.

By contrast, "item pool" refers to a collection of test items which has been assembled as an aid to examiners for building simple tests or study materials. Item pools may be constructed, for example, by faculty or textbook publishers.

A number of writers advocate the use of test item pools in education for the purpose of building good tests. Gronlund (1985) advocates the building of test item files and use of computer item pooling. He maintains that construction of good test items is difficult and time-consuming. Educators must slowly build a file of effective items in specific areas, especially of complex achievement, or run the risk of neglecting the measurement of learning outcomes in these areas. Vogler (1995) promotes the use of test item pools. Jacobs and Chase (1992) advocate the use of computerized item pools. Finally, Buchanan and Rogers (1990) posit that large class sizes produce unique pressures mandating that a large number of test items be developed continually. A popular solution to the problem of developing test item pools is use of item pools supplied by textbook companies.

Test item pools are available for many content areas. An ERIC review revealed that test items are readily available to build test item pools in the areas described below. A classroom teaching guide containing criterion-referenced test items for each objective in the child care and guidance management and services programs is available from the University of Missouri (1991). Criterion-referenced test items are available in air conditioning, heating, and refrigeration (Davis, 1992). The test item pool is available on computer disk that

provides duty area tested, task number addressed by the item, the correct answer for the question, source of the question, and learning domain tested (cognitive, psychomotor, and affective).

A 546 item criterion-referenced multiple choice and true/false test item pool in auto mechanics is available to cover 35 units of instruction (Tannehill, 1991). As with the previous test item pool, duty area, task number, correct answer, and learning domain tested are provided for the items. A test item pool covering 26 competency areas in the auto body curriculum is available along with instructional materials (Tannehill, 1990).

A test item pool intended to help instructors construct criterion-referenced tests for courses in building trades is keyed to the Missouri Building Trades Competency Profile (Davis, 1993). The item pool contains 525 test items covering topics developed by industry and education professionals in the field. A test item pool is available that contains 519 criterion-referenced multiple choice and true/false test items for a course in electronics (Davis, 1991a). The items cover 15 units of study and provide duty area tested, task number addressed, correct answer for the question and the learning domain tested.

Similar test item pools are available for machine shop (Davis, 1991b), drafting (Mathew, 1991), dental assistant (Laugen & Hintzen, 1986), hotel clerk (Olsen & Hintzen, 1986), skin and scuba diving (McCarthy, 1987), interior design and housing (North Carolina, 1988), ornamental horticulture production (Reneau, 1988a), radiologic technology (Reneau, 1988b), and small engine repair (Herd, 1994) courses.

Just-In-Time

Hudspeth (1992) advocates that students be allowed access to certain information and concepts on a just-in-time basis. He proposes that by utilizing just-in-time principles, instruction can be delivered with less cost and higher quality.

The roots of just-in-time are at least 50 years old and include related work by Katona (1940) and Katz (1950). Katona demonstrated that organization and structure of student learning is important. He concluded that students can learn better and remember much more if their learning is structured and organized. Katz identified a phenomenon that he called "mental dazzle" when he demonstrated that there is a point of diminishing return in a learning situation. He found that there is a point when increasing the number of elements in an intellectual task causes confusion and inefficiency.

Dorsey, Goodrum, and Schwen (1993) described a program conducted jointly between AT&T and Indiana University. The researchers attempted to identify critical needs as well as critical success factors for combining telecommuting as a work innovation with emerging technologies. The purpose of the training segment of the program was to construct the tools and materials needed to support workers wherever they worked. A number of findings were reported concerning training, productivity, tools, and equipment. The most significant recommendation related to training was a voucher system for employee training. It was recommended that vouchers be provided so that individuals could acquire training on an "as-needed basis" and not be limited to general training for all.

Finally, McKeachie (1986) maintains that instruction that is meaningful to the student results in better recall of material and use of ideas. Just-in-time introduction of material would parallel and contribute to meaningfulness. The concept of just-in-time fits nicely with other concepts, such as readiness, structure and relevancy, already being used abundantly in education.

Summary

Test item pools, and the ability to build test item pools (Vogler, 1991), are readily available to college faculty. Some item pools are commercially produced while some are produced by the faculty who use them. The items in these pools are currently being used for constructing quizzes, tests, and exams. Gronlund (1985), Vogler (1991), and Green (1991) advocate the use of tests for instructional purposes. Since the ability to maintain large item pools has been enhanced by textbook publishers and available computerized systems, it seems reasonable to propose that some items be provided to students for study purposes.

This review suggests that there might be a best way to provide the study questions. Because of the distribution and spacing effect on learning, it would seem that study questions should be provided on a just-in-time basis to students. It is suggested that students could best utilize this type of material if each component is provided to the student as the content is being covered rather than providing it as a mass of material at the beginning of the course.

CHAPTER 3

METHODOLOGY

This chapter describes the design of this study. Both the independent and dependent variables are identified. The population and sample utilized for study purposes are identified. The treatment and instrumentation for the study along with data collection procedures are described.

Design of the Study

The design of this study was quasi-experimental. There was a control group and two experimental groups. Three class sections of a course called INTRODUCTION TO MICROCOMPUTERS were assigned on a random basis as the control group and two experimental groups. The three groups were identified as a control group and two experimental groups. The two experimental groups were given access to a test item pool that serves as the variable being studied while the control group did not have access to the item pool.

The two experimental groups differed by the type of access given to the test item pool. One group was called the unlimited access group and was given all the study questions from the item pool at the beginning of the course. The second group was called the just-in-time access group and was given a limited number of questions each week. The questions furnished each week pertained to the topic being studied during that week.

Content for the course was controlled by using an artificial intelligence software suite from Instructional Performance Systems, Incorporated. The software is based on Vogler's Curriculum-Pedagogy-Assessment (CPA) model (Vogler, 1995). The software in this suite provided the basis for controlling the planning of course content, instructional delivery, and the test item pool used in the study.

The same instructor taught all three groups used in the study. The null hypothesis tested in this study was that there is no significant difference (at the 0.05 level) in achievement between groups for students in the three groups studied. In addition, it was hypothesized that there is no difference in study habits used by the groups in the study.

Variables

The independent variable for this study was access to study questions. The dependent variables for the study were scores on a teacher constructed achievement test and certain student study habits. The study habits are described later in this chapter.

Population and Sample

All students enrolling in OAD 201 at Southwest Virginia Community College comprise the population for this study. The course is an introductory computer class used by both part-time and full-time students to obtain beginning microcomputer skills. Upon completion of the course, students may choose one of several options for subsequent semesters. They may choose not to enroll in any further computer classes or to enroll in one

or more of six other classes and/or workshops offered at the college. The researcher anticipated that the students would come from a variety of backgrounds. Most of the students who registered for the classes had been out of high school for several years; some were recent high school graduates. Further, some had not taken college classes before, others were currently enrolled in a college program at the time they took the course.

Students in this study were enrolled in OAD 201, INTRODUCTION TO MICROCOMPUTERS during the Spring 1993 semester. The course is a three-credit course consisting of two hours of lecture and two laboratory hours per week. The same instructor taught all sections of the course involved in this study. The instructor was an adjunct faculty member who had taught previously for the college and had taught the introductory computer class before.

The sample consisted of 72 students who enrolled in the three sections of the INTRODUCTION TO MICROCOMPUTERS course. The sections were offered in the evening at three locations that are somewhat remote from each other. One section was taught on the Southwest Virginia Community College campus while the other two sections were taught at off-campus locations. The course sections were assigned randomly as a control group and two experimental groups, respectively. Certain demographic data were obtained in an attempt to confirm that the groups were equivalent for purposes of this study. The demographic information included age, gender, student status, and previous computer use.

One-way ANOVA was used to determine if there were differences between the means of the three groups on age. Chi squares were used on the other demographic variables as a goodness-of-fit test of equivalency (Huck, Cormier, & Bounds, 1974).

Treatment and Instrumentation

Treatment

The treatment in this study is access to questions in a test item pool. Three types of access were used. The first treatment group had unlimited access to the test item pool. The test item pool was provided to this group on computer disk during the first class session. During this first session, the instructor told the students how to use the disk to access the questions. Answers were not provided to any of the questions unless a student specifically asked about a particular question during a class session.

The second treatment group had just-in-time access to questions in the same test item pool. During the first class session, the instructor gave a disk, containing only questions that covered one session's content, to the students. Upon returning to class during successive weeks, the disk was exchanged for another that contained additional questions covering the new week's content. As with the unlimited access group, the instructor did not furnish answers unless a student asked a specific question in class.

The control group did not have access to the questions in the item pool described above. All other factors remained the same so that the effect of access to the study questions could be determined.

Instruments

In this study, a course was designed using a computer software package based on principles advocated by Mager (1962; 1972), Green (1975), Gronlund (1976; 1985), and Vogler (1995). The IPSI CourseBuilding and ExamBuilding Software from Instructional Performance Systems, Incorporated provided the basis for constructing the course, test item pool, and achievement test. The software incorporates the planning and evaluating components of Vogler's (1995) Curriculum-Pedagogy-Assessment (CPA) Model. The CourseBuilding Software was utilized to develop the course objectives that was the basis for documenting the course content. The ExamBuilding Software was used to build a test item pool and achievement test.

Forty-seven content goals were identified for a three credit course called INTRODUCTION TO MICROCOMPUTERS (See Appendix A for the course syllabus). A test item pool composed of approximately 10 test questions for each content goal was constructed before the course began. The 446 item pool became both the basis for constructing a test to be used at the end of the course to measure student achievement and the material available to the two experimental groups for this study (See Appendix B for Item Pool). A selective sample of ninety test items was extracted from the test item pool for the exam. A selective sample was used in the study to ensure adequate coverage of course topics. The remaining 356 questions were used as the items that were available to the two groups having access on an unlimited or just-in-time basis. The data for the final exam were analyzed using analysis of variance.

Finally, students in both experimental groups were required to record in a journal the amount of time spent using the test item pool as well as the amount of time spent studying from the textbook, class notes, class handouts, use of class tutors, library books, and personal books. Students in the control group recorded how much time they spent utilizing all of the previously mentioned resources except for the test item pool. The data gathered were used to determine whether access to the test item pool affected certain student study habits.

Summary

This study was a quasi-experimental study composed of 72 students in three INTRODUCTION TO MICROCOMPUTERS courses taught at Southwest Virginia Community College. The treatment targeted access to study questions on an unlimited versus just-in-time access as defined within this study. A control group did not have access to the study questions.

Achievement was measured on a criterion-referenced teacher constructed test. Data were collected from the students to give a student profile. These data were analyzed to determine if the groups could be considered equivalent for study purposes. Finally, students completed a journal page each week detailing how they had used certain study materials since the last class session. The data from this journal were analyzed to determine if there were any differences in study habits used by students in the three groups.

CHAPTER 4

FINDINGS

The purpose of this study was to determine the effects of access to test item pools on achievement and study habits of students in a beginning microcomputer class. This chapter presents the findings from the study. The demographic data were used to compare groups. Information on study habits is discussed. Finally, the results of the achievement test are presented.

Demographic Data

The subjects for this study enrolled in classes according to their choice of location. Before the first class meeting, the three groups were assigned randomly as the just-in-time access group, the unlimited access group, and the control group. Subjects were not assigned randomly to groups but rather the groups were randomly assigned. Therefore, demographic data were obtained from the subjects to test for equivalency of the groups.

Students completed a demographic data sheet that provided data concerning the student's age, gender, student status, and previous computer use (See Appendix D for demographic data sheet). The data were analyzed to determine if the groups were different on any of the group characteristics. Table 1 presents the data for the dichotomous variables (gender, student status, previously used a computer). The data for student age is presented in Table 2.

Table 1

Comparison of Groups on Dichotomous Demographic Variables

	Group							
	Unlimited Access (n = 22)		Just-in-time Access (n = 24)		Control (n = 26)		Chi-square	p
Gender	Female	Male	Female	Male	Female	Male		
	17	5	17	7	19	7	0.251	0.88
Status	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time		
	5	17	6	18	5	21	0.245	0.88
Used Computer before?	No	Yes	No	Yes	No	Yes		
	9	13	13	11	14	12	1.048	0.59

Seventeen students in the unlimited access group were female while five were male. Seventeen students in the just-in-time access group were female while seven were male. Finally, nineteen students in the control group were female while seven were male.

Five students in the unlimited access group were full-time while seventeen were part-time. Six students in the just-in-time access group were full-time while eighteen were part-time. Five students in the control group were full-time while twenty-one were part-time.

Nine students in the unlimited access group reported that they had not used a computer before. Thirteen reported that they had done so. Thirteen students in the just-in-time access group reported no previous computer use while eleven reported previous use. Finally, fourteen students in the control group reported use of computers before beginning the course while twelve had not used them. The students were not asked to report whether they had access to a computer at home or away from the classroom. It is possible that this could have been a confounding variable for the study.

Chi square was used as a goodness-of-fit statistic as advocated by Huck, Cormier, and Bounds (1974). The chi-square calculations indicated that the three groups were equivalent on all the dichotomous data variables for which data were collected.

Table 2

Table of ANOVA Results for Student Age

Source	DF	Mean Square	F-ratio	p
Groups	2	92.70	0.75	0.478
Error	69	124.10		
Total	71			

Table 2 presents the results for comparison of subject ages by group using analysis of variance. The mean age for the unlimited access group was 34.6 years; the mean for the just-in-time access group was 32.5 years; the mean for the control group was 36.3 years. Analysis of variance for the age variable did not indicate a significant difference among the groups for the continuous variable.

Study Habits

Analysis of variance (ANOVA) was used to determine if there was a difference among the groups in certain study habits. The habits analyzed in this study are use of class handouts, use of class notes, use of a class tutor, use of library books, use of personal books, use of the class textbook for all groups, and use of the study questions provided to the two experimental groups.

Students in all three groups were required each week to record the amount of time spent using class handouts, class notes, class tutor, library books, personal books, and class textbook. Only the unlimited access and just-in-time access group were required to report time spent using the study questions. The forms used for recording the time spent using each of the items are included in Appendix E.

Each student recorded study time using a scale that ranged from 1 to 5. For each item, the student was instructed to record his/her estimate of time spent studying for class since

the last meeting using the item listed. The student was instructed to place a check in one of five columns for each item. The columns were headed 0-15, 16-30, 31-45, 46-60, and over 60 to indicate the amount of time in minutes as intervals.

These data were collected for the eight weeks beginning with week two and ending with week nine of the course. Data were not collected during the last five weeks of the course because students worked during that time on independent class projects. The data were recorded for each subject and maintained according to subject number for all subjects in each of the three groups. Analysis of variance was used to determine if the amount of time utilizing each of the items available for studying was different for the three groups. The results are reflected in Table 3.

As the results in Table 3 show, the F-ratio for the three groups is significant for use of class handouts, use of class notes, use of library books, use of personal books, and use of the class textbook. **The F-ratio for the use of class tutors is the only ANOVA result that did not yield a significant difference among the three groups.**

The only study method not utilized by all three groups was the study questions. **The just-in-time access group reported greater use of the study questions as described in this study than did the unlimited access group** and the difference between the two groups was significant ($p < 0.01$). The control group did not have access to the study questions.

Table 3

Table of Means, ANOVA Results, and Newman/Keul's Analysis for Study Methods

Study Method Used	Group Means			ANOVA Results		Newman/Keul's Results Significance Between Groups (*s* indicates significance)		
	Unlimited Access*	Just-in time Access*	Control Group*	F-ratio	p	1 & 2	1 & 3	2 & 3
Handouts	1.56	1.88	1.68	3.79	0.02	*s*		
Class notes	2.03	2.85	2.72	20.59	< 0.01	*s*	*s*	
Class tutor	1.11	1.26	1.25	1.78	0.17			
Library books	1.11	1.00	1.20	7.51	< 0.01	*s*		*s*
Personal books	1.34	1.14	1.49	8.38	< 0.01	*s*		*s*
Textbook	3.03	2.94	3.73	17.91	< 0.01		*s*	*s*
Study questions	2.09	2.77		20.63	< 0.01	*s*		

*For Newman/Keul's identification of groups, 1 = unlimited access, 2 = just-in-time access, and 3 = control.

For the five remaining study methods where the F-ratios were significant, the analysis of variance tells only that there is a difference among the three groups on each variable, but does not tell which individual group differences are significant. Therefore, in each instance where the F-ratio is significant, Newman/Keul's procedure was used to determine which groups showed a significant difference on reported use of each of the study items.

The just-in-time access group reported that they used class handouts more than both the other two groups. However, the control group did not differ significantly from the just-in-time access group nor the unlimited access group in reported use of class handouts. Only the difference between the just-in-time and unlimited access groups is significant.

Both the just-in-time access group and the control group reported using class notes more than the unlimited access group. While both these differences are significant, the difference between the just-in-time access group and the control group is not significant.

Both the unlimited access group and the control group reported more time using library books than the just-in-time access group and both differences are significant. The difference between time reported by the unlimited access group and control group is not significant.

Both the unlimited access group and the control group also reported a greater use of personal books than the just-in-time access group and both differences are significant. The difference between the unlimited access group and control group is not significant.

The control group reported significantly greater use of the class textbook than either of the other two groups. The difference between the unlimited access group and the just-in-time access group is not significant.

Only the two experimental groups had access to the study questions. The just-in-time access group reported greater use of the study questions as described in this study and the difference between the two groups was significant.

In an effort to understand these findings, study methods were grouped and the findings were aggregated. Some revealing patterns emerged as a result of this aggregation. First, **no group made a significantly higher use of all study methods than any other group**. However, the groups differed significantly on the use of certain study methods.

A second pattern indicates that **subjects in the control group utilized a greater variety of study methods and materials** than reported by either of the experimental groups. This pattern is supported by the finding that **there was no instance in which either of the experimental groups used any study method significantly more than the control group.** It is additionally supported by the finding that **the control group used class notes and the class textbook significantly more than the unlimited access group**. Also, **the control group used all types of books significantly more than the just-in-time access group.**

It is useful in understanding the results of reported data on study habits to separate the study materials made up of class handouts, class notes, study questions, library books and personal books into two distinct groups. The two groups are ***in-class*** materials (composed

of class handouts, class notes, and study questions) and *out-of-class* materials (comprised of library books and personal books). **The just-in-time access group made a significantly greater utilization of in-class materials than the unlimited access group**. However, **the unlimited access group used out-of-class materials, as identified in this section, significantly more than the just-in-time access group**.

Reliability

A teacher constructed achievement test was used to measure achievement for the subjects in this study. Ninety questions were extracted from the test item pool before the semester began for the purpose of constructing the achievement test. The remaining questions in the test item pool were used as study questions to be made available to the two experimental groups. Items on the achievement test were validated according to content taught in the course by two other instructors not involved in the study but had taught the course for several semesters. This was done to determine item and test validity.

The achievement test was pilot tested using eleven students who had completed the introductory microcomputer course in a previous semester. The split-halves method was employed to obtain an estimate of the reliability for the test. Correlation between the number of correct responses for odd-numbered items and even-numbered items was calculated. Then the Spearman-Brown formula was applied to yield a coefficient of reliability.

The correlation coefficient for the achievement scores in the pilot group for odd- and even-numbered items was 0.83. Using the correlation coefficient, the Spearman-Brown formula was applied to yield a coefficient of reliability of 0.91.

The process was repeated for the achievement scores in the groups studied. The correlation coefficient for this group was 0.72. When the Spearman-Brown formula was applied to this correlation coefficient, it yielded a coefficient of reliability of 0.84. This latter reliability coefficient is somewhat lower than would be hoped for. The desired level for reliability is in the 0.9 range or above.

A number of factors might serve to explain the lower reliability coefficient for the subjects in the study. An analysis of the reading level of subjects used in piloting the achievement test versus the reading level of 42 subjects used in this study revealed a significant difference in reading level. The mean reading score as measured on the Comparative Guidance and Placement (CGP) test for the subjects in the study was 31.3. The mean for the students used in piloting the test was 47.8.

As the questions were being entered into the test item pool, the researcher overrode some of the defaults of the ExamBuilding software due to the nature of the content of the course. This led to a somewhat higher reading level for the achievement test than normally would be expected. In addition, while the students chosen for piloting the test had previously completed the course being studied, they were full-time students at SVCC who were enrolled in a regular program of studies.

Achievement

A major purpose of this study was to determine the effect of access to items in an item pool on student achievement in a beginning microcomputer class. To determine the effect, means for each group on the ninety item achievement test were calculated. The means then were compared using analysis of variance.

The mean achievement score for the students in the control group ($\overline{X}$ = 55.00) was lower than the mean for either of the experimental groups. Students in the just-in-time access group ($\overline{X}$ = 64.96) scored higher than students in the unlimited access group ($\overline{X}$ = 61.59). As shown in Table 4, ANOVA results for the group means indicate that there is a difference among the three groups on the mean achievement scores.

Table 4

Table of ANOVA Results for Achievement

Source	DF	Mean Square	F-ratio	p
Groups	2	643.70	8.61	<0.01
Error	69	74.82		
Total	71			

The Newman/Keul's test for significance was applied to the three groups to determine which groups differed significantly. **Students in the control group scored significantly lower than students in either of the other two groups. The difference between the mean for the just-in-time access group and the mean for the unlimited access group was not significant.**

Summary

Demographic data concerning age, gender, student status, and previous computer use were collected for all subjects at the beginning of the course used in this study. When the data for the dichotomous variables were compared for the three groups, none of the differences were found to be statistically significant. Upon comparison of the means of students' age, the differences were not found to be statistically significant.

Data were collected from all subjects for eight weeks during the semester for the amount of time spent utilizing class handouts, class notes, class tutor, library books, personal books, and textbook. Data concerning time spent using the study questions were collected from the unlimited access and just-in-time access groups. ANOVA analysis did not indicate a significant difference among the three groups for the use of a class tutor. However, ANOVA analysis indicated significant differences among the three groups on each of the five other variables available to the subjects in all three groups. In addition, the difference on the use of study questions was significant for the unlimited and just-in-time access groups.

Follow-up analysis using the Newman-Keuls procedure revealed three patterns concerning use of study methods. First, no group made a significantly higher use of all study methods than any other group. Second, subjects in the control group utilized a greater variety of study methods and materials than subjects in the two experimental groups. Finally, the just-in-time access group made a significantly greater utilization of in-class materials than the unlimited access group while the unlimited access group used out-of-class materials significantly more than the just-in-time access group.

An achievement test was administered at the end of the course to measure each subject's level of learning. Mean scores for the three groups on the achievement test were analyzed using analysis of variance. Results indicated that the differences in mean scores for the three groups were significant. Again, results from the Newman-Keuls procedure indicated that the control group scored significantly lower than both the unlimited access and just-in-time access groups. The difference between the unlimited access and just-in-time access groups was not significant.

CHAPTER 5

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the effects of access to test item pools on achievement and study habits of community college students in a beginning microcomputer class. To accomplish this purpose, an experiment was conducted using two treatment groups and a control group. This chapter presents a summary of findings and conclusions concerning the demographic data gathered for the study, the results of student reported study data, the reliability data on the achievement test, and student achievement results. In addition, implications resulting from the study are discussed. Finally, recommendations based on the study are presented.

Demographic Data

Summary of Findings

Demographic data concerning age, gender, student status, and previous computer use were collected for all students who participated in this study. When the data for the dichotomous variables (gender, student status, and previous computer use) were compared for the three groups, none of the differences were found to be statistically significant. Comparison of the means of students' age indicated that differences between groups were not significant.

Conclusions

Analysis of all dichotomous demographic variables for which data was collected indicated no significant chi squares. Comparison of subjects' age for the three groups indicated no significant difference between the group means. Therefore, it is concluded that the three groups were equivalent in terms of these factors.

It is further concluded that, because the groups were randomly assigned as a control and two treatment groups and because comparisons indicated no significant differences, the difference in effects can be attributed to the treatment in this study, access to a test item pool.

Study Habits

Summary of Findings

Data were collected for eight weeks during the semester from all subjects for the amount of time spent utilizing class handouts, class notes, class tutor, library books, personal books, and class textbook. Data concerning time spent using the study questions were collected from the unlimited access and just-in-time access groups. **ANOVA analysis did not indicate a significant difference between the three groups for the use of a class tutor.** However, differences were indicated for all other study methods.

Follow-up analysis was conducted using the Newman-Keuls procedure to determine which group means were significantly different. This analysis revealed three patterns

concerning use of study methods. First, **no group made a significantly higher use of all study methods than any other group**. Any modification of study habits relating to time spent using the techniques in this study only applied for certain techniques or groups of techniques. Second, **subjects in the control group utilized a greater variety of study methods and materials than subjects in the two experimental groups**. Finally, **the just-in-time access group made a significantly greater utilization of in-class materials (class handouts, class notes, and study questions) than the unlimited access group** while **the unlimited access group used out-of-class materials (library books and personal books) more than the just-in-time access group**.

Conclusion

Certain groups did use some study methods significantly more than others. In fact, findings indicate that certain student groups used categories of study methods significantly more than other student groups. The just-in-time access group made greater use of in-class materials than the other experimental group. The unlimited access group made greater use of out-of-class materials than the just-in-time access group. Because the control group did not have access to the study questions, subjects in the group utilized a greater variety of study methods and materials than subjects in the two experimental groups. Therefore, **it is concluded that students adapted their use of study techniques according to the methods and types of materials available to them**.

Instrument Reliability

Summary of Findings

The achievement test was piloted with eleven students that had previously completed the same course used in this study. The split-halves method was used to estimate reliability for the test. The Spearman-Brown formula yielded a reliability coefficient of 0.91. The same procedure was used to verify reliability using the scores for subjects in the study. The reliability coefficient for subjects in the study was 0.84.

Conclusion

On the piloted subjects the reliability of the achievement test was high. Duplication of the split-halves method for subjects used in this study yielded a somewhat lower reliability coefficient. It is possible that this difference could be attributed to the difference in reading levels for the students in the pilot group and the subjects in this study. Since the reliability coefficient for the study subjects is lower than desired, it is recommended that further studies be conducted to test the reliability under similar conditions.

Achievement

Summary of Findings

The achievement test was used to measure each subject's level of learning. Analysis of the results using ANOVA indicated that the differences in mean scores for the three

groups were significant. Results from the Newman-Keuls procedure indicated that **the control group scored significantly lower than both the unlimited access and just-in-time access groups. The difference between the unlimited access and just-in-time access groups was not significant.**

Conclusions

The finding that the control group did not perform as well on the achievement test leads to the conclusion that **it is better to have access to study questions than not to have access.** The finding that no significant difference existed between the two access groups leads to the conclusion that **there is no preferred method for giving access to the questions when increased achievement is the only desired outcome.** Rather, access to the study questions is the important factor.

Another conclusion is possible based on the findings in this study concerning both student achievement and student study habits. The literature review yielded findings concerning test expectancy. **This study further supports the contention by Milton, Pollio, and Eison (1986) that tests greatly influence how students study and what they learn.** Subjects in both the unlimited access and just-in-time access groups had access to study questions that were similar to those used on the achievement test. Even though the study

questions were not the same as those on the achievement test, the same type of questions (true-false, completion, matching, and multiple choice) were provided to the students in both experimental groups.

Implications of the Study

The most useful implication of the findings and conclusions of this study concerns access to study questions in beginning community college microcomputer classes. **Access does improve learning**. Faculty and publishers alike have invested much time and effort in developing a variety of materials for classes. One of the most useful set of materials readily available is the test item pool (often called a test bank or student study guide by the publisher).

Computers are readily available in colleges and universities for instructional purposes. Test item pools could be used efficiently because of the characteristics inherent in the use of technology for instruction. In this era when accountability at all levels is an important issue, all technology and materials that prove effective in helping students learn must be utilized.

For the typical computer users' class at a community college, students success and satisfaction are often determined by how much time the student spends on meaningful tasks. Although no attempt was made to collect data concerning student and faculty attitude, student comments to the instructor indicated that the students enjoyed the opportunity to use

the study questions. At one point, two students who were studying together "discovered" that two of the questions in the item pool did not have "correct" responses. The instructor checked the questions and verified the students' conclusion.

The findings concerning student study habits and use of study techniques did not indicate that one method is better than another in every case. However, the findings did lead the researcher to conclude that **students adapted their use of study techniques according to the methods and materials available to them**. Students in the control group did not have access to the study questions and, as a consequence, utilized a greater variety of study methods and materials. Students in the just-in-time access group were much more selective in their use of study methods and materials.

The contrast between the unlimited access and just-in-time access group was revealing. Students in the just-in-time access group made greater utilization of methods and materials available in the classroom (class handouts, class notes, and study questions). On the other hand, the unlimited access group made greater utilization of methods and materials that were available outside the classroom (personal books and library books). Katz's (1950) phenomenon of "mental dazzle" may have been in effect for the latter group. Perhaps the students sought other sources outside the classroom to clear up some of the confusion and inefficiency caused by having access to so much material at one time in the classroom. This could be explained in terms of Katona's (1940) findings that organization and structure of

student learning is important. In the case of the just-in-time access group, their material was organized and structured for them. With the unlimited access group, the students sought outside material to help them organize and structure the content from their other materials.

Recommendations

The most important conclusion resulting from this study is that providing access to items in a test item pool by students as study questions improves achievement in beginning microcomputer classes. The major recommendation derived from this conclusion is that **test item pools should be utilized as instructional tools in addition to being used as tools for evaluation**. These item pools should be effective tools for improving instruction in other microcomputer and computer applications classes as well. Faculty in other community college occupational/vocational classes may effectively use item pools to improve student achievement.

While it is concluded in this study that there is no preferred method for giving access to an item pool when achievement is the only desired outcome, it was also concluded that students adapted their use of study techniques according to the methods and materials available to them. Because of this effect on study habits, **it is recommended that faculty carefully consider any pedagogical reasons for using study questions in the manner utilized in this study**. If the primary pedagogical goal is to promote student organization of content and independent use of materials outside the classroom, unlimited access to item

pools may be the technique to choose. However, if the primary pedagogical goal is increased achievement and high utilization of materials and methods available within the classroom, just-in-time access may be the preferred technique.

The beginning microcomputer class used in this study only allowed for the testing of learning in the cognitive domain. Learning in the affective domain was minimal. Therefore, the psychomotor and affective domains remained untested in this study and it is not recommended that the results be interpreted as applying to these learning domains.

It is recommended that future research be conducted for other areas of study. Research is needed to test for effect in the psychomotor and affective learning domains. More advanced classes in all content areas could be utilized to determine both the effectiveness of the item pool as a learning tool and its effect on study habits. It is further recommended that follow-up research consider whether access to a computer at home or away from class is a confounding factor in a study of this type.

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Appendix A

CONTENT GOALS

OAD 201

INTRODUCTION TO MICROCOMPUTERS

1. Define business computer system components.
2. Describe computer input devices.
3. Describe computer output devices.
4. Explain computer processing terms.
5. Classify computer software.
6. Describe computer keyboard components.
7. Explain secondary storage concepts.
8. Perform computer system startup.
9. Explain MS-DOS file naming rules.
10. Explain MS-DOS internal commands.
11. Explain MS-DOS external commands.
12. Use MS-DOS substitution characters.
13. Define word processing functions.
14. Perform text editing.
15. Perform document storage.
16. Perform document retrieval.
17. Explain document formatting.
18. Perform text centering.

19. Perform text underlining.

20. Use boldface commands.

21. Use block commands.

22. Perform document printing.

23. Use find and replace commands.

24. Define electronic spreadsheet terms.

25. Describe cell pointer movement.

26. Describe cell entry types.

27. Use special electronic spreadsheet keys.

28. Use worksheet template.

29. Perform worksheet retrieval.

30. Describe worksheet storage.

31. Perform cell entry replication.

32. Perform repeating text entry.

33. Explain electronic spreadsheet functions.

34. Describe worksheet printing commands.

35. Define database terms.

36. Explain database management system tasks.

37. Use data types.

38. List database records.

39. Perform record selection.

40. Use logical operators.

41. Perform database structure creation.

42. Perform database structure modification.

43. Describe database record addition.

44. Describe database record removal.

45. Perform database record editing.

46. Perform record sorting.

47. Perform report printing.

Appendix B

PERFORMANCE OBJECTIVES

1. The student will not be allowed references. The student will define business computer system components. Performance will be satisfactory if components are defined and the definitions are consistent with the textbook and a test can be completed in 50 minutes.

2. The student will not be allowed references. The student will describe computer input devices. Performance will be satisfactory if devices are described and the descriptions are consistent with the textbook and a test can be completed in 50 minutes.

3. The student will not be allowed references. The student will describe computer output devices. Performance will be satisfactory if devices are described and the descriptions are consistent with the textbook and a test can be completed in 50 minutes.

4. The student will not be allowed references. The student will explain computer processing terms. Performance will be satisfactory if terms are explained and the explanations are consistent with the textbook and a test can be completed in 50 minutes.

5. The student will not be allowed references. The student will classify computer software. Performance will be satisfactory if software is classified and the classification is consistent with the textbook and a test can be completed in 50 minutes.

6. The student will not be allowed references. The student will describe computer keyboard components. Performance will be satisfactory if components are described and the descriptions are consistent with the textbook and a test can be completed in 50 minutes.

7. The student will not be allowed references. The student will explain secondary storage concepts. Performance will be satisfactory if concepts are explained and the explanations are consistent with the textbook and a test can be completed in 50 minutes.

8. The student will be allowed references. The student will perform computer system startup. Performance will be satisfactory if startup is performed and the performance is completed successfully in each of the next five class sessions.

9. The student will not be allowed references. The student will explain MS-DOS file naming rules. Performance will be satisfactory if rules are explained and the explanation is consistent with those provided by the instructor and a test can be completed in 50 minutes.

10. The student will not be allowed references. The student will explain MS-DOS internal commands. Performance will be satisfactory if commands are explained and the explanation is consistent with those provided by the instructor and a test can be completed in 50 minutes.

11. The student will not be allowed references. The student will explain MS-DOS external commands. Performance will be satisfactory if commands are explained and the explanation is consistent with those provided by the instructor and a test can be completed in 50 minutes.

12. The student will be allowed references. The student will use MS-DOS substitution characters. Performance will be satisfactory if characters are used and the usage is consistent with samples provided by the instructor and 10 problems are completed successfully in fifteen minutes.

13. The student will not be allowed references. The student will define word processing functions. Performance will be satisfactory if functions are defined and the definitions are consistent with those provided by the instructor and a test can be completed in 50 minutes.

14. The student will be allowed references. The student will perform text editing. Performance will be satisfactory if editing is performed and the performance is exactly the same as the reference text provided by the instructor and the editing is performed in a single lab session.

15. The student will be allowed references. The student will perform document storage. Performance will be satisfactory if five documents are stored and the performance is completed by deadlines established by the instructor.

16. The student will be allowed references. The student will perform document retrieval. Performance will be satisfactory if retrieval is performed and the performance allows the student to proceed with appropriate editing assignments.

17. The student will not be allowed references. The student will explain document formatting. Performance will be satisfactory if formatting is explained and the explanation is consistent with the textbook and explanations provided by the instructor and a test can be completed in 50 minutes.

18. The student will be allowed references. The student will perform text centering. Performance will be satisfactory if centering is performed and the performance is consistent with assigned text provided by the teacher.

19. The student will be allowed references. The student will perform text underlining. Performance will be satisfactory if underlining is performed and the performance is consistent with assigned text provided by the teacher.

20. The student will be allowed references. The student will use boldface commands. Performance will be satisfactory if commands are used and the usage is consistent with assigned text provided by the teacher.

21. The student will be allowed references. The student will use block commands. Performance will be satisfactory if commands are used and the usage is consistent with assignments provided by the teacher.

22. The student will be allowed references. The student will use find and replace commands. Performance will be satisfactory if commands are used and the usage is consistent with the textbook and assignments provided by the teacher.

23. The student will not be allowed references. The student will define electronic spreadsheet terms. Performance will be satisfactory if terms are defined and the definitions are consistent with the textbook and a test can be completed in 50 minutes.

24. The student will not be allowed references. The student will describe cell pointer movement. Performance will be satisfactory if cell pointer movement is described and the description is consistent with the textbook and a test can be completed in 50 minutes.

25. The student will not be allowed references. The student will describe cell entry types. Performance will be satisfactory if types are described and the descriptions are consistent with those provided by the instructor and a test can be completed in 50 minutes.

26. The student will be allowed references. The student will use special electronic spreadsheet keys. Performance will be satisfactory if 80% of the special electronic spreadsheet keys are used and the usage is consistent with assignments provided by the instructor.

27. The student will be allowed references. The student will perform worksheet retrieval. Performance will be satisfactory if retrieval is performed and the performance allows for the satisfactory completion of assignments provided by the instructor.

28. The student will be allowed references. The student will use a worksheet template. Performance will be satisfactory if a spreadsheet template is used and the usage is consistent with an assignment provided by the instructor and four sensitivity analyses are performed in one lab session and all computed answers are correct.

29. The student will not be allowed references. The student will describe worksheet storage. Performance will be satisfactory if storage is described and the description is consistent with samples provided by the instructor and a test can be completed in 50 minutes.

30. The student will be allowed references. The student will perform cell entry replication. Performance will be satisfactory if replication is performed and the performance is consistent with assignments provided by the instructor.

31. The student will be allowed references. The student will perform repeating text entry. Performance will be satisfactory if entry of repeated text is performed and the performance is consistent with assignments provided by the instructor.

32. The student will not be allowed references. The student will describe worksheet printing commands. Performance will be satisfactory if commands are described and the description is consistent with samples provided by the instructor and a test can be completed in 50 minutes.

33. The student will not be allowed references. The student will explain electronic spreadsheet functions. Performance will be satisfactory if functions are explained and the explanations are consistent with the textbook and those provided by the instructor and a test can be completed in 50 minutes.

34. The student will not be allowed references. The student will define database terms. Performance will be satisfactory if terms are defined and the definitions are consistent with the textbook and a test can be completed in 50 minutes.

35. The student will not be allowed references. The student will explain database management system tasks. Performance will be satisfactory if tasks are explained and the explanations are consistent with those provided by the instructor and a test can be completed in 50 minutes.

36. The student will be allowed references. The student will use data types. Performance will be satisfactory if data types are used to create database structures and the usage is consistent with assigned tasks provided by the instructor.

37. The student will be allowed references. The student will list database records. Performance will be satisfactory if database records are listed and the listings are consistent with assigned tasks provided by the instructor.

38. The student will be allowed references. The student will perform record selection. Performance will be satisfactory if record selections are performed and the performance is consistent with assigned tasks provided by the instructor.

39. The student will be allowed references. The student will use logical operators. Performance will be satisfactory if operators are used and the usage is consistent with assigned tasks provided by the instructor.

40. The student will be allowed references. The student will perform database structure creation. Performance will be satisfactory if creation of database structures is performed and the performance is consistent with assigned tasks provided by the instructor.

41. The student will be allowed references. The student will perform database structure modification. Performance will be satisfactory if database structure modifications are performed when necessary and the performance is consistent with assigned tasks provided by the instructor.

42. The student will not be allowed references. The student will describe record addition. Performance will be satisfactory if record addition is described and the description is consistent with the textbook and a test can be completed in 50 minutes.

43. The student will not be allowed references. The student will describe database record removal. Performance will be satisfactory if record removal is described and the description is consistent with the textbook and a test can be completed in 50 minutes.

44. The student will be allowed references. The student will perform database record editing. Performance will be satisfactory if editing is performed as needed and the performance is consistent with assigned tasks provided by the instructor.

45. The student will be allowed references. The student will perform record sorting. Performance will be satisfactory if records are sorted as needed and the performance is consistent with assigned tasks provided by the instructor.

46. The student will be allowed references. The student will perform document printing. Performance will be satisfactory if documents are printed as needed and the performance is consistent with assigned tasks provided by the instructor.

47. The student will be allowed references. The student will perform report printing. Performance will be satisfactory if reports are printed as needed and the performance is consistent with assigned tasks provided by the instructor.

Appendix C

Study Questions

In each of the following questions, choose the best answer from the choices provided.

1. The computer itself, and associated equipment, is called:

A. data B. hardware C. program D. software

2. Step-by-step instructions that tell a computer how to do certain tasks is called:

A. data B. information C. programmer D. software

3. Raw material that can be processed by a computer is called:

A. computer B. data C. information D. user

4. People who purchase and use computer software are called:

A. analysts B. programmers C. technicians D. users

5. A name for a large computer is:

A. mainframe B. microcomputer
C. minicomputer D. Univac

6. The smallest of computers that are often used in homes is the:

A. mainframe B. microcomputer
C. minicomputer D. Univac

7. Input to a computer system takes the form of:

A. data B. information C. keyboard D. disk drive

8. Processed data that is organized, meaningful, and useful is called:

A. computer B. data C. information D. user

9. Disk drives are examples of:

A. CPU
B. primary storage
C. processors
D. secondary storage devices

10. Instruction manuals that usually accompany packaged software is called:

A. data
B. documentation
C. primary storage
D. secondary storage

11. Computer programs that help people solve a particular problem are called:

A. applications software
B. language processors
C. operating systems
D. utilities

12. The types of devices that accept data in machine-readable form for processing are:

A. input devices
B. output devices
C. processors
D. secondary storage devices

13. The part of the computer system that performs computations is the:

A. input device
B. output device
C. processor
D. secondary storage device

14. Word processing, electronic spreadsheet, and database management software are examples of:

A. applications software
B. language processors
C. operating systems
D. utilities

15. The type of software that allows the user to create, edit, format, store, and print text is:

A. database management
B. desktop publishing
C. electronic spreadsheet
D. word processing

16. The type of software that is used to produce high-quality text and graphics is called:

A. database management
B. desktop publishing
C. electronic spreadsheet
D. word processing

17. The type of software that is used to store, update, manipulate, and report data is called:

A. database management
B. desktop publishing
C. electronic spreadsheet
D. word processing

18. The type of software that is used primarily for calculations using numbers is:

A. database management
B. desktop publishing
C. electronic spreadsheet
D. word processing

19. The type of memory that temporarily holds programs and data is:

A. ALU B. RAM C. ROM D. secondary storage

20. The part of the CPU that executes all arithmetic and logical operations is the:

A. ALU B. RAM C. ROM D. secondary storage

21. The computer system is directed and coordinated by the:

A. ALU B. control unit C. monitor D. secondary storage

22. A single character of data is represented in computer memory by the:

A. bit B. byte C. cursor D. keypad

23. A term often used to describe the size of a computer system is the:

A. cursor B. data bus C. icon D. keyboard

24. The type of keyboard found on most computers and typewriters is the one called:

A. Dvorak B. QWERTY C. mouse D. joy stick

25. A pictorial symbol that indicates an activity that might be performed on a computer is called a(n):

A. icon B. joy stick C. light pen D. mouse

26. A handheld device with a knob or lever that is frequently used with video games is the:

A. icon B. joy stick C. light pen D. mouse

27. The type of input device that converts the spoken voice into digital code that can be understood by the computer is the:

A. digitizer
B. joy stick
C. mouse
D. speech recognition device

28. A device that has a light-sensitive cell at the end for interacting directly with pictures or data on the monitor screen is the:

A. icon B. joy stick C. light pen D. mouse

29. A flashing square or dash on the screen that indicates where the next character will appear when typed is the:

A. cursor B. icon C. joy stick D. mouse

30. The portion of the computer keyboard that resembles a 10-key calculator is the:

A. function keys B. numeric keypad C. QWERTY D. typewriter keypad

31. Arrow keys used to move the cursor are called:

A. arrow dedication keys
B. cursor movement keys
C. function keys
D. icon keys

32. The type of monitor that displays only one color on a black background is called:

A. color CRT B. color monitor C. monochrome D. pixel

33. The number of pixels that determines clarity of the screen is called:

A. graphics adapter
B. light emitting diode
C. monochrome
D. resolution

34. Printed paper output is produced using a:

A. keyboard B. monitor C. mouse D. printer

35. Printed paper output is called:

A. graphics adapter
B. hard copy
C. resolution
D. soft copy

36. The type of printer that contains a removable wheel with raised characters on a set of spokes is:

A. daisy wheel B. dot matrix C. ink jet D. laser

37. The type of printer that is a key ingredient in desktop publishing is:

A. daisy wheel B. dot matrix C. ink jet D. laser

Decide whether each of the following is true (T) or false (F).

38. A group of computers that can operate independently or in cooperation with each other is called secondary storage.

39. A device that converts data that is sent to or received from other computers is called a modem.

40. The process by which computers exchange data over communications facilities is called data communications.

41. The type of disk drive that has two read/write heads is called soft-sectored.

42. The disk drive is a secondary storage device.

43. The read/write head is positioned over tracks in order to read data.

44. Sealed modules that contain one or more rigid disks are called floppy disks.

45. The part of the track that holds s specific number of characters is a sector.

Choose the description, explanation, or definition on the right that best tells about each of the terms on the left.

46. ALU
47. character
48. control unit
49. cursor
50. data
51. database management
52. disk drive
53. documentation
54. field
55. file
56. hard copy
57. hardware
58. information
59. keyboard
60. kilobyte
61. laser printer
62. mainframe
63. microcomputer
64. modem
65. monochrome
66. network
67. printer
68. RAM
69. record
70. software

A. 1024 bytes
B. another name for memory
C. collection of related characters
D. collection of related fields
E. collection of related records
F. computer and associated equipment
G. computer programs
H. device that helps computers communicate
I. directs and coordinates computer systems
J. flashing indicator
K. Group of computers that share resources
L. input to a computer to be processed
M. instruction manual
N. large computers
O. letter, number, or symbol
P. near letter quality printer
Q. output that is useful to people
R. performs arithmetic and logic operations
S. primary input device
T. produces hard copy
U. quietist printer
V. screens that display one color
W. secondary storage
X. smallest of computer systems
Y. software for managing interrelated files

71. List at least six reasons why computers have become an indispensable part of our lives:

_____

_____

_____

_____

_____

_____

Match the term on the left with the definition or explanation on the right that most closely describes the term.

72. cold boot	A. command for copying and formatting, simultaneously
73. command	B. command to display the disk directory
74. COPY	C. contains your created files
75. data disk	D. current drive
76. default drive	E. disk containing copy of internal DOS programs
77. DIR	F. disk onto which files are copied
78. disk directory	G. disk to be copied from
79. DISKCOPY	H. name that invokes a program
80. "dot"	I. operating system for IBM personal computer
81. FORMAT	J. prepares a new diskette for use
82. MS-DOS	K. record of all files stored on a disk
83. source disk	L. separates file names and file extensions
84. system disk	M. starting the computer when it is off
85. target disk	N. system reset
86. warm boot	O. used to copy one or all files to another disk

Answer each of the following as true (T) or false (F).

87. A file name may be from one to eight characters long.

88. A file extension must be three characters or fewer.

89. External DOS programs can be accessed after the DOS diskette has been removed from the disk drive.

90. A command is a set of programs that lets the computer system control resources.

91. The asterisk (*) is a "wild card" character.

92. If a disk is copy-protected, you will not be able to copy files from it onto another disk.

93. DIR/W is a directory command that is used to display file names in five columns on the screen at one time.

94. If a drive letter is used in a file name, it must be followed by a semicolon.

95. The disk drive that the computer is currently using is called the hard disk.

96. The signal that the operating system is ready for a command is called a cold boot.

97. A set of programs that lets the computer system control resources is called the disk drive.

98. The DIR command is an external DOS program.

99. The COPY command is an external DOS program.

100. The FORMAT command is an external DOS program.

101. A cold boot is the process of starting the computer.

102. The default drive is the one the computer is currently using.

103. The source disk is the one to be copied to.

104. DISKCOPY does the same thing as COPY.

105. The COPY command may be used to copy a file from one disk to another.

106. The COPY command may be used to make a copy of a file on the same disk as long as it has a different name.

107. The RENAME command is used for erasing a file from disk.

108. The TYPE command is used for displaying the contents of a file on the screen.

109. The "*" could be used if a command to copy all the files with the XYZ extension to a disk in drive B.

110. The ERASE command is used to remove a file or group of files from disk.

Complete each of the following by providing the term or terms that correctly complete the sentence.

111. _____ is the command for looking at the names of all the files stored on a disk.

112. To prepare a new diskette for storing files on them, we use a command called _____.

113. The file name and the file extension are separated in MS-DOS by using the _____.

114. Another name for the current drive is the _____.

115. The types of DOS programs that can be accessed only when the DOS diskette is in the disk drive are called _____.

116. The operating system for the IBM Personal Computer is called _____.

117. A name that invokes the correct DOS program is called a _____.

118. The type of disk that contains a copy of the internal DOS programs is called a _____.

119. To start a computer system that is not on, use a process known as a _____.

120. The types of programs that are loaded from the disk into memory and can be accessed without the DOS diskette being in the disk drive are called _____.

121. The command that allows for the copying of one, some, or all the files on a disk to another disk is _____.

122. The disk that is being copied from is called the _____.

123. When we cannot copy files from one disk onto another disk, we say that the disk is _____.

124. The disk that is being copied to is called the _____.

125. A file extension cannot be longer than _____ characters.

126. The command that abbreviates directory information by displaying only the file names and extensions in columns is _____.

127. If the computer system is already on, the best way to restart it is to use the _____.

128. The type of disk that contains the data you create is called the _____.

129. The command that lists all the information from the directory but displays one screen of listings at a time is _____.

130. The maximum number of characters for a file name is _____.

131. The command used to create a system disk is _____.

132. We distinguish a file on a disk from all other files on the disk by using a _____.

133. A set of programs that lets the computer system control resources is called the _____.

Answer each of the following as instructed.

List the three types of diskettes used on IBM Personal Computers.

134. _____ 135. _____

136. _____

List the computer resources controlled by the operating system.

137. _____ 138. _____

139. _____ 140. _____

List the two methods of booting the computer.

141. _____ 142. _____

Decide whether each of the following is true (T) or false (F).

143. The feature of word processing that moves any word that will not fit on a line to the beginning of the next line is called insert mode.

144. Removing characters and closing up the spaces automatically is called deleting.

145. Replacing old text by typing the new text over the old is called inserting.

146. The device that fits over the function keys to explain the use of the keys is called a template.

147. A set of choices that appears on the screen is called a menu.

148. Putting a copy of a document, that has just been typed, on the disk is called creating.

149. The standard way of inserting corrections when using word processing is called insert mode.

150. To change from one of two settings to another, use a toggle switch.

151. The way a document appears on the page is called the format.

152. The original margin settings in word processing is called the justified settings.

153. When text lines up neatly on the right-hand side, creating an even margin, it is justified.

154. When words are printed darker than other words around them, they are underlined.

155. To edit a document, you must first store it on a disk.

156. The "rolling" of text up or down on the screen by moving the cursor is called scrolling.

157. The making of a copy of a document on paper is called printing.

158. The cursor is moved around on the screen in word processing by using the function keys.

159. To move the cursor up or down a whole page at a time, use the number keys.

160. In word processing, the enter key is pressed at the end of every line.

161. The default number of lines per page in word processing is 64.

162. The default number of characters per line in word processing is 64.

Complete each of the following by providing the term or terms that correctly complete the sentence.

163. The flashing symbol on the screen used to show where the next character you type will appear is called the _____.

164. The original margin settings are called the _____.

165. A paper or plastic device that fits over the function keys and briefly describes the use of each key is the _____.

166. The mode that replaces existing text with new text when typing in word processing is called _____.

167. The type of switch that changes from one of two settings to another is called a _____.

168. When text lines up neatly on the right-hand side, it is said to be _____.

169. To cause words to appear darker on the printed page, use a word processing feature called _____.

170. The feature of word processing that causes a word that cannot fit on a line to automatically start on the next line is called _____.

171. To remove characters from a document and close up the spaces automatically, use a feature of word processing called _____.

172. When we want to end a paragraph in word processing, use the _____.

173. The way that a document appears on the page in word processing is called its _____.

174. To adjust the top and bottom margins so that text is centered relative to the top and bottom of the page is called _____.

175. The function of word processing that allows for the saving of a document on disk for later use is called _____.

176. To move the cursor around on the screen in word processing, use _____.

177. To move the cursor up a whole page at a time in word processing use _____.

178. The function of word processing that produces a paper copy of a document is called _____.

179. The movement of parts of a document on the screen at any one time is called _____.

180. The function of word processing that allows for the deleting and inserting of text in a document is called _____.

181. The _____ key is used to move the cursor down a whole page at a time in word processing.

182. A set of choices for the user that appears on the screen is called a _____.

Match the term on the left with the definition or explanation on the right that most closely describes the term.

___183. boldface
___184. create
___185. default settings
___186. delete
___187. edit
___188. enter
___189. format
___190. insert mode
___191. justified
___192. print
___193. scrolling
___194. store
___195. template
___196. toggle switch
___197. typeover mode
___198. underline
___199. word wrap

A. causes words to appear darker
B. changes between two settings
C. describes use of function keys
D. draws line underneath words
E. enters new text without erasing current text
F. entry of text for first time
G. key used to end paragraph
H. make changes by inserting and deleting
I. make paper copy of document
J. movement of parts of document on screen
K. original settings
L. put copy of document on disk
M. puts words on next line when it will not fit on current line
N. removal of characters from document
O. replaces existing text with new text
P. text aligns neatly on right-hand side
Q. way a document appears on a page

List the basic functions of word processing.

200. _____ 201. _____

202. _____ 203. _____

204. _____

In each of the following questions, choose the best answer from the choices provided.

205. One or more words, phrases, sentences, paragraphs, or pages is called:

A. boilerplating B. default C. subscripts D. text block

206. The line that is displayed at the top or bottom of the screen that tells the page number, line number, and character position of the cursor is the:

A. font line B. print line C. status line D. superscript

207. The type of line that is printed at the top of every page is the:

A. page footer B. page header C. subscript D. superscript

208. Lines that are printed at the bottom of every page are called the:

A. page footer B. page header C. subscript D. superscript

209. Searching for a certain word or phrase and replacing it with another word or phrase is called:

A. boilerplating
B. search and replace
C. spell checking
D. a thesaurus

210. Synonyms and antonyms are supplied in word processing by using:

A. boilerplating
B. search and replace
C. spell checking
D. a thesaurus

211. To move quickly to a column position without using the cursor movement keys or the space bar for the purpose of typing, use:

A. page footers B. page headers C. subscript D. tab

212. Creating a document from parts of documents that have been previously saved in another disk file is called:

A. boilerplating
B. search and replace
C. spell checking
D. a thesaurus

Complete each of the following by providing the term or terms that correctly complete the sentence.

213. The word processing command that copies a block of text into a new location, leaving the text in its original location, is called _____.

214. The process of creating a document from parts of documents that have been previously saved in another disk file is called _____.

215. A unit of text made up of one or more words, phrases, sentences, paragraphs, or pages is called _____.

216. The place where the cursor automatically goes when the tab key is pressed is called _____.

217. The page number, line number, and character position of the cursor in word processing is displayed on the _____.

218. A program which supplies synonyms and antonyms is called _____.

219. A program in word processing that includes a built-in dictionary is called _____.

220. The word processing feature that quickly searches through a document to find each instance of a certain word or phrase and replaces it with another word or phrase is called _____.

221. "Personalized" form letters are created automatically using _____.

222. The command that is used to move text to a different location is _____.

223. To manipulate a block of text, you must first _____ the block.

224. The command that lets the user remove a block of text in word processing is called _____.

225. The type of line that automatically prints at the top of each page is called _____.

226. The feature of word processing that places characters one- half line below the current line of text is called _____.

227. The type of line that automatically prints at the bottom of each page is called _____.

228. The word processing command that is sometimes known as "cutting and pasting" is _____.

229. The print option that allows for controlling how many characters can be printed per inch is _____.

Decide whether each of the following is true (T) or false (F).

230. Creating a document from parts of documents that have been previously saved in another disk file is called mail-merge.

231. Automatically printing lines of text at the bottom of each page of a document is called subscript.

232. A program that supplies synonyms and antonyms is called a thesaurus.

233. Causing the cursor to jump to a preset position by pressing one key is called tab.

234. A unit of text, such as one or more words, phrases, sentences, paragraphs, or pages, is called a text block.

235. To move text to a different location within a document is called Block Copy.

236. Form letter programs allow for the creation of "personalized" form letters automatically.

237. A page footer is lines of text that are automatically printed at the top of each page of a document.

238. The status line states the page number, line number, and character position of the cursor.

239. The Block Delete command copies a block of text into a new location, removing it from its original location.

240. Boilerplating is a feature of word processing that searches through a document to find each instance of a word or phrase and replaces it with another word or phrase.

241. Block Move is another name for cutting and pasting.

List five operations that can be performed on a block of text in word processing.

242. _____ 243. _____

244. _____ 245. _____

246. _____

In each of the following questions, choose the best answer from the choices provided.

247. Forms that are used to organize data (especially numbers) into rows and columns are called:

A. databases
B. desktop publishers
C. spreadsheets
D. word processors

248. The intersection of a row and column is called a:

A. cell B. formula C. function D. menu

249. Descriptive information about entries in a spreadsheet is called a:

A. formula B. function C. label D. value

250. An actual number entered into a cell is called a:

A. formula B. function C. label D. value

251. Instructions to a spreadsheet program to perform a calculation are called:

A. formulas B. functions C. labels D. values

252. Preprogrammed formulas in a spreadsheet are called:

A. formulas B. functions C. labels D. values

253. A group of cells that is continuous and rectangular is called a:

A. cell address B. control panel C. menu D. range

254. A list of different options that are available in an electronic spreadsheet is called a:

A. cell address
B. command menu
C. function
D. mode indicator

255. The actual contents of a cell in an electronic spreadsheet is called the:

A. cell address
B. cell contents
C. command menu
D. displayed value

256. The condition or state in which an electronic spreadsheet program is currently functioning is called the:

A. cell address
B. command menu
C. function
D. range

Decide whether each of the following is true (T) or false (F).

257. The mode indicator in an electronic spreadsheet tells the current mode.

258. The current cell is marked in a spreadsheet by the pointer.

259. The control panel is used in a spreadsheet to keep track of what has been inputted.

260. The result of a formula or function is called cell contents.

261. Cursor movement keys are used to scroll through the spreadsheet horizontally or vertically.

262. To clear the current worksheet out of memory, use the file command.

263. A worksheet may be saved by using the file command.

264. Retrieval of a file is accomplished by using the print command.

265. A computerized version of a manual spreadsheet is called a database.

266. The letter and number that describes a cell is called its current cell.

267. The way that a label is displayed on the screen in an electronic spreadsheet is called its format.

268. The default format for labels in a worksheet is right justification.

269. Default label format can be overridden by using a function.

270. Right justification of a label in a worksheet is accomplished by using a double quotation mark.

271. Centering of labels in a worksheet is accomplished by using the apostrophe.

272. The format for all cells in a worksheet may be changed by using the global command.

273. Settings for specified groups of cells may be changed using the default command.

274. Duplication of contents of cells in a range may be accomplished by the copy command.

275. Monthly payments in Lotus 1-2-3 are calculated by using the @PV function.

276. When cell addresses change in a predictable way as a formula is copied, the cell addresses are said to be absolute.

277. Mixed cell references combine relative and absolute addresses.

278. Cell addresses in a formula that do not change at all (are fixed) are said to be relative.

279. The spreadsheet capability that allows for the changing of a label, value, or formula without retyping the whole entry is called the edit mode.

280. When all the necessary labels and formulas have been entered in the appropriate areas of a worksheet, the result is called a template.

281. A sequence of commands stored as a label in a separate area of a worksheet is called a template.

Complete each of the following by providing the term or terms that correctly complete the sentence.

282. The active cell in an electronic spreadsheet is marked by the _____.

283. An actual number entered into a cell is called a(n) _____.

284. A preprogrammed formula in an electronic spreadsheet is called a(n) _____.

285. The current mode is described by the _____.

286. A storage area in an electronic spreadsheet is called a(n) _____.

287. An instruction to the electronic spreadsheet program to perform a calculation is called a(n) _____.

288. A reference to a cell using the letter and number of the intersecting column and row is called the _____.

289. Descriptive information in the form of text in an electronic spreadsheet is called a(n) _____.

290. When a help mode offers helpful information related to the command you were using when you pressed the Help key, it is said to be _____.

291. The result of a calculation in an electronic spreadsheet is called a(n) _____.

292. Many cells that make a block in an electronic spreadsheet is called a(n) _____.

293. The formula or function that is entered into a cell is its _____.

294. The first line of the control panel in an electronic spreadsheet is called the _____.

295. The list of options for the command you are choosing in an electronic spreadsheet is called the _____.

296. The command for saving, retrieving and erasing files from disk in an electronic spreadsheet is called _____.

297. You can scroll through a spreadsheet horizontally or vertically by using the _____ keys.

298. The condition or state in which the spreadsheet program is currently functioning is its _____.

299. The command for clearing a worksheet from memory and providing a blank worksheet is _____.

300. Columns in a spreadsheet are labeled with _____.

301. The spreadsheet command used to leave the spreadsheet and return to DOS is _____.

302. Rows in a spreadsheet are identified with _____.

303. The three lines at the top of a spreadsheet screen such as Lotus 1-2-3 make up what is called the _____.

304. The intersection of a row and column in a spreadsheet is called a(n) _____.

305. An entry in a spreadsheet is stored in the _____.

306. The READY, ENTRY, and MENU modes are examples of the _____.

Answer each of the following as true (T) or false (F).

307. The Global command changes the format for all unfilled cells in a spreadsheet.

308. The Copy command tells Lotus to repeat a character as many times as needed to fill a cell.

309. Quotation marks in Lotus 1-2-3 causes right justification.

310. In Lotus 1-2-3, the caret indicates that text is to be left justified.

311. The default format for labels in a spreadsheet is left justification.

312. The Range command changes the format for all unfilled cells in a spreadsheet.

313. The way that a label is displayed on the spreadsheet screen is called its address.

314. A value is an instruction to the spreadsheet program to perform a calculation.

315. The control panel contains three lines that, among other things, contains the status line and displays a submenu.

316. The command menu names a cell by using a letter and a number.

317. Numbers are normally displayed in a spreadsheet left justified.

318. The actual value contained in a cell is called its cell contents.

319. The cell address names a cell.

320. The range is often used in a function to indicate that more than one cell is to be used.

321. A list of different spreadsheet options is called a menu.

Complete the following by providing the term or terms that correctly complete(s) the sentence.

322. The default format for labels is _____.

323. When the cell address in a spreadsheet will change in a predictable way as a formula is copied, the address is said to be _____.

324. The command that changes the format for all unfilled cells is _____.

325. The Lotus function for calculating monthly payments is _____.

326. A cell address which will not change at all when copied is said to be _____.

327. The spreadsheet mode that will allow for the changing of the contents of the cell without retyping is called _____.

328. A worksheet that has already been designed for the solution of a specific problem is called a(n) _____.

329. A sequence of commands stored as a label in a separate part of a spreadsheet is called a(n) _____

330. The default column width in Lotus is _____.

331. The combination of a relative and absolute cell address is called _____.

332. The action of pressing Enter is represented in a macro by the _____.

Answer each of the following as instructed.

List the three pieces of information that must be supplied when the @PMT function is used.

333. _____ 334. _____

335. _____

List the three types of database models.

336. _____ 337. _____

338. _____

List the four commonly used types of fields in database processing.

339. _____ 340. _____

341. _____ 342. _____

List the two steps needed to delete records.

343. _____

344. _____

List the two steps used to create a database report.

345. _____

346. _____

List the two ways that dBASE III PLUS allows for the entering of commands.

347. _____ 348. _____

List the three things needed to define file structure.

349. _____ 350. _____

351. _____

List the two steps in creating a file.

352. _____

353. _____

Answer each of the following as true (T) or false (F).

354. An organized collection of related data is called a relation.

355. Software that creates, manages, protects, and provides access to a database is called an electronic spreadsheet.

356. Another name for a file is a relation.

357. Another name for a field is an attribute.

358. Another name for a record is a data item.

359. When entering instructions in a DBMS, comparisons are made by using arithmetic operators.

360. When dBASE III PLUS is in COMMAND mode, a "dot" prompt appears.

361. Records are added to a database by using the Add command.

362. Records are marked for deletion in a database by using the Mark command.

363. a database file is opened and readied for use by using the Use command.

364. Pack is a command that marks records for deletion.

365. List is a command used to create database structure.

366. Edit is a command used to change the contents of a database record.

367. Browse is a command used to change the contents of a database record.

368. The selection bar is used in the COMMAND mode in a database to highlight menu choices.

369. A field common to more than one database file is called a link field.

370. In a database, the FOR statement is used to identify the criteria to be used during a search.

371. .AND. and .OR. are called relational operators.

372. Sort is a database command that uses more complex criteria for searching.

373. Index is a database command that sorts data according to a specified field.

374. When using the database Index command, the actual physical order of the data within the original file is altered.

375. Key field is a value in each record that is different for each record.

Appendix D

DEMOGRAPHIC DATA

Please supply the following information concerning yourself as a student in this class.

1. What is your age, in years?

___11-15 ___16-20 ___21-25 ___26-30

___31-35 ___36-40 ___41-45 ___46-50

___Over 50

2. Sex: ___Female ___Male

3. What is your student status at SVCC?

___Full-time (enrolled in 12 or more credit hours)

___Part-time (enrolled in less than 12 credit hours)

4. Have you used a computer before?

___No ___Yes

Appendix E

Journal Log Form

Experimental Groups

Social Security Number _____-____-_____

Please estimate the time that you spent in studying for class since the last class meeting. Indicate your estimate by placing an X in the column that corresponds to the amount of time spent.

	Time in Minutes				
	0-15	16-30	31-45	46-60	Over 60
Class handouts	_____	_____	_____	_____	_____
Class notes	_____	_____	_____	_____	_____
Class tutor	_____	_____	_____	_____	_____
Library books	_____	_____	_____	_____	_____
Personal books	_____	_____	_____	_____	_____
Study questions	_____	_____	_____	_____	_____
Textbook	_____	_____	_____	_____	_____

Journal Log Form

Control Group

Social Security Number _____-____-_____

Please estimate the time that you spent in studying for class since the last class meeting. Indicate your estimate by placing an X in the column that corresponds to the amount of time spent.

	Time in Minutes				
	0-15	16-30	31-45	46-60	Over 60
Class handouts	_____	_____	_____	_____	_____
Class notes	_____	_____	_____	_____	_____
Class tutor	_____	_____	_____	_____	_____
Library books	_____	_____	_____	_____	_____
Personal books	_____	_____	_____	_____	_____
Textbook	_____	_____	_____	_____	_____

Appendix F

Table 5

Table of ANOVA Results for Class Handouts

Source	DF	Mean Square	F-ratio	p
Groups	2	5.068	3.79	0.02
Error	573	1.336		
Total	575			

Table 6

Table of ANOVA Results for Class Notes

Source	DF	Mean Square	F-ratio	p
Groups	2	35.34	20.59	<0.01
Error	573	1.716		
Total	575			

Table 7

Table of ANOVA Results for Class Tutor

Source	DF	Mean Square	F-ratio	p
Groups	2	1.130	1.78	0.17
Error	573	0.636		
Total	575			

Table 8

Table of ANOVA Results for Library Books

Source	DF	Mean Square	F-ratio	p
Groups	2	1.947	7.51	<0.01
Error	573	0.259		
Total	575			

Table 9

Table of ANOVA Results for Personal Books

Source	DF	Mean Square	F-ratio	p
Groups	2	6.32	8.38	<0.01
Error	573	0.75		
Total	575			

Table 10

Table of ANOVA Results for Class Textbook

Source	DF	Mean Square	F-ratio	p
Groups	2	37.51	17.91	<0.01
Error	573	2.094		
Total	575			

Table 11

Table of ANOVA Results for Study Questions

Source	DF	Mean Square	F-ratio	p
Groups	1	43.16	20.63	<0.01
Error	366	2.09		
Total	367			

Appendix G

Southwest Virginia Community College
P.O. Box SVCC, Richlands, Virginia 24641-1510, Telephone: (703) 964-2555
Fax: (703) 964-9307
V/TDD: (703) 964-7235

M E M O R A N D U M

TO: Dr. John Cox

FROM: Ron Bartley RB

SUBJECT: Experimental study in instruction

DATE: October 25, 1992

I am requesting permission to conduct an experimental study for my dissertation using test item pools in OAD 201 classes during the Spring 1993 semester. Attached is a brief description of what I propose to do. I feel that what we could learn from this study could be of great benefit to students in the classroom.

The immediate concern, when conducting a study as I am proposing, is whether any students will be harmed or deprived of normal opportunities by the study. In response to that question, the control group will receive all instruction and testing as is normally done now. The two experimental groups will be given access to instructor designed questions in a test item pool that will, hopefully assist them in learning the material in the course.

Criterion-based instruction has been widely advocated for many types of courses and instruction. The capability for designing courses by specifying objectives for learning, designing lessons that match those objectives, and then testing what is taught is readily available. In fact, assessment activities require that we be held accountable for the content of courses.

If test item pools are another possible tool available to the faculty member for instructional purposes, then we owe it to our students to determine whether it is effective/efficient in assisting students to learn.

I hope that you will present this request to the Curriculum and Instruction Committee for their consideration. I will be receiving some personal gain from this project. However, the gain is a professional one and the ultimate winners in this experiment could be students.

Again, I hope to receive permission to proceed with this experiment as proposed. I would like to begin the test item pool design as quickly as possible so that it will be ready for the spring semester. Thank you in advance for your assistance.

cc. Joseph DiPietro

Southwest Virginia Community College
P.O. Box SVCC, Richlands, Virginia 24641-1510, Telephone: (703) 964-2555
Fax: (703) 964-9307
V/TDD: (703) 964-7235

MEMORANDUM

TO: Dean Smith

FROM: John Cox

DATE: October 29, 1992

SUBJECT: Experimental Study in Instruction (Bartley, October 25, 1992)

I am in full support of the proposed study. I do not foresee any potential for harm to our students, and this study could provide data to improve instructional methodology.

The subject of this proposed study and the methodology used by Mr. Bartley makes this study seem very publishable. This helps point out to the community college community that SVCC is innovative and supportive of improvements in instructional delivery.

I encourage your support of this project with the Curriculum and Instruction Committee.

pl

Attachment

cc Joseph DiPietro
Ron Bartley

Southwest Virginia Community College
P.O. Box SVCC, Richlands, Virginia 24641-1510, Telephone: (703) 964-2555
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V/TDD: (703) 964-7235

M E M O R A N D U M

TO: Joe Dipietro

FROM: Ron Bartley RB

SUBJECT: Proposal to Curriculum and Instruction Committee

DATE: October 25, 1992

Please find attached a copy of a memorandum to Dr. Cox requesting permission to conduct an experiment in OAD 201 classes during the spring semester 1993. I have already discussed the proposal with Dr. Cox and he does not have a problem with anything I am proposing to do. However, he wants me to present the proposal the the Curriculum and Instruction Committee since it has instructional implications and involves a study of the effects on human subjects.

I will be glad to furnish additional information if needed. I will be available for further discussions or presentations concerning this proposal. It is with eager anticipation that I hope to hear from you. I am excited about doing some research and would like to conduct it in a manner that is truly reflective of our profession.

Thank you for any assistance you can offer in this effort.

Southwest Virginia Community College
P. O. BOX SVCC, RICHLANDS, VIRGINIA 24641-1510 TELEPHONE (540) 964-2555
FAX (540) 964-9307
V/TDD (540) 964-7235
OFFICE OF THE DEAN OF INSTRUCTION

MEMORANDUM

To: Ron Bartley

Fr: Don Smith

Date: November 10, 1992

This memorandum is in response to your request to use the College's OAD 201 classes in the data-gathering process for your dissertation, "The Effect of Access to Test Item Pools on Student Achievement and Student Study Habits." The activity would have no detrimental effect on students enrolled in the classes, and would assist you in progressing toward completion of your doctoral program at Virginia Tech; therefore, I encourage you to proceed with your plan.

I am pleased that the classes and students of Southwest Virginia Community College will have the opportunity to participate in this research.

Please do not hesitate to let me know if there is any way that I can be of furlther service as you pursue this important milestone in your professional life.

VITA

Ronnie Bartley
P. O. Box 911
Cedar Bluff, Virginia 24609

Education

1970 Bachelor of Science (Mathematics), East Tennessee State University, Johnson City, Tennessee

1979 Masters in Education (Administration and Supervision), University of Virginia, Charlottesville, Virginia

1997 Doctor of Education (Community College Administration), Virginia Polytechnic Institute and State University, Blacksburg, Virginia

PROFESSIONAL EXPERIENCE

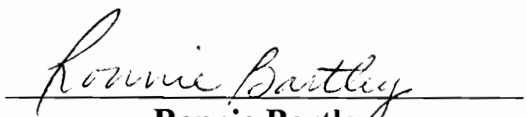
1970-1979 Mathematics Teacher, Haysi High School, Haysi, Virginia

1979-1983 Assistant Principal, Haysi High School, Haysi, Virginia

1983-1989 Assistant Professor of Data Processing, Southwest Virginia Community College, Richlands, Virginia

1989-Present Associate Professor of Computer Information Systems, Southwest Virginia Community College, Richlands, Virginia

1994-Present Business Division Chair, Southwest Virginia Community College, Richlands, Virginia



Ronnie Bartley