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Tutorials for Software: A Comparison of the Appleworks
Software Tutorial with Pre-Entered Data and an
Experimental Tutorial with User Entered Data

A Thesis

Presented to

The Faculty of the Graduate School

University of the Pacific

In Partial Fullfillment

of the Requirements for the Degree

Master of Arts

by

Toni L. Steil

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This thesis, written and submitted by

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5/9/86

Abstract

The attention directed toward computer software research has been sparse which is quite evident in particular facets such as learning methods, specifically towards tutorials. Some authors have identified various important issues which include cognitive factors, reduction of presentation of superfluous information, and the importance of interaction with software and hardware. The present study examined two tutorials which were similar except in their level of required user behaviors. Tutorial A required only user manipulation of disk stored data. Tutorial B required the user to enter the data into the computer, design the screen format, and then to manipulate it. It was predicted that the extra task of entering data and designing the screen format would provoke more positive scores for Tutorial B as measured by two independent questionnaires, would require fewer requests for assistance than for those using Tutorial A, and require a comparative duration period to complete. The results obtained supported all hypotheses except for the duration period which took longer for Tutorial B. The implication is that there should be development of improved Tutorial options utilizing research based methods such as these presented.

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In the past decade, human factors engineering has been used successfully to address human interaction with computer systems. Presently this interaction has expanded to include "software psychology" i.e., where the focus is on human performance limitations associated with the design and use of the software rather than the traditional focus on computer hardware (Kearsley & Hillelsohn, 1982, p. 74).

This change in emphasis from hardware to software is easily seen in the voluminous research done on computer assisted instruction (CAI) in the educational setting (Clement, 1981; Kearsley & Hillelsohn, 1982). However, there is little research relating to performance limitations on other types of application software (i.e., that which is commercially available) (Lawton & Gerchner, 1982).

Thousands of computer programs are purchased every month and an increasing proportion of society is relying on word processing software or spreadsheet software for both home and business use. Consequently, there is a need to explore the software training component of the computer system/user interaction more fully.

One facet of application software that warrants attention is how the user goes about learning how to use the program. The traditional documentation/manual approach has recently been supplemented with magnetic media and printed media tutorials to facilitate in the learning process. However, little research has been done to determine the best

applications of these tools (Clement, 1981).

Some have suggested that the human/computer interface should pay more attention to cognitive factors (Clement, 1981; Lipsitz, 1982). These factors include motivation and goals of the user (Lang, Auld, & Lang, 1982), confidence (Paxton & Turner, 1984), and attitudes (Lawton & Gerchner, 1982; Clement, 1981).

To incorporate these cognitive factors, (as cited in Lipsitz, 1982) Gagne suggests that tutorial designers should be aware of cognitive learning theory in the organization of learning material. Cognitive learning theory stresses some of the various learning processes. According to Gagne (as cited in Lipsitz, 1982) however, it is not just a matter of figuring out how to present a stimulus, which, as stated by Gagne is the older way of phrasing the question of instruction. The question is now, what kind of external event can affect the internal processes that are going on when the act of learning occurs. Gagne (as cited in Lipsitz, 1982) asserts that the tutorial mode of teaching requires development as a new technology. And as a technique it should especially incorporate drill and practice. He reports that according to modern cognitive theory, drill and practice "deserve more credit than most people give it" (p.14).

Furthermore he asserts that the cognitive theories developed about such subjects as basic skills (i.e., reading, writing, and arithmetic) have proposed that for the learner to undertake the problem solving that is required when he solves arithmetic problems he must use his

working memory which deals with the ability to acquire and retain information but which has a limited capacity. In order to effectively carry out the processing that is required, some of the subordinate skills must be automatic.

Additionally it has been suggested by Kearsley and Hillelsohn (1982) that only the essential skills and knowledge necessary for the specific function in question should be presented in the material. Training materials should have one primary objective or all objectives related to a single particular task. Hence, tutorials and other training materials should not be encumbered by extraneous text or non-essential material not central to the tasks to be trained. Such superfluous information can be confusing and tedious to the trainee, especially considering that only a portion of the material will be retained by the trainee. Non-essential material is likely to be forgotten, or confused with that information which is important. Conversely however, some tutorials are negligent regarding one vital learning resource, information required to correct errors (Davis & Swezey, 1983). In other tutorials, information regarding error correction is skeletal or non-existent. Novice users especially prefer learning situations which are enhanced with extensive help and error correction facilities (Benbasat & Wand, 1984). If the user has the ability to correct errors, then confidence is gained (Paxton & Turner, 1984).

Psychological factors such as confidence, attitudes, and anxiety

have been shown to affect the user's rate of learning as well as his performance when working with computers. Specifically, it has been demonstrated that naive users with negative attitudes toward computers learned editing tasks more slowly and made more errors (Schniederman, 1979). Eason and Damodaron (1981) have also lent support to the importance of attitude and its effect on the nature of the user, especially the naive user's interaction with the computer. Their belief is that the naive user's attitude toward computers affects his motivation in working with the computer. Eason and Damodaron (1981) assert that while a negative attitude toward computers may result in the user's exaggerating small problems into large ones, a positive attitude may result in the user being motivated to deal with small problems he encounters with the computer. The implication then, is for designers to create computer systems and related materials that will help instill positive attitudes toward the system.

Schniederman (1979) has suggested that anxiety may reduce short-term memory and impair performance. Consequently, when designing a system for novice users it is recommended that every effort be made to make them feel at ease without being too obvious or patronizing. The instructions should be clear, in familiar terms, easy to follow, and should begin with simple tasks that will enable the user to have early successes and gain confidence.

In 1967, Mayer (as cited in Paxten & Turner, 1984, p. 146) recognized this and stressed that a lack of efficient and effective

training techniques in both software and hardware is one of the naive user's greatest difficulties in achieving maximum interaction with the computer. Thus, Mayer had proposed an automated training "subsystem" for training the user on the computer. Each subsystem would incorporate tutorial features produced by the computer, which would always be available to the user for training. This process would be based on a shaping principle (the method of successive approximations) where the tutorial material would be presented in small incremental steps requiring frequent responses from the learner and enabling the learner to progress at his own speed. One of the benefits discussed by Mayer (as cited in Paxten & Turner, 1984, p. 146) of such a training process included the fact that the trainee learns the computer system by actually using the system, and that successful use of a computer has strong motivational effect. Thus, much can be said for the effective use of shaping procedures in computer oriented tutorials and an emphasis on hands on training formats.

While cognitive factors are receiving recent attention in relation to computer interaction and design of adjunct materials (i.e., tutorials) (Schniederma, 1979), more attention also needs to be directed toward the choice of tasks that facilitate learning. The present thesis suggests that a crucial phase in training a new software user, is to include in the training tutorial the tasks of data entry and screen design, which require creating the screen template allowing the program to accept, store, and manipulate the data once it has been entered, in an

organized manner. As stated earlier by Gagne (as cited by Lipsitz, 1982), actual drill and practice are especially important in training programs. However, in the interest of expediency, some software tutorials are bypassing actual user entered screen design and data entry by providing a diskette containing pre-entered data (though some software, like "Dollars and Sense" (Millin, F. E. 1983) do provide both).

The user's interaction with the computer and software functions is greatly decreased when most of the required work is already done for the user (i.e., via a pre-entered data diskette). It is recommended that the effectiveness of such a tutorial may be hampered by the subsequent reduction of the user's interactivity while using the tutorial. This decrease in effectiveness would be especially evident if the user attempts to then use the new found skills taught by the tutorial with the software. The user would likely find difficulty in beginning the software functions because the skills required for the rudimentary first steps - screen design, and data entry have not been practiced. As mentioned above, Paxton and Turner (1984) reported that the successful use of the computer after training will produce a strong motivational effect and that the absence of this crucial step could lead to a negative experience for the user instead of the enrichment the user should be experiencing. This positive or negative post-training experience for the computer user would no doubt be applicable to software training as well.

This presentation of learning theory is heuristically valuable and relevant, however in reference to tutorials in particular, an extensive literature review revealed little specific to software tutorial methods.

Statement of the Problem and Hypothesis

In view of the research just discussed, it is evident that there is little attention oriented toward software tutorials and empirical testing to determine the most effective tutorial presentation methods.

In the present study, two software tutorials were tested in order to evaluate through comparison a more effective presentation method. Both were oriented to the data-base portions of the Appleworks software program. The first, tutorial A, provided a data disk with pre-entered data for the user to manipulate and no error correction information. This tutorial is that which actually accompanies the Appleworks program. The other, tutorial B, did not include a data disk and encompassed features of data entry and screen design provided by the user from given sample data. Tutorial B followed the same format as tutorial A and was designed and written by the experimenter.

Both tutorials are comparable and require nearly identical user manipulations of the data during the task. The only substantive difference between them is the method of data entry. Two groups of participants were exposed to both tutorials. Group 1 experienced tutorial A first and tutorial B second and Group 2 experienced tutorial B first and tutorial A second.

The dependent variables in this study consisted of: (1) The level

of confusion occurring in the use of the tutorials. It was hypothesised that tutorial A, the tutorial that accompanied the Appleworks program, would have higher reported levels of confusion than tutorial B, the experimental tutorial. Dependent variable (2) represented user satisfaction ratings taken from a satisfaction survey. The surveys were given to each participant upon completion of each tutorial task representing a positive or negative index. It was hypothesised that tutorial B would have higher reported levels of satisfaction than tutorial A. Dependent variable (3) included measures of time taken to use the two tutorials. The time measured encompassed the time taken from the point at which the user was instructed to begin the tutorial and task to the time the user reported that he had completed the task. All the participants were instructed to report to the experimenter that they were finished, as soon as they had completed the task. Thus this dependent variable represents the time taken to complete the task (in minutes). It was hypothesised that the time taken to complete both tutorials would be equal in duration. Dependent variable (4) represented the number of requests for assistance from the experimenter, whenever the participant reached a point in each tutorial where they felt they could not continue without assistance. It was hypothesised that tutorial A would require more requests for assistance from the experimenter than tutorial B. Dependent variable (5) measured participant reaction to the two tutorials using a comparison questionnaire given after both tutorials had been

completed. It was hypothesised that the comparison questionnaire would indicate a preference for tutorial B over tutorial A after a comparison of the two.

Method

Subjects

The Participants in the present study were 30 undergraduate students (12 male, 18 female). The participants were chosen from a group of volunteers (N=75) from an Introductory Psychology course taught at the University of the Pacific in Stockton California. The subjects were chosen by use of a sampling procedure (without replacment).

Design

The participants were randomly assigned to two groups each containing 15 participants. Group 1 used tutorial A first and tutorial B second. Group 2 used tutorial B presented first and tutorial A presented second. Thus all participants experienced both tutorials, half in one order of presentation, the other half in reversed order of presentation.

Apparatus

The database portion of the Appleworks software tutorial was utilized. Currently this software is sold with a written tutorial (see Appleworks tutorial pages 31 - 48) and an accompanying data disk used in conjunction with the tutorial. This tutorial and data disk

(referred to as tutorial A) were given to both groups 1 and 2. A second tutorial (referred to as tutorial B) was used which was designed for the same software using the same database program and much of the same data as found in tutorial A (see appendix A). This tutorial was also given to both groups. While both tutorials were similar, the difference was in their approach to data entry. Tutorial A provided for various manipulations of the data using the program functions, but the data used was already stored on a data disk so that the user needed only to access this disk to begin. Tutorial B did not include a prepackaged data disk but instead required the user to set up a database format using a given example, then to enter his own data, and finally to manipulate it using the program functions.

All the participants used the Apple IIe computer with 128 K memory, two disk drives, a monitor, and an interactive software tutorial developed by Apple to help introduce users to the computer which is entitled, An introduction to the Apple IIe computer. Apple Presents... Apple (copyright 1982).

A 20 item 7-point likert scale satisfaction survey was given to each participant upon completion of each tutorial (see appendix B). The survey was designed to measure a participant's level of confidence and level of satisfaction toward the tutorial and toward the software. The confidence and satisfaction level was considered a positive user experience when the score ranged from 10 to 30 points. It was a moderately satisfying experience when the scores ranged from 31 to

50 points. A score in the range of 51 to 70 represented a dissatisfying user experience (notice that lower scores represented more positive responses). The extreme points of the scale represented bipolar attitudinal statements with (1) being the most positive response and (7) being the least positive. Several of the statements were scored differently because a reversal of the polarity of the responses occurred in some of the questions as an attempt to prevent the user from orienting to one side of the survey (see appendix D for an explanation of those items with reversed polarity).

Of the questions provided on this survey, two questions were designed to determine (in particular) user preference regarding use of disk based data and user entered data. Question 13 asked how important the respondent thought entering their own data by hand was in terms of creating confidence in use of the software. Question 14 asked if having data already entered on disk would create greater confidence.

Another comparison questionnaire was also given to the participants after completion of both tutorials which contained eight questions allowing the participants to indicate comparative preferences between the two tutorials (see appendix C).

Procedure

The present study was conducted in a small comfortable, sound attenuating room measuring 2.1 meters by 4.6 meters, located in the University of the Pacific Psychology Department. Lighting was

provided by two 150 watt soft flood lights, one located directly above the computer. Subjects were led to the computer room and seated in front of the computer. The participants were given identical instructions provided by one female experimenter and each worked independently. The participants were given basic operating instructions (i.e., how to insert a disk). They were then instructed to complete the introductory disk (Apple Presents... Apple). This preparation provided each participant with a common base understanding of computer use.

Participants were then told that while going through their respective tutorial, if they reached a point where they felt they could not proceed because the difficulty level was too high, that they may then request assistance from the experimenter. The statement from the experimenter regarding requests for assistance was, "Please continue through the tutorial to the best of your ability. If you reach a place where you feel you cannot continue or do not have enough information, try to work through it. If you still feel "stuck" then you may request help from me to get you going again". The frequency of requests was referred to as "requested assists".

Results

A series of t-tests and ANOVAs were conducted on each of the dependent variables comparing not only the two tutorials, but also comparing them on the basis of order presented to the participants. In particular, comparisons were made between: 1. tutorial A (as presented

first) compared to tutorial A (as presented second), 2. tutorial A (as presented first) compared to tutorial B (as presented first), 3. tutorial A (as presented second) compared to tutorial B (as presented first), 4. tutorial A (as presented first) compared to tutorial B (as presented second), 5. tutorial B (as presented first) compared to tutorial B (as presented second), and 6. tutorial B (as presented second) compared to tutorial A (as presented second). Table 1 presents the dependent variable means for visual comparison. Remember that lower scores in the satisfaction questionnaire represent more favorable responses.

Table 1

Average Scores for Dependent Variables

Dependent Variables	Tutorial A	Tutorial B	Tutorial A	Tutorial B
	First	First	Second	Second
Level of Confusion %	21.7	18.0	17.7	9.7
Satisfaction Survey Total	40.5	35.9	34.5	25.7
Specific Survey Questions				
Survey Question 13	2.5	3.4	2.5	1.9
Survey Question 14	3.1	2.9	3.5	5.3
Time (minutes)	25.4	31.7	22.0	25.5
Requests for Assistance	1.2	0.8	0.9	0.7

Comparison Questionnaire Scores

Tutorial A = 2.4

Tutorial B = 3.0

Note: Comparison Questionnaire Scores indicate only one score for each tutorial because only one questionnaire was completed by each participant.

Results for Level of Confusion

Several *t*-tests were conducted on confusion measures producing results which were not significant for several tutorial measure combinations. However participant measures for those given tutorial A first ($\bar{x}=21.7$) followed by tutorial B ($\bar{x}=9.7$) indicated substantial mean deviations. This was also found to be the case for those participants in which tutorial B was given second ($\bar{x}=9.7$) compared to participants in which tutorial B given as the first tutorial ($\bar{x}=18$). The means for these tutorial measures did suggest a degree of confidence for tutorial B over tutorial A, however this could not be substantiated because of a high degree of individual error in the scores.

Results for Satisfaction Survey Totals

A *t*-test revealed a preference for Tutorial A when given first ($\bar{x}=40.5$) over tutorial A given second (after exposure to tutorial B) ($\bar{x}=35.9$), $t(28) = .697$, $p < .05$.

Survey scores were also significantly in favor of tutorial B ($\bar{x}=34.5$) when tutorial B was given as the first tutorial over tutorial A given as the first tutorial ($\bar{x}=40.5$), $t(28) = 1.163$, $p < .05$.

When comparing tutorial B given as the first tutorial ($\bar{x}=34.5$) and tutorial B given as the second tutorial ($\bar{x}=25.7$) (after exposure to tutorial A), a preference was found for tutorial B given as the first tutorial, $t(28) = 3.154$, $p < .01$.

Additionally, tutorial B ($\bar{x}=25.7$) following tutorial A ($\bar{x}=40.5$) represented a significant difference, $t(28) = 3.10$, $p < .01$.

Results for Specific Survey Questions

Two of the questions from the survey were compared on their own merit, Question 13 and Question 14.

Question 13

Question 13 asked how important the respondents thought entering their own data by hand was in terms of creating confidence in use of the software. When comparing tutorial B given first ($\bar{x}=3.4$) and tutorial B given second ($\bar{x}=1.9$) there was high degree of significance toward tutorial B, $t(28) = 2.28, p < .05$.

Question 14

Responses to question 14 determined whether having data already entered on disk created greater confidence.

Significance was found between tutorial B given first ($\bar{x}=2.9$) and tutorial B given second ($\bar{x}=5.3$) indicating a lesser preference for disk entered data after experience with tutorial A, $t(28) = 3.24, p < .01$.

Significance was also found between tutorial A given first ($\bar{x}=3.1$) and tutorial B given second ($\bar{x}=5.3$) representing a decrease in positive response to question 14, $t(28) = 3.24, p < .01$.

A significant difference additionally was found between tutorial A given second ($\bar{x}=3.5$) and tutorial B given second ($\bar{x}=5.3$) indicating that those in the group that followed tutorial A had a higher dissatisfaction rating for question 14 than those in the group that followed tutorial B, $t(28) = 2.67, p < .02$.

Finally, for question 14, a level of significance was found in the

interaction of groups having tutorial A and tutorial B, $F(1,28) = 13.51$, $p < .01$ (see figure 1).

Interestingly there was also significance in comparing the scores of tutorial B given second after exposure to tutorial A for question 13 ($\bar{x}=1.9$) and question 14 ($\bar{x}=5.3$), $t(28) = p < .002$.

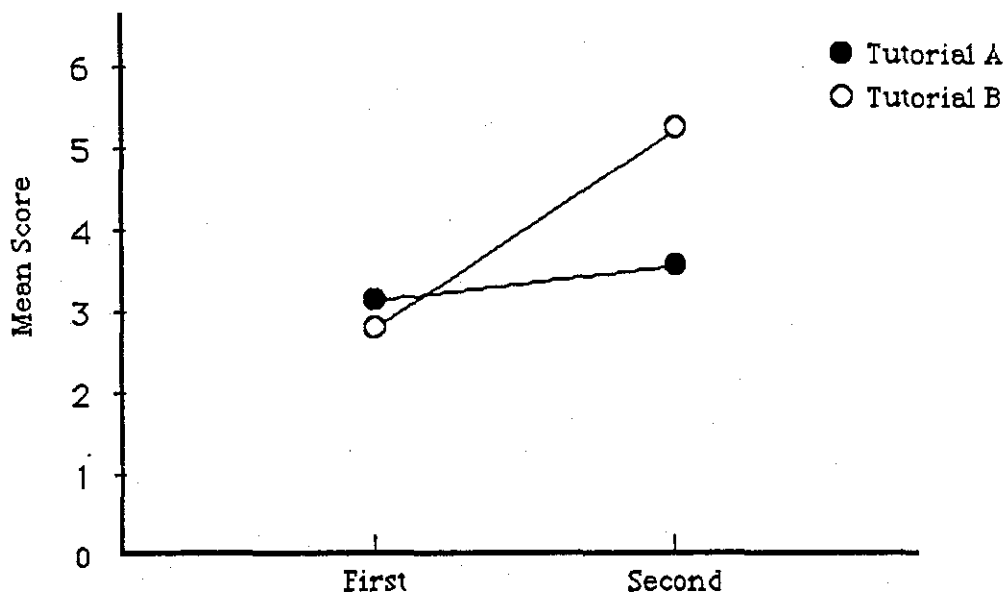


Figure 1

Time

Anova tests indicated that tutorial A ($\bar{x}=23.70$) took significantly less time to complete than tutorial B ($\bar{x}=28.60$), $F(1,28) = 9.24$, $p < .05$.

Results for Frequency of Requests for Assistance

In measuring the frequency of requests for assistance from the experimenter, results were not significant. However while the means do suggest a difference, a high degree of individual error precluded

any significance shown statistically.

Results for Comparison Questionnaire Scores

Results for preference comparison measures taken from the comparison questionnaire (given after both tutorials were experienced) between tutorial A ($\bar{x}=2.37$) and tutorial B ($\bar{x}=3.0$) also proved significant $t(28) = 2.3, p < .05$ in favor of tutorial B.

Discussion

The reported results indicate considerable support for several of the experimental hypotheses.

Discussion of Reports of Confusion

Mean measures of stated levels of confusion (as per the satisfaction survey) provided descriptive support of less confusion occurring in the use of tutorial B (the experimenter written tutorial) than in the use of tutorial A (the manufacturer's tutorial), especially when tutorial B was given following tutorial A. When tutorial A was given after tutorial B, the reported level of confusion was virtually the same.

These results suggest that exposure to tutorial B produced considerably less confusion especially when presented with other materials (i.e., tutorial A) first. However confusion was not notably reduced for tutorial A even when presented with other materials beforehand. Indication here could be that tutorial B was more strongly enhanced than tutorial A by a learning curve which occurred when exposed to similar material before hand. It is suggested that this is largely due to the greater interactive nature of tutorial B.

In addition, it is interesting to note that both tutorial A and tutorial B when presented as the first tutorials had comparative confusion measures (i.e., Tutorial A ($\bar{x}=21.7$) and Tutorial B ($\bar{x}=18$)). This relative comparison could suggest that any tutorial presented without benefit of previous exposure will create a moderate level of confusion regardless of the mode of presentation.

Discussion of Satisfaction Survey Totals

The satisfaction survey provided data in reaction to only one tutorial at a time as it was given immediately after each tutorial presentation. The intent of this survey was to provide information about each tutorial which would be as independent as possible. However it would be naive to assume that the participants would respond to the second survey without some reference to the prior experience of the preceding tutorial. Therefore, tests were conducted on the two tutorials based on their independent scores and also on the scores in relation to the order in which the tutorials were given (and scored on the survey).

The results showed that a comparison of tutorial A given as the second tutorial (after exposure to tutorial B) compared less positively than tutorial A given as the first. The indication here is that after exposure to tutorial B the participants were less positive about tutorial A than they were without any opportunity to compare tutorial A against another tutorial form (i.e., tutorial B).

Additionally, scores for tutorial B when given first were

significantly better than scores for tutorial A given first. The indication here is clearly that even without an opportunity to compare the two tutorials, participants indicated a significant preference for tutorial B.

A preference was also found for tutorial B when given as the second tutorial (after tutorial A), over tutorial B given as the first tutorial. This result supports the contention that after given an opportunity to experience and compare the two tutorials a preference was extended toward tutorial B (especially when tutorial B was given after tutorial A). This finding was also supported in tests comparing tutorial A followed by tutorial B, indicating a significant preference for tutorial B.

In summary, for all cases of presentation order tutorial B was preferred by the participants over tutorial A both in the case of having the opportunity to compare the tutorials against each other and in the case of not having had the opportunity to compare tutorials (i.e., both tutorial A and tutorial B compared as the first tutorials presented).

Discussion of Specific Survey Questions

The survey also contained two questions which dealt directly with preference of entering data, whether by hand or by using pre-entered disk based data. The results of these questions related directly to the main experimental hypothesis.

Question 13

Question 13 asked participants to respond as to how important they thought entering data by hand was in terms of creating

confidence in use of the software.

When comparing tutorial B given first and given second, significance in t-tests suggested that a difference was found in preference of user entered data (tutorial B) after having been exposed to the disk entered data tutorial (tutorial A). This finding is also interesting in respect to the fact that responses to this question for all participants scoring tutorial A (i.e., tutorial A given first and tutorial A given second) were identical in both groups (see table 1). The main difference between all measures emerged for tutorial B when tutorial B was presented after tutorial A.

Question 14

Question 14 asked a question opposite of question 13, specifically, if having data already provided on disk would promote greater confidence for the user.

The t-test results indicated significance found between tutorial B given first and tutorial B given second (see table 1). When users had an opportunity to experience tutorial A first then to compare with tutorial B, the participants indicated a clear and significant preference for user entered data (tutorial B). This result provided clear support for the experimental hypothesis.

In addition, where tutorial A was given first and tutorial B was given second, and where both tutorials were given second, results supported a preference for user entered data.

It is interesting to note that all scores for tutorial A (given first and

second) on both question 13 and question 14, scores varied little.

However, measures for tutorial B changed dramatically in favor of the experimental hypothesis supporting tutorial B especially after exposure to tutorial A.

A comparison of question 14 by ANOVA yielded significance in interaction of tutorial A and tutorial B supporting the differences between responses by the two groups. This comparison lended a direct indication that participants preferred using the tutorials in which they were required to enter their own data.

Discussion of Time

The time taken to complete the tutorials was initially hypothesized to be comparable. ANOVA results however indicated that tutorial B took significantly longer to complete than tutorial A. It is important to note however that the actual difference in minutes was at its greatest difference only 9.7 minutes (see table 1). In exchange for the considerable benefit provided in the other results, this difference can be considered a minimal sacrifice in the training of a novice user on a new software program.

The results suggested that the participants preferred tutorial B based on their satisfaction survey measures, the fewer required assists from the experimenter, and the results of the comparison questionnaire.

These implications are important in relation to how tutorials and other training materials should be presented to the novice software

and hardware user.

While pre-entered data afford the user less time in the learning process, it is suggested that pre-entered data does not instill as much confidence as the user would have experienced if they had entered their own data and designed their own screen format. This is an important message to training developers who are interested in providing the best possible training format (particularly in relation to tutorials).

Discussion of Frequency of Requests

The results while not significant do provide means which suggest that more requests for assistance were required for tutorial A than for tutorial B. This is relevant in considering the ease of use and teaching capacity of the two tutorials. Therefore, if using data from a pre-entered disk causes the user to require more help than utilizing user entered data, teaching materials designed for use outside of the classroom format (i.e., independent instruction using a tutorial) should incorporate the medium which reduces error and requires least assistance. This is especially important considering that in an independent learning environment (such as one's home) there would be little assistance available.

Discussion of Comparison Questionnaire Score

The results of a separate comparison questionnaire which measured preference between the two tutorials indicated a significant preference for tutorial B over tutorial A. This measure is important in

that it provided the participants the opportunity to compare the tutorials against each other on variables such as ease of use, level of comfort and level of enjoyment obtained among others. It is evident that in this most basic measure users will have enhanced learning experiences when using a tutorial that they find easier, more comfortable to use, and more fun to use. This dependent variable most strongly supports the use of an interactive tutorial that makes use of primary software tasks such as screen design and data entry over the tutorial which provides pre-entered data and screen design to be then manipulated by the user.

Other research in this area could elaborate on these findings by comparing tutorials containing some combination of the user entered and disk based data which would provide optimum training with ease and as brief a time period as possible.

Additionally, training in hardware could be explored along the same format in reference to interactive tutorials.

In general, there are many training formats being utilized currently in the training of software and hardware and only two formats were discussed in this thesis. A concerted effort to compare other training media (i.e., cassette tapes and video interfaces) as well as useful combinations could do much to contribute to the search for the most effective training formats.

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Appendix A

APPLEWORKS™

DATA BASE TUTORIAL

The data base is used for many purposes. It is used to organized names and addresses, expense items, checkbook records, and much more.

To use the Appleworks Data Base:

1. Place the Appleworks UNII disk into the disk drive. If the computer is OFF, turn it on and the program will start automatically.

If the computer is ON, press the **⌘** (called the Open-Apple key) and the **Control** keys, and hold them down while you also press the **Reset** key. Release all three of them at the same time and the program should start. (note: If it doesn't start, just try again).

2. When the drive stops (and the red drive light goes off) the bottom of the screen instructs you to place the Appleworks Program disk in the disk drive. With this disk drive however, simply press the **Space Bar**.

Note: The bottom of the screen will usually ask you to respond a certain way. While going through the instructions, just notice how you will be responding to the prompts as they are given.

3. Shortly, the screen will show a date and then asks you for Today's Date. Enter in the current data (use the format provided on the screen). Press the space bar over any numbers which may be left over, the press **Return**.
4. Now the screen contains the Main Menu. Since you want to create a file, you want to choose, "Adds File to the Desktop". Since this choice is already highlighted, you can just press **Return**.

The following instructions will provide you with a column for GENERAL INFORMATION and WHAT TO DO. You will read the GENERAL INFORMATION column then perform the required steps described in the WHAT TO DO column.

GENERAL INFORMATION**WHAT TO DO**

Now you have a choice of using an already constructed file from "Disk Drive 1" or creating a new file from the three choices on the bottom of the screen.

You're interested in creating a data base file, so:

Press **↓** 3 times until Data Base is highlighted.

Press **Return**

The screen now asks you if you want to start from Scratch. Since you do;

Press **Return**

The bottom of the screen asks you to enter a file name. For convenience you can utilize the Data Base using all capitol letters.

Push down the **Caps Lock** key

Type **PIE FILE**

Press **Return**

The screen display is cut in half. The left half displays - "Category 1", and the cursor is at the beginning of that line (on the "C").

You are now ready to begin to use the data base. For your purposes, imagine that you are managing a pie company, and you want to keep track of vital

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information about your pies. You may now design the format that will organize your pie information.

You first want to clear the left screen of the the phrase "Category 1".

Press **C** **Y**

This clears the line.

Now you can begin typing the first of the various points of information regarding each pie.

Type **PIE NAME**

Hint If you make a typing mistake, just back over the error using the Delete key. Then you can retype the information.

You are now ready to type in the rest of the labels of your pie information.

Press **Return**

Type **UNITS SOLD**

Press **Return**

Type **UNITS/MONTHS**

Press **Return**

Type **DATE INTRODUCED**

Press **Return**

Type **TOTAL SALES**

Press **Return**

Type **PRICE/UNIT**

Press **Return**

These are the labels you're interested in at this time.

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Now to begin entering information for each pie concerning each of these areas.

Press **ESC**

The screen contains a message that "The file does not yet contain any information". To continue;

Press the Space Bar

You should now see a copy of the categories you entered on the screen.

The next step is to begin entering the relevant information for each pie. On Data Base Sample Page 1, is a list of this information for each of six pie products.

To begin, after "PIE NAME",

Type APPLE LIGHT

Press **Return**

You will be taken to the next line. After "UNITS SOLD",

Type 4000

Press **Return**

After "UNITS/MONTH",

Type 2000

Press **Return**

After "DATE INTRODUCED",

Type 7/4/85

Press **Return**

HINT As you can see on the screen, the date is not presented in the same format as that you typed in. This is because, Appleworks will alter any date entered in a category which contains the word DATE to a uniform date format.

After "TOTAL SALES"

Type \$16000

Press **Return**

After "PRICE/UNIT"

Type 2.80

Press **Return**

You now have a second blank set of categories for you to use to enter information for your next pie.

Use the Sample Sheet 1 to enter in the information for pies 2, 3, 4, 5, and 6, just as you did for 1, APPLE LIGHT, pressing **Return** after each entry.

Return to these instructions when you have finished.

You have just built your first data base file!

Now press **ESC** (for escape)

Press **⌘ Z** (in order to view all the pies on the screen at the same time).

Now you can view all the files at once. This screen is called the Multiple Records screen. However, some of

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the pie names look like they've been "cut off" (i.e., GRANOLA PUDDING should be GRANOLA PUDDING DELIGHT). That's because the column width is too narrow. To change the column width you need to go to the Change Layout Screen.

Press **C** **L** (for layout)

Now look at the screen. Notice there are fewer pies on the screen. That's no problem though, the rest are just hidden.

Now, to move the cursor from column to column, you use **C** **R** and **C** **L** to get around. However, the cursor is already in the category you want, **PIE NAMES**, so to extend the length of this column.


Press **C** down. While holding this key down, press **R** enough times to allow room for the longest name - GRANOLA PUDDING DELIGHT (this should be about 17 spaces to the right)

(You won't be able to see the rest of the longest names on the screen yet.)


Now the columns are all the right size. You may notice that you have 6 categories but only 4 are on the screen. That's because there's not room for more than 5 or so columns at one time. To view the fifth and sixth categories;


Press **R** 6 times

This feature is called Scrolling. You could access many columns of information by scolling if you needed to.

Now press  6 times to get
back to PIE NAMES


Now you want to get back to the
Multiple Records screen.

Press 

Press  (to choose
Down Standard)

Now you can see all of each pie name.

Looking over the list you now see that
you want to make a change in one of
your pie names. You want GRANOLA
PUDDING DELIGHT to be GRANOLA
PUDDING DELITE.

Place the cursor on Granola
Pudding Delight pressing the 
arrow key 5 times.

When the cursor is there you can "zoom
in" on it.

Press  

Now you can use the arrow key to get
to the end of the pie name.


Use the arrow key to place the cursor
one space to the right of the last "T"
in DELIGHT.

To change DELIGHT to DELITE;

Press the  key 3
times

Now type TE

Now that the change has been made,

Press 

Press **Ctrl** **Z** (to zoom back to the Multiple Record Layout)

Since **GRANOLA PUDDING DELITE** is the last name, you want to get back to the beginning of the list.

Press **↑** 5 times.

Now imagine that you have decided to use some of the information in your pie data base to include in a letter. You need to go back to the **Change Layout** screen to prepare the information the way you want it.

Press **Ctrl** **L**

For the purposes of this letter, all you are interested in are the categories; **PIE NAME, UNITS SOLD, DATE INTRODUCED, and TOTAL SALES**. So you will delete (for the time being) the categories for: **UNITS/MONTH and PRICE/UNIT**.

Press **→** until the cursor is on **UNITS/MONTHS** (2 presses)

Press **Ctrl** **D** (for Delete Column)

Press **→** 2 times until the cursor is on **PRICE/UNIT** (2 presses)

Press **Ctrl** **D**

Now you have all the information you are interested in, **PIE NAME, UNITS SOLD, DATE INTRODUCED, and TOTAL SALES**.

Press **ESC**

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Press **Return**

In looking over the pies, you realize that you really want them listed alphabetically;

so, press **⌘ A** (for Arrange)

The cursor is already on A to Z, which will alphabetize from A, so;

press **Return** to make this choice.

Now suppose that UNITS SOLD for CRISPY COTTON should have been 200 instead of 20. You can get to CRISPY COTTON another way by using the FIND function.

Press **⌘ F**

The bottom of the screen asks you to type "Comperative Information".

Type CRI (the first 3 letters is usually all that you need if there are no similar names)

Press **Return**

Now that you have located CRISPY COTTON, you can "zoom in" on it to make the change.

Press **⌘ Z**

Press **↓** once

Add on an extra "0" to the end of "20" using the arrow key to get there.

Press **Return**

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Press **ESC**Press **C** **Z** to get back to the
Multiple Record ScreenPress **↑** once to get to the top
of the list

Now that the file is all in order, you can make selections from the pies based on any information you are interested in. For example, suppose that for your letter, you want a list of pies that; a) have sold over 300 units, and b) were introduced after July, 1985. For this you would use the Records Selection Rules option.

Press **C** **R**

You are interested in the UNITS SOLD category, so;

Press **↓** oncePress **Return**

Now you can choose which comparison you want to make. You want to choose 2 ("is greater than").

Press **↓** oncePress **Return**

The bottom of the screen asks you to type "Comparative Information". Since you want pies which have sold over 300 units;

Enter **300**Press **Return**

Now you have a choice of AND, OR and THROUGH. You want pies which

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have sold over 300 units **and** were developed after July, 1985. Since **AND** is already highlighted;

Press **Return**

You should now be back at the category listing. You want **DATE INTRODUCED**, so;

Press **↓** 2 times

Press **Return**

Now, since you are working with a date, you have a few different choices. You're interested in "is after", so;

Press **↓** once

Press **Return**

Type **JUNE**

Press **Return**

Now you've made all your selections.

Press **ESC**

The pies selling over 300 units which were introduced after June, 1985 are now listed on the screen.

Congratulations ! You have now used many of the basic features of the Appleworks Data Base program.

Database Sample Page

EXAMPLE 1 (note: this example is
provided in the instructions)

PIE NAME: APPLE LIGHT
UNITS SOLD: 4000
UNITS/MONTH: 2000
DATE INTRODUCED: 7/4/85
TOTAL SALES: \$16,000
PRICE/UNIT: 4.00

EXAMPLE 4

PIE NAME: CRISPY COTTON
UNITS SOLD: 20
UNITS/MONTH: 20
DATE INTRODUCED: 8/14/85
TOTAL SALES: \$80
PRICE/UNIT: 3.50

EXAMPLE 2

PIE NAME: VERY BERRY
UNITS SOLD: 6000
UNITS/MONTH: 1500
DATE INTRODUCED: 5/5/85
TOTAL SALES: \$24,000
PRICE/UNIT: 4.00

EXAMPLE 5

PIE NAME: YOGURT YUMMY
UNITS SOLD: 1250
UNITS/MONTH: 300
DATE INTRODUCED: 7/4/85
TOTAL SALES: \$3,675
PRICE/UNIT: 4.00

EXAMPLE 3

PIE NAME: KUMQUAT
UNITS SOLD: 150
UNITS/MONTH: 40
DATE INTRODUCED: 5/5/85
TOTAL SALES: \$850
PRICE/UNIT: 3.80

EXAMPLE 6

PIE NAME: GRANOLA PUDDING
DELIGHT
UNITS SOLD: 200
UNITS/MONTH: 50
DATE INTRODUCED: 5/5/85
TOTAL SALES: \$800
PRICE/UNIT: 4.00

Press RETURN and go back to the
instructions when you are finished.

Appendix B
Questionnaire

DATE _____

NAME _____ SEX M F AGE _____

EXPERIENCE WITH COMPUTERS _____ MOS. _____ YRS.

YEAR IN SCHOOL _____ MAJOR _____

PLEASE CIRCLE THE NUMBER OR RESPONSE THAT MOST CLOSELY DESCRIBES YOUR FEELINGS.

1. I _____ enjoy(ed) using this manual.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 greatly moderately did not

2. I found the manual _____

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 to be a useful teaching tool not too useful in terms of training

3. I feel that I could begin using the Database _____

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 with little additional training after considerably more training

4. I _____ that this tutorial needs improvement.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 do not feel very much feel

5. This manual has given me _____ of use of the Database in general.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 a greater understanding little understanding

6. The uses to which a Database could be put _____

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 is evident is not
 to me now evident to me now

7. I was confused _____ of the time while using this tutorial.

0% _____ 50% _____ 100%

8. I feel _____ in my ability to start using this Database right away.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 very not too
 confident confident

9. This type of software has _____ in terms of widespread use.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 great few
 possibilities possibilities

10. I felt _____ while I used this manual.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 nervous calm

11. I wish the manual _____

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 had been had been
 longer shorter

12. I felt the amount of time it took to use this tutorial _____

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 was too was quite was too
 long appropriate brief

13. I feel that entering my own data is (would be) _____ in creating confidence in use of the Database.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
 important not
 important

14. I feel that having the data already entered on a data disk is (would be) _____ in making me confident in using this Database myself.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
more useful less useful

15. This manual was _____ helpful in making me feel confident with my my ability to use the Database.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
very not very

16. I would _____ use this type of tutorial when I am learning new software.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
not like to

17. I was _____ satisfied with my performance in going through the tutorial.

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7
quite somewhat not very

18. How would you change this manual if you could?

19. Comments I would make about this tutorial are:

Appendix C

Comparison Questionnaire

NAME _____ DATE _____

PLEASE CIRCLE THE RESPONSE THAT MOST CLOSELY DESCRIBES YOUR FEELINGS.

1. In terms of length, did you prefer: TUT1 TUT2 NO PREFERENCE
2. In terms of ease of use, did you prefer: TUT1 TUT2 NO PREFERENCE
3. Were you more comfortable with: TUT1 TUT2 NEITHER
4. If you were to make a mistake, which tutorial better prepared you to correct errors? TUT1 TUT2
5. Is the amount of information volume, that is most appropriate for initial training purposes, best provided in: TUT1 or TUT2
6. Which tutorial did you consider to be most fun to use? TUT1 or TUT2
7. Which features of tutorial 1 did you prefer?

8. Which features of tutorial 2 did you prefer?

Appendix D
Additional Questionnaire Scoring Criteria

The anchors to the questionnaire questions were oriented such that (1) was the more positive response and (7) was the least positive response except for questions 10 and 17 (see Appendix B) in which the scores were reversed such that (7) was the more positive response and (1) was the least positive. This reversal was done to reduce the chances of the respondent patterning toward one side of the questionnaire. In addition questions 11 and 12 (see Appendix B) were oriented to obtain information about the respondent's attitude of the size of the tutorial. Questions 18 and 19 (see Appendix B) requested general narrative information regarding the participant's attitudes toward the software tutorial.