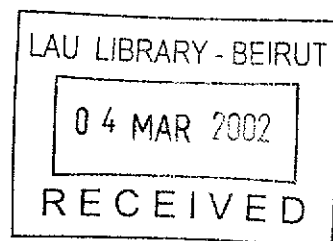# MULTIMEDIA NEW LEARNING TECHNOLOGY OF TODAY:
Delivering Information
And Training With
Multimedia.

A Research Topic
Presented to Business School
Lebanese American University
LAU

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Business
Management

BY
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LEBANESE AMERICAN UNIVERSITY
BEIRUT, LEBANON

APPROVAL OF RESEARCH TOPIC

CANDIDATE : <u>MOHAMAD ALI MALLI</u>   DATE: <u>JUNE 1995</u>

DEGREE   : <u>MASTER OF SCIENCE IN BUSINESS MANAGEMENT</u>

ADVISOR   : <u>DR. HUSSIN HEJASE</u>

TITTLE OF RESEARCH TOPIC : <u>MULTIMEDIA NEW LEARNING</u>
<u>TECHNOLOGY OF TODAY:</u>
<u>Delivering Information And</u>
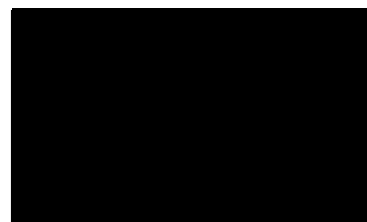<u>Training With Multimedia.</u>

The following professors nominated to serve as the advisors of the above candidate have approved his research work.

ADVISORS   <u>DR. HUSSIN HEJASE</u>

SIGNATURE

SIGNATURE

<u>DEDICATION</u>

**TO
MY MOTHER
&
MY FATHER
WITH ALL MY LOVE**

ACKNOWLEDGMENT

ABSTRACT

Today with each successive generation people can expect several periods of change and they must cope with them at a faster rate of imposition. The pace of change is accelerating. Under these conditions, the knowledge and skills gained yesterday will no longer be sufficient to equip a person for a lifetime. They are only appropriate for a short period of time before becoming obsolete.

They must therefore develop a new training system. They should be moving away from the traditional method of transmitting knowledge and, instead should be helping people to learn. Adopting multimedia training method is an effective tool to train people and make them understand and learn quickly.

In this research the importance of computer-assisted training are presented and the various kinds of training are listed. As a powerful and effective training tool, multimedia technology has a great part of this research. The meaning of multimedia as well as its elements and applications are also presented and defined to highlight its importance and ability in providing information and enriching knowledge.

To show the effectiveness of adopting multimedia technology in training, an experiment was applied on two groups of subjects. Each group was asked to answer questionnaires, solve different problems, then they were asked to answer two different kinds of evaluation forms. After this experiment some statistical models were applied on the collected data to end up with a conclusion stating that multimedia is a new and powerful tool to teach and train people.

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CHAPTER I

INTRODUCTION

1.1 General Overview

In the last 20 years a succession of pundits have made extravagant claims about the coming impact of the computer training . They all been proved wrong.

In education successive government initiatives have repeatedly failed to make inroads and achieve the "computer literacy" on which it supposed hangs our future in an information society. At the same time the pundits have predicted a glowing future for the computer as a teaching machine. The overt and covert reasoning behind their arguments was the feeling that teaching was too important to be left to teachers. They believe that the machine could do the job more quickly and effectively and in the process eliminates the intervention of human teachers[1].

The training world has also had its share of wide-eyed visionaries making extra extravagant claims about the size of market . They did their market research and highlighted a number of factors to convince themselves that the market was almost bottomless[2]:

1 - Size of the training need. Virtually every industrial worker needs training or retraining.

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[1]- Jon William Toigo, Automated Training Development Systems.
[2]- Ibid.

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ii - Desperate shortage of good trainers.

iii - Falling cost curve of computer technology versus the rising cost curve of conventional training methods.

iv - Measurability of computer-mediated training.

In their enthusiasm the enthusiasts conveniently overlooked a number of important constraints, including:

1 - Complexity and cost of "authoring" i.e. writing good

courseware.

2 - Lack of hardware in delivery situation.

3 - Cost of delivery, especially of interactive video.

The end of the 1980s saw the end of the hopes of the teaching machine protagonists. As the totalitarian regimes crumbled throughout Europe, so did the hopes of those who thought they could build an industry by injecting pre-prepared courses, delivered on an unfriendly and anonymous computer, to compliant masses of learners[3].

Now it is believed a revolution is about to dawn, the user is back in control because the computer has been tamed. Steeply falling hardware costs are being matched by unprecedented rise in computer speed and memory. The PC, personal computer, is now becoming a servant rather than a master. One is witnessing the end of the teaching machine era and the beginning of the learning machine era. The interactive multimedia learning revolution is about to begin.

The two keywords are interactive and multimedia. The old style text-based approach is being superseded by an approach which combines audio and color video in a much more exciting way. The videodisk will be joined in the next few years by a whole host

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[3] John Barker and Richard N Tucker, " The interactive learning revolution", p 14.

of digital technologies which will unlock the knowledge bases of the world[4].

1.2 Importance of Training

Training is about developing people as individuals and helping them to become more confident , efficient and competent in their lives and in their jobs. The learning process is the core of training. And the ways of, and opportunities for, learning are numerous and varied. The training field is a rapidly growing sector of people lives and has come of age as a profession. The need for training has always been present in every walk of life, but today the need is so much greater. There are many reasons for this but the most important are probably as follows:

1.2.1 - The pace of change: The pace of change is increasingly gathering momentum. What was appropriate 10 years ago is no longer appropriate and valid today. Indeed, in some areas of one's life what was appropriate last month is no longer appropriate today. This is very different from the experience of previous generations.

1.2.2 - The attitude of employers: The attitude of employers to training is changing. Many are now beginning to see it not as a cost but as an investment. The awareness in management development, generated during 1980s in the reports by Coopers and Lybrand, Constable and McCormick and by Handy, is at long last beginning to be translated into commitment. The implications of the quotation, 'if you think training is expensive, try ignorance,'[5] are beginning to be realized and acted upon.

1.2.3 - The attitude of individuals: The attitude of individuals to personal development is changing. People have begun to realize that training and development are lifelong processes, that the ability to learn does not necessarily decline sharply with age, that one's potential could be infinitesimal and that personal

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[4]- Ibid., p. 15.
[5] - Tony Pont, "Developing effective training skills", McGraw-Hill Book Company, pp 1-2.

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development is important and essential for both individual growth and occupational success[6].

Significant quality training is an investment which results in dividends of immeasurable value. The success that comes from learning through learning and training tools such as multimedia courseware can result in long-term cost efficiency and give unbeatable advantages.

1.3 Computer-assisted training

Computer-assisted instruction is an advanced tool for centralized or decentralized training. This is largely a refinement of programmed training in which individuals work through written material in a programmed way. Trainers progress in a step-by-step fashion, having received feedback on their responses.

Such programmed training has become more sophisticated in recent years with the advance of computers, videos and video discs. Individuals can work at home if they have their own PC or on a work station at work, which may form part of an open training as well as learning facilities.

One of the great advantages of such training is flexibility, the learners can progress at their own pace and whenever they want. The disadvantages are isolation, which can result in low motivation and reduced commitment, and cost. With some of the interactive video packages on the market the cost of hardware and software can be several thousand of pounds. A detailed cost-benefit analysis is required before an investment of such magnitude is undertaken.

1.4 Multimedia, An effective tool in training.

Multimedia refers to the integrated use of text, graphics, animation, sound, still images, and motion video in digital format on a computer-based system. The digital format endows multimedia systems with the power, versatility, and possibilities for user

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[6-] Ibid., p2.

interaction that make these systems highly appropriate for a variety of applications, including training and education[7].

Multimedia is a powerful teaching and learning tool. Hardware is becoming cheaper and more powerful, and the quantity and quality of applications almost grow daily. Unfortunately, until teachers as well as trainers are taught with this tool and have models for effective instructional design and use, the full potential of this technology will likely go unrealized.

Fortunately, everyone can participate in realizing this potential. Those who know more about multimedia and its use can share this information with others; those who know relatively less can seek opportunities to expand their knowledge. Trainers at all levels of training can appropriately incorporate multimedia by applying different methods and instructional models. Administrators can assist their trainers and faculty in becoming knowledgeable about interactive multimedia and facilitate integration of this tool into classrooms and other learning environments.

The first step is to train the trainers to provide key educators with current knowledge[8]. Multimedia should be integrated into ongoing instruction in colleges and universities, particularly into pre-service and in service instruction. This training should demonstrate the use of simulated interaction, structured observation, didactic presentations, exploration and other models of instruction while employing multimedia as training, teaching and learning tool.

Once trainers have been taught using multimedia and have models of effective instructional design, they can advocate for the greater availability of these tools in training centers or schools and ultimately, apply the power of multimedia to effectively meet the tremendous training, teaching, and learning needs that currently exist[9].

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[7]- John Barker and Richard N. Tucker, The Interactive Learning Revolution.
[8]- Jon William Toigo, Automated training Development Systems.
[9]- Dr. Dennis R. Falk and Dr. Helen L. Carlson, Learning to teach with Multimedia.

The use of multimedia in training is burgoing and creating changes in the way the trainers train and trainees learn. Multimedia is widely acclaimed as a new and improved force in training and as a powerful and learning tool in enhancing the deliverance of efficient and helpful training.

1.5 The need of this study.

It is believed, and backed by research evidence, that raising the learners interest in the topic, and motivation, leads to higher achievement. The method and the means of delivering information play an important role in motivating the learner which lead to development and sophistication in the art of delivering information. Education and training have always taken advantage of adapting technical and industrial innovations to the art of teaching and training; the history of using technical devices in the learning process is quite long and the list of such devices includes printing press, a variety of boards, photography, slide projection, overhead projection, movies, computers and many more. Multimedia technology offers alternatives to substitute traditional media of communication. It can handle most traditional media of communication in an attractive and interactive way. And the potential of increasing the level of motivation is higher with multimedia[10].

In the United States, most companies realize the importance of multimedia in their training process. Their training departments are now developing their training applications, using multimedia tools, taking the advantages of the rapid development of the computer as well as other developing technologies. In the Arab world generally and in Lebanon particularly, the training and teaching institutions have not yet introduced the new multimedia technology in their training and educational sessions because of the lack of knowledge about multimedia tools. Also these new technologies have not been completely and effectively introduced for them to develop their effective powerful training tools.

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[10] - H. Yagi, Designing Multimedia Instructional Systems.

To test and assess the practicality of multimedia technology in training, this thesis project was felt necessary to reach to the conclusion felt in the Western countries which are already developing and using the technology in different fields.

1.6 Statement of the problem.

Training can be considered as one of the critical factors responsible for ensuring the success of employee performance. A study points out that "basic and advanced training should be integral element of any strategy designed to enhance end user efficiency and effectiveness"[11].

As training programs become important and essential needs are felt in most organizations, some problems have emerged and can be presented as follows:

i   - Time, or the training period.

ii   - Space, or the place in which the training procedure is

        taking place.

iii - The professional training team, or the skilled trainers.

iv   - Training materials used during the training period.

Most of these problems were solved by most of the American and European organizations by adopting new interactive multimedia training tools that facilitate and improve the training procedure and develop effective tools for learning purposes.

Based on a research done by Mr. Wael Nuwayhed and other studies; it was found out that the multimedia training tools are not used neither in the Arab world nor in Lebanon. In Lebanon, none of the organizations adopt the interactive multimedia training tools in training their employees and developing their working skills.

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[11]- Hala Abdallah Ghutmy, The effects of various training methods and computer interface on learning performance and ease of use.

1.7 Statement of purpose.

The purpose of this research is to highlight the importance and the implications of interactive multimedia in enabling to link data, information and ideas, and helping to make the connections which are critical to learning. By integrating text, graphics, sound, animation and video, it addresses a different learning style, providing a truly interactive learning environment that students and trainees can explore, add to and expose in, enabling them to become actively engaged in the learning process.

1.8 Methodology.

To perform an interactive multimedia training experiment, two training applications were developed using a multimedia authoring tool, Macromind Director. Each of these training applications has its own purpose and use.

1.8.1 - The first application teaches the users the functions of each utility of the "Tool Bar" of the spreadsheet Microsoft Excel.

1.8.2 - The second application shows the end users how a specific Excel problem can be treated, solved and saved in the computer.

After developing the above mentioned applications, two groups of user, who have no idea about Microsoft Excel, have been chosen to be trained on using the Excel spreadsheet software.

The first group, or the test group, was trained using interactive multimedia applications to learn Microsoft Excel software. Then they were asked to solve a specific spreadsheet problem,(see appendix), using the Excel software.

The second group, or the reference group, was trained according to the classical teaching method to use the same Microsoft Excel software. Then they were asked to solve the same spreadsheet problem using the Microsoft Excel software.

When both groups end their session, they are subject to answer a questionnaire to assess their perception of the methods used.

1.9 Limitation of the study.

As any other study, this study has it own limitations presented as follows:

    1.9.1 - This kind of study has not been done before to compare its findings.

    1.9.2 - The size of the two groups, the test and the reference groups, is not big enough to generalize the findings on all training types and procedures.

1.10 Construction of the study.

After introducing the multimedia and its importance as an effective training tool in chapter I, Chapter II is a review of literature dealing with the subjects of end user, training and multimedia. Chapter III is a description of the design and methodology followed and applied in the study. Chapter IV presents the study findings with an explanation of these findings. Finally chapter V is a conclusion for the study along with certain suggested recommendations.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction.

Computers, ... Will they really have an impact on trainers and the way they teach? Will they create a new learning environment for trainees? Of more importance to people in the profession, will they replace the classroom teachers?.

The answer to these questions must be "yes", "yes", and "no". But such answers depend on how one views the use of computers. If one views them as a piece of technology which can organize, store and analyze information one will use them as a resource in a learning environment. If one views computers as a complete substitute for a trainer one will not use them at all. If one foresees ways in which they help people learn in new and exciting ways one will consider adding them to his list of teaching resources[12].

2.2 Computer system.

The term computer is used to describe a device made up of a combination of electronic and electromechanical (part electronic and part mechanical) components. By itself, a computer has no intelligence and is referred to as hardware. A computer system is a combination of five elements which are[13]:

- Hardware.

- Data/information.

- Procedures.

- People.

- Software.

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12 - Computer in education, edited by K.a.Duncan and d.I.Harris.
13 - Hutchinson / Sawyer, Computers - The user perspective.

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When one computer system is set up to communicate with another computer system, connectivity becomes a sixth system element. In other words, the manner in which the various individual systems are connected, for example, by phone lines, microwave transmission, or satellite, is an element of the total computer system.

2.2.1 Computer hardware.

The computer hardware consists of the physical components that make up the computer system. It can be divided into four categories :

      i - Input hardware.

      ii - Storage hardware.

      iii- Processing hardware.

      iv- Output hardware.

i- **Input hardware** : The purpose of input hardware is to collect data and convert it into a suitable language for computer processing. The most common input device is the keyboard.

ii- **Storage hardware** : The purpose of storage hardware is to provide a means of storing computer instructions and data in a form that is relatively permanent, or nonvolatile, that is, the data is not lost when the power is turned off.

iii- **Processing hardware** : The purpose of processing hardware is to retrieve, interpret, and direct the execution of software instructions provided to computers. The most common components of processing hardware are the central processing unit and main memory.

iv- **Output hardware** : The purpose of output hardware is to provide the user with the means to view information produced by the computer system. Information is output in

either hard copy or soft copy form. Hard copy output can be held in your hand, examples are paper with text (words or numbers) or graphics printed on it. Soft copy output is displayed on a monitor.

2.2.2 Data / Information.

The purpose of a computer system is to convert data into information. Data is raw, unevaluated facts and figures, concepts, or instructions. This raw material is processed by the computer into useful information. In other words, information is the product of data processing.

2.2.3 Procedures.

Processing includes refining, summarizing, categorizing, and otherwise manipulating the data into a useful form for decision making.

2.2.4 People.

People, computer professionals and users, are the most important component in the computer system. Although one's role may seem rather obvious, it is often underestimated. Here are some of the ways people can affect computer operations[14].

1. Computer professionals design computer hardware and related equipment.

2. Computer professionals design, create, and develop computer software.

3. Professional computer operators run the computer systems and monitor their activities during processing.

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[14] - Jon William Toigo, Automated training Development Systems.

4. Professional data entry clerks and users key in vast amounts of data every day in computer-usable form for storage and processing at a later time.

5. Users also input data to be processed right away, depending on the design of the computer system.

6. In some cases, users create their own specialized applications software.

7. Users review information produced by the computer for use in making business and professional decisions.

8. Users and computer professionals make decisions and use and operate computer systems in ways that can affect our security, comfort, and well-being in daily life.

2.2.5 Computer software.

A computer is an inanimate device that has no intelligence of its own and must be supplied with instructions so that it knows what to do and how and when to do it. These instructions are called *software*. The importance of software can't be overestimated. One might have what most people consider the "best" computer sitting on his desk in front of him; however, without software to "feed" it, the computer will do nothing more than take up space.

Software is made up of a group of related programs, each of which is a group of related instructions that perform very specific processing tasks. Software acquired to perform a general business function is often referred to as a software package.

Software packages, which are usually created by professional software writers, are accompanied by documentation and users' manuals, that explain how to use the software.

Software can generally be divided into two categories[15]:

> A - Systems software.
> B- Applications software.

A - SYSTEMS SOFTWARE.

Programs designed to allow the computer to manage its own resources are called systems software. This software runs the basic operations; it tells the hardware what to do and how and when to do it. However, it does not solve specific problems relating to a business or a profession. For example, systems software will not process a prediction of what a company's tax bill will be next year, but it will tell the computer where to store the data used during processing; systems software will not process the creation of the animation strip for your next film, but it will manage how it is output.

B - APPLICATIONS SOFTWARE.

Any instructions or collection of related programs designed to be carried out by a computer to satisfy a user's *specific* need are applications software. A group of programs written to perform payroll processing is one type of applications software, as are programs written to maintain personnel records, update an inventory system, help one calculates a budget, or monitor the incubation temperatures at his poultry farm.

Applications software can be purchased "off the shelf," or packaged, that is already programmed, or written to order by qualified programmers. If, for example, a company's payroll processing requirements are fairly routine, it can probably purchase one or more payroll applications software programs off the shelf to handle the job. However, if a company has unique payroll requirements, such as a need to handle the records of hourly employees, salaried

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[15] - Jon William Toigo, Automated training Development Systems.

employees, and commissioned employees, then off-the-shelf software may not be satisfactory. It may be more cost-effective to have the payroll programs written to exact specifications than to try to modify off-the-shelf programs to do something they were never intended to do.

The following are two of the most important programmed application softwares where each of them can benefit the end user and help him/her perform different jobs efficiently. Simply, The following softwares are chosen because they are used in the multimedia experiment aiming to highlight the effectiveness of using the multimedia tools provided by the Macromind Director application to create a training tool used to enable the end users understand and learn about the Tool Box utilities of the Microsoft Excel™ spreadsheet software.

2.2.5.1   Excel.™

Microsoft Excel™ is a powerful spreadsheet for Microsoft Windows™ and the Apple Macintosh. Microsoft Excel™ provides the automated business tools needed for data analysis, list keeping, and calculations as well as the presentation tools needed for reporting wanted results.

Using a worksheet, one can store, manipulate, calculate and analyze data such as numbers, text, and formulas. Moreover, one can attach a two-dimensional (2-D) or three-dimensional (3-D) chart to his data and add graphic elements to it such as lines, rectangles, text boxes, and buttons.

2.2.5.2   Macromedia Director 4.0™

Macromedia Director, the premier authoring tool for multimedia productions, provides the most complete authoring environment for

creating interactive productions that can be controlled by the user or viewer[16].

Macromind Director allows more effective communication through the impact of animation, sound, QuickTime movies, and interactivity. Director can be used to produce dynamic interactive presentations, entertainment and educational CD-ROM titles, information kiosks, technical visualization, simulations, and video productions.

With Director, users combine text, graphics, and digital and analog video form different sources including the Macintosh applications, videodisk and CD-ROM players, video tape players, projectors, and special effects cards.

Director provides precise control and timing of virtually every element in a multimedia production. The program's main components, Overview, Studio, Lingo, and Player, offer flexibility to create and synchronize animation, graphics, text, sound and video[17].

i- Overview: Lets users quickly import and arrange elements in production.

ii- Studio: Is the heart of Director where animation sequences, music, voices, and more can be created, synchronize and edited with a variety of tools.

iii- Lingo: An easy top use HyperTalk-like scripting language, allows the user to add a wide range of interactivity and to control audio or video devices such as CD-ROM, videodisk players, and videotape recorders.

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[16] - Multimedia solutions guide for MULTIMEDIA production.
[17] - Micromedia Solutions Guide.

iv- Productions created with Director can be distributed

as:

Stand-along applications with the Director player for

Macintosh and the Director Player for Windows.

2.2.6 Computer-based training.

Computer-based training is frequently a good choice for new systems. A creative system designer should be able to make much use of the computer-based training techniques that have been developed over the past few year. Computer-based training should not be used because it is novel, neat or convenient, but because it is the "best way" to accomplish the learning skills. System designer should have an objective to train people as quickly and efficiently as possible. In some systems, paper-oriented documents may satisfy this requirement much easier than using the computer[18].

One advantage of using the computer to assist in training people is that it can provide a very flexible presentation of materials to the learner, and keep track the progress of the learner. The computer can be used to provide droller practice, it can provide learning in the form of games or case problems, and it can be used to automatically supply remedial information at appropriate times. Good computer-based training can be very effective in reducing errors of data systems. In fact, one of the main uses of computer-base training is to provide practice with immediate feedback so the learner always knows if an error has been made and can correct it[19].

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[18] - Jon William Toigo, Automated training Development Systems.
[19] - Robert W. Bailey, 1983, Human error in computer systems, p. 61.

2.3 Multimedia.

2.3.1 Definition.

If one divides this word, one finds out that it consists of two words. Multi which means more than one and Media which are the means of communication with a large number of people. That means, Multimedia is more than one medium such as texts, sounds, animation, graphics, and special effects combined together in order to develop a powerful message which will be easily and accurately received by the end users. Its revolution has created entirely a new way of presenting information. By integrating text, graphics, animation and video, multimedia engages the sense and allow people to interact with information in a richer, more natural way[20].

2.3.2 Multimedia technology.

Although multimedia technology began emerging decades ago, it had broad use only over the last few years. Multimedia will soon pervade all aspects of life. One will communicate with CD-workers, users of compact disc technology, through messages and mail messages; homes or office computers will scan wire services, newspapers, and television programs to create personalized news; companies and schools will offer interactive courses that allow employees and students to explore material at their own pace. Ultimately, multimedia will deliver all types of information quickly and easily[21].

Multimedia productions present a tremendous opportunity for companies interested in communicating their ideas powerfully and effectively. Some of the most popular applications in use today include public information kiosks, self-running product demonstration at trade shows, educational and entertainment titles such as books and games, and graphical front-end applications,

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[20]- Multimedia solutions guide for MULTIMEDIA production.
[21] - Robert W. Bailey, Human error in computer systems.

database that give visual expression to statistical information. The applications are as unique as visions of each multimedia developer.

Standards are now emerging for multimedia development on CD-ROMs, Compact Disk drives, are becoming the standard for efficient replication and distribution of multimedia titles and creating demand for more titles. The average of the end-user add-on CD-ROM drive pegged at $621 in 1991 is expected to drop to $120 by 1996[22]. (Refer to Figure 2.1).
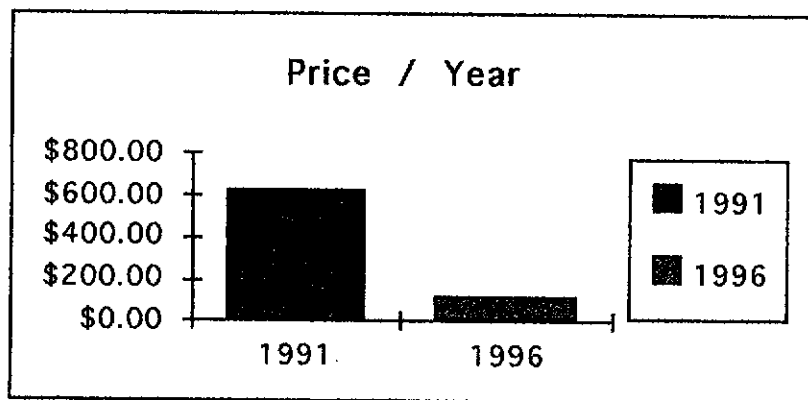
Figure 2.1. Price / Year.

From 1988 the number of CD-ROM drives in circulation had increased from 100,000 to more than 2,000,000 in 1992 , sales of electronic encyclopedias and atlases far outsold their print counterparts[23]. (Refer to Figure 2.2).
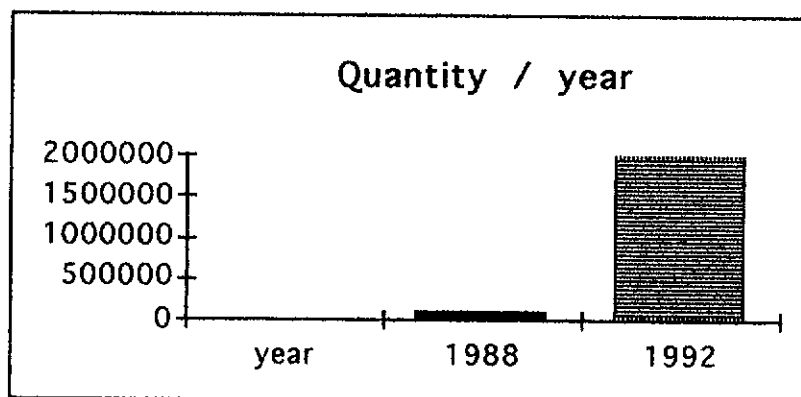
Figure 2.2. Quantity / Year.

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[22] - Multimedia solutions guide for MULTIMEDIA production.
[23] - Ibid.

These trends will continue as more people experience multimedia's benefits. By delivering the right information when and where it's needed, multimedia applications provide more effective communication at a lower cost than traditional media[24].

"Multimedia provides information at your fingertips. No matter what form it 's in , you can get the information you are looking for very easily"[25].

2.3.3 Elements of multimedia.

As said earlier that multimedia is more than one element or medium combined together in a professional artistic way in order to be received by the end users accurately. These elements can be presented as follows:

- Texts.

- Sounds.

- Movies.

- Graphics.

- Animation.

- Special Effects.

2.3.4 Good reasons for adopting interactive multimedia.

Interactive multimedia learning systems are gaining widespread acceptance within the training communities. Such systems have been available for more than 10 years, with hundreds

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[24] - Ibid.

[25] - Bill Gates. Microsoft corporation.

of off-the-shelf software programs and custom applications produced to date. Leading corporate, institutional and governmental users report the following benefits achieved through their use of these technologies[26]:

2.3.4.1. Reduced Learning Time

More than 30 studies compiled todate have found that interactive multimedia technologies reduce learning & training time requirements by an average of 50 percent.

2.3.4.2. Reduced Cost

The primary costs of interactive multimedia instruction lie in design and production—not replication, distribution and delivery. Thus, the cost per trainee is reduced as more trainees use the same program.

2.3.4.3. Instructional Consistency

Technology-based instructional systems do not converge to bad days at the end of a long day. Instruction is delivered in a consistently reliable fashion that does not vary in quality from one company location to another, class to class or school to school.

2.3.4.4. Privacy

With one-to-one systems, trainees are free to ask questions and explore areas that might cause embarrassment in group situations.

2.3.4.5. Mastery of Learning

Because instructional systems never lose patience, they encourage learners to persist in asking questions and in reviewing materials until real mastery is achieved or natural curiosity is appeased.

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[26] - Multimedia Today, volume II, Issue 4 - 1994.

Unlike a normal classroom situation or training session, an interactive multimedia system will not move on to new material until current material is mastered. This ensures that trainees have strong foundations for continued learning.

2.3.4.6. Increased Retention

The process of interaction with material being trained provides a strong learning reinforcement that significantly increases content retention over time.

2.3.4.7. Increased Safety

With interactive multimedia systems, students can explore potentially dangerous subjects without risk.

2.3.4.8. Increased Motivation

Interactive multimedia systems provide a level of responsive feedback and individual involvement that has proven to be highly motivating in both individual and classroom learning environments. Further, interactive multimedia systems focus attention, reducing the potential for distraction or disruptive classroom behavior.

2.3.4.9. Increased Access

Interactive multimedia systems can provide greater and more equal access to quality training. Systems can deliver peripheral subjects in company branch offices where trainee populations are insufficient to support full-time trainers for such subjects or where qualified trainers are unavailable. Furthermore, interactive multimedia systems can be used to simulate laboratory equipment that typically would be too expensive to make available to trainees.

2.3.4.10. Learners Enjoy Interactive Learning

Interactive multimedia systems allow learners to take greater control of and hence, responsibility for their own learning process. As they discover new areas of interest and

accomplishment, they become seekers of knowledge, not just recipients of instruction.

2.3.5 Applications of multimedia.

2.3.5.1 Reference.

This category covers the broadest range of titles, from History discs and literary collections to travel guides and atlases.

2.3.5.2 Resources.

This category covers CD-ROMs that serve as resources to the users, and in most cases includes collections of programs on one disc.

2.3.5.3 Education.

It covers a variety of learning titles, many of which targeted to children. Also frequently included are reviews of general-interest and adult education titles.

2.3.5.4 Applications.

From presentation programs to word processors and paint programs, this category covers a wide range of titles, many in the area of productivity.

2.3.5.5 Entertainment.

It covers an array of software types. Entertainment includes games, but also covers many education and entertainment titles, simulations, and other products that were designed primarily to entertain.

2.4 Interactive learning.

Interactive multimedia promises to revolutionize the way people work, learn, train, and communicate. By integrating text, graphics, animation, video, and sound multimedia engages the senses and allow one to interact with information in a richer, more natural way.

This technology has tremendous impacts on learning and training environments. By empowering students as well as trainees to become involved in their own learning process, interactive applications improve the quality of training and education by providing easy access to information and the ability to illustrate ideas in new, innovative ways[27].

Interactive learning software first became widely used in corporate training applications, traditionally known as computer-based training. As organizations realized the benefits of multimedia, which include improved students and trainees performance and lower costs, learning is expanding to areas such as education and product support.

By delivering the right information when and where it's needed, interactive learning applications help motivate trainees, increase retention, and reduce training costs.

2.4.1 Cost reduction.

The cost for developing, and delivery of interactive lessons is significaly less expensive than for traditional methods.

The primary costs of interactive learning applicants are incurred during development. Delivery and maintenance cost are relatively low. Unlike instructor-led learning or paper-based communication, which requires new teaching material for each class, the cost per user remain stable each time an interactive application is used, and the return on investment increased during the application's lifetime.

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[27] - Tony Pont, Developing Effective Training Skills.

24

Because learning applications can be delivered world wide on CD-ROM diskettes, or over a network directly to the individual desktop, there's no need to invest in expensive travel or classroom space.

2.4.2 Reduced training time.

Because of its visual and audit reinforcement of information, and its responsive feedback qualities, interactive training applications significally reduce the time required to master information.

Interactive applications provide constant feedback on progress as new material is studied. In a corporate environment, less training time means more productive time.

2.4.3 Better trainee performance.

At the heart of interactive learning is the written, visual, and audit or reinforcement of concepts critical to the learning process. Studies have shown that people remember 20 percent of what they see, 40 percent of what they see and hear, and 70 percent what they see, hear, and do[28]. (Refer to Figure 2.3).
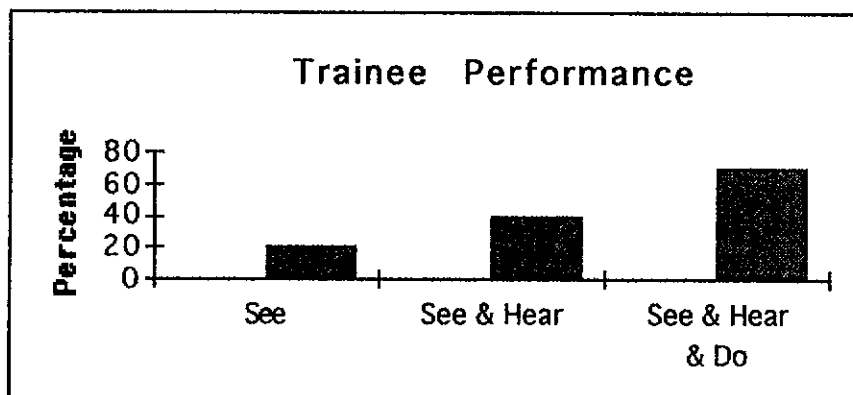
Figure 2.3. Trainee Performance.

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[28] - Tony Pont, Developing Effective Training Skills.

Interactive learning applications provide immediate feedback and multi-sensory learning environment to maximize the way the people retain information. These applications provide constant feedback on progress as new material is learned and mastered, and reinforce new concepts while providing the motivational momentum to continue through an entire set of material.

Interactive support and learning systems can accelerate learning and permit novices to perform like experts while they learn new skills.

2.4.4 Rapid development time.

Powerful authoring systems enable vast amounts of information to be compiled quickly and presented in compelling and meaningful ways. Users of authoring systems find that producing interactive materials takes much less time than producing brochures, binders, or other traditional teaching or training material. In addition, interactive applications are quick and inexpensive to update.

2.4.5 Consistent presentation.

With interactive multimedia, every one sees that same information and is exposed to identical learning environments. The ability of instruction, quality of information and presentation of material is consistent from user to user and from session to session. This consistency extends to all departmental functions, bringing unanticipated synergies throughout organizations.

2.4.6 On- demand availability.

Interactive leaning and training applications can be delivered on demand, where and when they are needed. They accommodate individual working and learning styles. This self-directed training approach puts people in control of their learning processes.

2.4.7 No risk environment

Interactive applications can be created as multimedia, laboratory, or field environment, that may be inaccessible for on site-training demonstrations. Employees safely master skills before applying them in potentially hazardous situations.

2.5 Training.

"Training is about developing people as individuals and helping them to become more confident and competent in their lives and their jobs[29]".The learning process is at the core of training and the ways of, and opportunities for, learning are numerous and varied.

2.5.1 The reasons for the need of efficient training.

Training is a rapidly growing sector and has come of age as a profession. The need for training has always been present in every walk of life, but today the need is so much greater. There are many reasons for this but the most important are probably as follows[30]:

i - The pace of change:

> The pace of change is increasingly gathering momentum. What was appropriate 10 years ago is no longer appropriate today. Indeed, in some areas of people lives what was appropriate last month is no longer appropriate today. This is very different from the experience of previous generations.

> Today, for each successive generation one can expect several periods of change and one must cope with them at a faster rate of imposition. The pace of change is accelerating. Under these conditions the knowledge and skills gained yesterday will no longer be sufficient to equip a person for a lifetime. They are only appropriate for a short time before becoming obsolete.

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[29] - Tony Pont, Developing effective training skills, The McGRAW-HILL TRAINING SERIES, p.1.
[30] - Ibid.

One must, therefore, develop a new training system that equip individuals to cope with this change. One should be moving away from the traditional method of transmitting knowledge and, instead should be helping people to learn. The emphasis change from WHAT, i.e. what knowledge or skills one imparted, to HOW, i.e. how do one help people to learn, so ask questions to acquire skills of self-direction.

ii - The attitude of employers.

The attitudes of employers to training is changing. Many are now beginning to see it not as a cost but as an investment. The awareness in management development, generated in the 1980s by the reports by Coopers and Lubrand, Constable and McCormick and by Handy, is at long last beginning to be translated into commitment. The implications of the quotations, 'If you think training is expensive, try ignorance,' are beginning to be realized and acted upon[31].

iii - The Attitude of individuals.

The attitude of individuals to personal development is changing. One have begun to realize that training and development are lifelong processes, that the ability to learn does not necessarily decline sharply with age, that one's potential could be infinitesimal and that personal development is important for both individual growth and occupational success. Many employers are becoming aware of this shift of individual attitudes. The implications of the 'demographic time bomb' are becoming more apparent as people progress towards the 1990s and beyond, and employers are placing increased emphasis on personal development opportunities as part of their recruitment and retention strategies.

With the growth in the training market, training is now available through a variety of sources. Large organizations provide their own and some companies form consortiums to

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[31] - Tony Pont, Developing effective training skills, The McGRAW-HILL TRAINING SERIES, p.2.

widen their provision. In addition there are numerous public and private educational institutions, professional associations, consultancies, home study, television and other media. All these providers offer a variety of approaches which must be matched to the needs of the individual and the organizations.

2.5.2 The training Cycle.

Training can be viewed as a cyclical process which is on-going. There are five distinct phases in the cycle[32]:

> 1   Analyzing training needs.
>
> 2   Planing and designing the training approach.
>
> 3   Developing the training materials.
>
> 4   Delivering the training.
>
> 5   Evaluating the training.

One needs to look at the five stages in the cycle in a little more detail.

2.5.2-1   Analyzing training needs.

There are three main areas in which this analysis may take place:

i   Needs at organizational level. Where in the organization is training most needed?.

ii   Needs at occupational level. What is needed in terms of skills, knowledge and attitude so that the duties of various jobs can be effectively and competently carried out?.

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[32] - Ibid.

iii Needs at individual level. Who needs training in what?.

The exact relative importance of these three areas will vary from situation to situation, but the final stage will always involve an identification of the people to be trained and the competency gap to be bridged.

2.5.2-2   Planning and designing training approach.

Like the analysis stage, a great deal of information gathering is required, particularly if involved with new programs. It is also worth spending plenty of time on this phase. There is often a tendency to skate over the planning and rush into some sort of action.

The importance of planning cannot be overemphasized: 'Failing to plan is planning to fail'. The time invested in good planning will reap benefits later in the cycle[33].

Among the tasks that have to be addressed in this phase are:

- Defining the learning objective of the training.

- Deciding on the most appropriate methods of training.

- Deciding on the staffing and support.

- Selecting from the variety of media.

- Deciding upon content.

- Identifying evaluation tools.

- Deciding on the prerequisites and pre-course preparation for the learners.

- Organizing and sequencing the training.

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[33] - Tony Pont, Developing effective training skills, The McGRAW-HILL TRAINING SERIES.

2.5.2-3 Developing the training materials.

This is the stage when the work of the two previous stages is integrated into a complete set of materials to assist course delivery and meet the stated learning objectives.

Among the training materials that need to be developed and assembled are:

- Course outline.

- Session plans.

- Learner materials.

- Audio-visual aids.

- Evaluation sheets.

Other important activities have to be carried out during this stage:

- Background reading so that one is up-to-date on the subject.

- Reviewing existing materials and altering or replacing them.

- Briefing the tutors.

- Fitting individual training sessions into a logical sequence so that it all 'hangs together', which, with a new course, may require several 'trial and error' runs.

- Taking care of all administrative arrangements.

- Validating new materials, e.g. films, videos.

2.5.2-4 Delivering the training.

This the stage when it all comes together. If the planning and preparation have been through, then the chances of success are vastly increased[34].

2.5.2-5 Evaluating the training.

This is an often neglected but vitally important part of the cycle. It involves some evaluation of the following:

1 Self, from self-analysis, evaluation forms and feedback from colleagues in the training team. Could you have done better? Are there areas of improvement?

2 The course materials. Do they need replacing, revising, updating?

3 The whole course, self, learners, observers.

4 Segments of the course, self, learners, observers.

5 Follow-up inquiry in terms of improved performance or behavior in the work situation. How effective has been the transfer of learning to the real world?

These five stages help to bring about a change in the delegates' behavior. This change is called learning and without it there is no effective training[35].

2.5.3 Types of training.

Two broad categories of training exist:

1—Trainer controlled. A good example is the lecture.

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[34] - Tony Pont, Developing effective training skills, The McGRAW-HILL TRAINING SERIES, pp. 1-6. .
[35] -Ibid.

2—Learner controlled. A good example would be a distance learning package

All learning is essentially and is the responsibility of the learners. The more they put into the experience, the more they tend to get out of it. This would apply to the whole age of learning opportunities that are available from the lecture to the participatory methods to every day learning opportunities. Very often learning is consolidated and integrated following a period of contemplation and implementation, which requires commitment.

The types of training may be summarized as follows[36]:

2.5.3-1 Classroom.

This can vary greatly in approach from the traditional methods in which the trainer adopts the role of lecturer, with little or no student participation, to where the trainer adopts the role of facilitator with the style ranging from non-directive to directive.

2.5.3-2 Outdoors.

This form of training has been widely used for a number of years and has probably been most used by the armed forces, particularly in such fields as leadership training and team-building. An increasing number of companies are now using such an approach.

2.5.3-3 Computer-assisted learning.

This is largely a refinement of programmed learning in which individuals work through written material in a programmed way. Learners progress in a step-by-step fashion, having received feedback on their responses.

Such programmed learning has become more sophisticated in recent years with the advent of computer, videos and video discs. Individuals can learn at work if they have

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[36] - Jon William Toigo, Automated training Development Systems.

their own PC or a work station, which may form part of an open learning facility.

One of the great advantages of such training is flexibility, the learners can progress at their own pace and wherever they want.

2.5.3-4 Simulation.

This type of learning is very participative and is used mainly for skills training. It may reinforce other types of training, i.e. classroom training.

2.5.4 Training methods.

Within the types of training, some flexibility exists as to the methods used. Equally, within the methods, a variety of media can be used, over-head projectors, flip charts, films, slides, which can enhance the method of delivery.

As a general rule, one should try to aim for a variety in both methods and media , it breaks up the learner's day and allows the message to get through on more than one channel.

The chapter presents some information about the computer, training methods, and the multimedia approach. The next chapter will deal with the methodology that will be adopted to gather and analyze the collected data pertinent to this study.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

3.1 The Basic Approach.

This study has been conducted as a result of an interest in examining two specific methods of training.

1 - The traditional instructional training method.

2 - The Multimedia based training method.

The study intends to examine the effects of each of the training methods on users' performance and to measure the ease of use of each method as a training system.

The research study will attempt to assess the implications of using multimedia in training programs in such countries as Lebanon reflecting peoples' perceptions of this technology.

3.2 Sources of Information and research Design.

A laboratory experiment was conducted to test the above mentioned types of training interfaces, and to explore the training methods used in the preparation of employees and to find out whether multimedia technology is currently applied in training programs.

A specific questionnaire, presented in the appendix, is developed to collect data from the individual subjects to measure the effects of using the two types of training. The questionnaire helped to find out if the use of multimedia training application will ease and facilitate the learning process.

The subjects who participated in the experiment consisted of 30 persons with a common background of having some knowledge in using computers in any application.

Other information needs were gathered from secondary sources like books and periodicals pertinent to the subject.

3.3 Experimental Procedure.

An experiment was conducted on two different groups: A Test group and a Reference group. Each group consisted of 15 subjects of different sexes, ages, and different educational backgrounds.
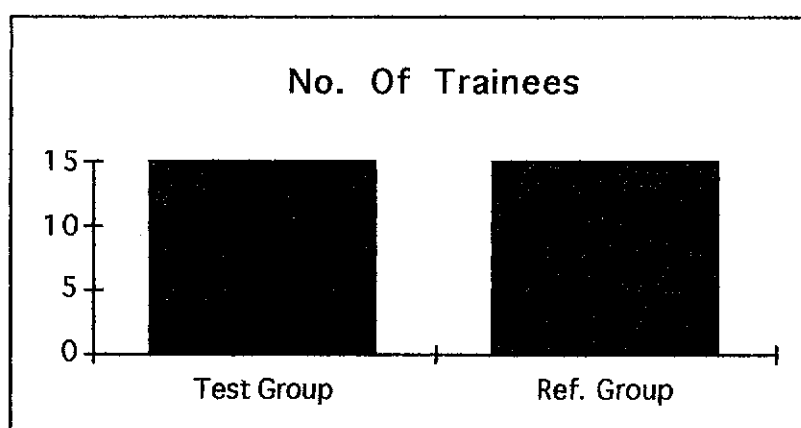
Both groups were provided with:

i- Questionnaires, (Quest)(see appendix).

ii- An Excel Problem.

iii- Two different Evaluation forms, Form (1) and

Form (2)(see appendix).

The subjects of the Test group performed the following:

1 - Answering the questionnaires , (Quest).

2 - Running a multimedia teaching application.

3 - A solution of Microsoft Excel problem was shown using multimedia techniques.

4 - Solving the assigned Microsoft Excel problem.

5 - Filling evaluation forms, (Form (1)), about multimedia.

The subjects of the Reference group performed the following:

1 - Answering the questionnaires , (Quest).

2 - Receiving explanations about the "Tool Bar" (see appendix) of the Microsoft Excel.

3 - Solving a Microsoft Excel problem by the trainer.

4 - Solving the assigned Microsoft Excel problem.

5 - Filling up evaluation forms, (Form (2)), about the computer.

The time taken by each group was around half an hour using an Apple Macintosh computer system.

3.4 Research Variables

As shown in the questionnaire, (Quest), and the evaluation forms, FORM (1) & FORM (2), there are two measurable outcomes of computer learning:

- The traditional instructional learning.

- The Multimedia based learning.

3.4.1   Learning Performance.

Learning performance was measured by the trainees' overall performance in solving the Microsoft Excel problem; performing the step by step problem instructions, and the time spent on solving the problem. Moreover, by evaluating the use of the two learning methods by answering the evaluation forms distributed to the trainees.

3.4.2   Perceived Ease of Use.

A Multimedia application was developed to be used as a learning instrument for the Multimedia trainees.

A questionnaire as well as two different types of evaluation forms were developed to measure whether adopting the traditional instructional training method or the multimedia based training method each perceived by the trainees as easy or not. The questionnaire developed to measure the easiness of using the two methods were divided into two parts.

3.4.2.1   Demographics.

The demographic part included questions to define the subject's age and sex, the educational level, and a question was included to ask the participant if he/she has ever attended any training programs. The latter was divided into 7 questions specifying the location, period, nature, technology, frequency and the number of the participants attending the training program. Moreover, six questions were asked to specify if the subject has any idea about multimedia, if he/she uses it, where, in what field, the characteristics of Multimedia and if he/she is in favor of using it.

Two different evaluation forms, distributed after solving the problem in both traditional instructional and multimedia training methods, specifying the use of computer systems in general and the use of multimedia specifically.

3.4.2.2 Ease of Use.

The ease of use was measured by asking the participants to indicate their agreement, uncertainty and disagreement with statements related to the use of the computer systems they have used as well as adopting the Multimedia technology in their training programs. These statements were included in the evaluation forms distributed to the subjects after solving the Microsoft Excel problem in the two types of training methods. Each statement was responded according to a five-point likert-type scale ranging from (1) strongly disagree to (5) strongly agree.

3.5 Data Analysis

Data gathered was analyzed using the facilities of the Microsoft Excel 4.0. The data were sorted and tabulated and charts were constructed for some specific combinations of numbers related to specific variables of the data.

Having identified the experimental design and the research methodology , the variables to be included, and the analysis tools to be used, it was an important step to list the findings and the implications of the study and to evaluate in the light of the hypotheses to be tested. This is in fact the objective of the following chapter.

CHAPTER IV

FINDINGS AND RESULTS

As stated in chapter three, an experiment was held on two groups of subjects. They were asked to answer questionnaires each consisting of 18 questions, then they were asked to solve a Microsoft Excel problem. Later on, they answered two different types of evaluation forms according to the training session they attended. Chapter four presents the findings of these questions which are tabulated and depicted as charts.

4.1 Questions related to Demographics: Q. 1 to Q. 3.

Q. 1- *Age.*

The ages of the participating subjects are between 16 and 35 years old.

Q.2 - *Sex.*

19 of the subjects (63 %) were males and the other 11 were females (37%). (Table 4.1 and Figure 4.1) .

Table 4.1 Gender Distribution.

	Frequency	Percentage	Cum. Perc.
Male	19	63.33%	63.33%
Female	11	36.66%	100.00%
Total	30	100.00%	

Figure 4.1 Gender Distribution of experiment participants.
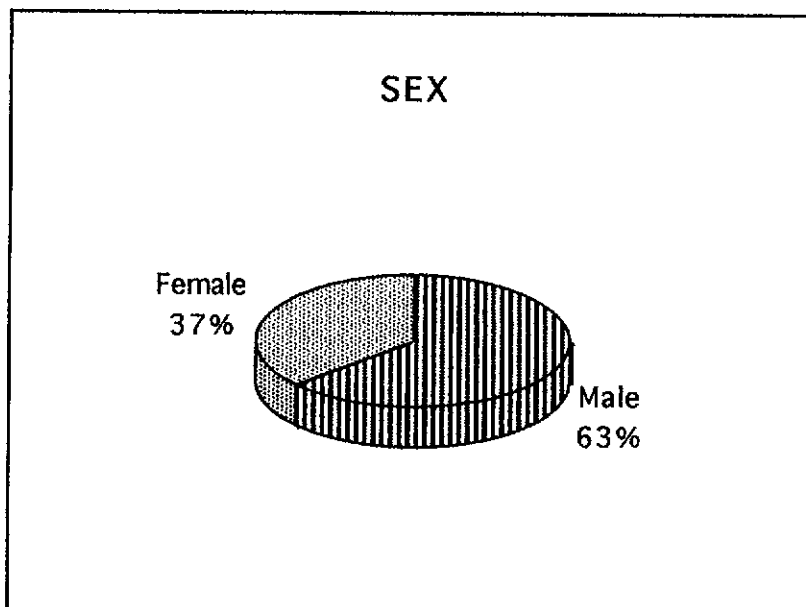
Q. 3 - Education.

10 of the 30 subjects (33%) hold university degrees; 10 (33%) are seeking undergraduate studies, 4 (13%) have degrees from vocational schools and the remaining 6 (20%) are students of high school. Table and Figure 4.2 depict the results.

Table 4.2 Education of selected subjects.

Education	Frequency	Percentage	Cum. Perc.
Univ. Degree	10	33.33%	33.33%
College	10	33.33%	66.66%
Voc. School	4	13.34%	80%
High school	6	20%	100%
Total	30	100.00%	

Figure 4.2 Education of participant subjects.

EDUCATION
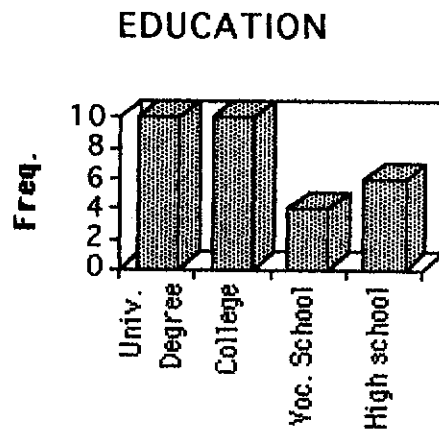
Q. 4 - *Did you attend any training programs?*

14 out of 30 or 47% have attended training programs and the other 16 or 53 % have not attended any training programs. Meaning that the majority of the subjects did not have previous training experience.

Table 4.3 Training experience.

	Frequency	Percentage	Cum. Perc.
A. Tr. Prog.	14	46.66%	46.66%
N. A. Tr. Prog.	16	53.34%	100.00%
Total	30	100.00%	

Figure 4.3 Training Experience.

TRAINING PROGRAMS

N. A. Tr. Prog. 53%   A. Tr. Prog. 47%
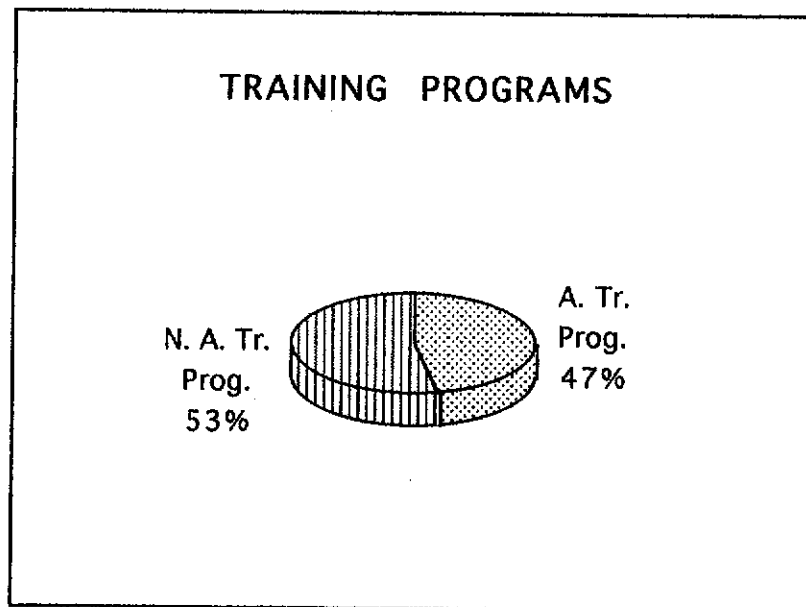
Q. 5 - Where did you attend this training

program ?

57 % of those who attended training programs (vocational or computer software) were registered in training institutions. The other 43 % of the subjects had in-house training at their work. It shows that the majority of the subjects prefer to get their training at special training institutes for the environment provided and the attention involved. Table 4.4 shows the distribution of where the previous training was conducted.

Table 4.4 Location of Previous Training Experience

	Frequency	Percentage	Cum. Perc.
Company	6	42.85%	42.85%
S. Institute	8	57.14%	100.00%
Total	14	100.00%	

Figure 4.4 Location of previous Training Experience.

PLACE OF T. P.

S. Institute 57%

Company 43%
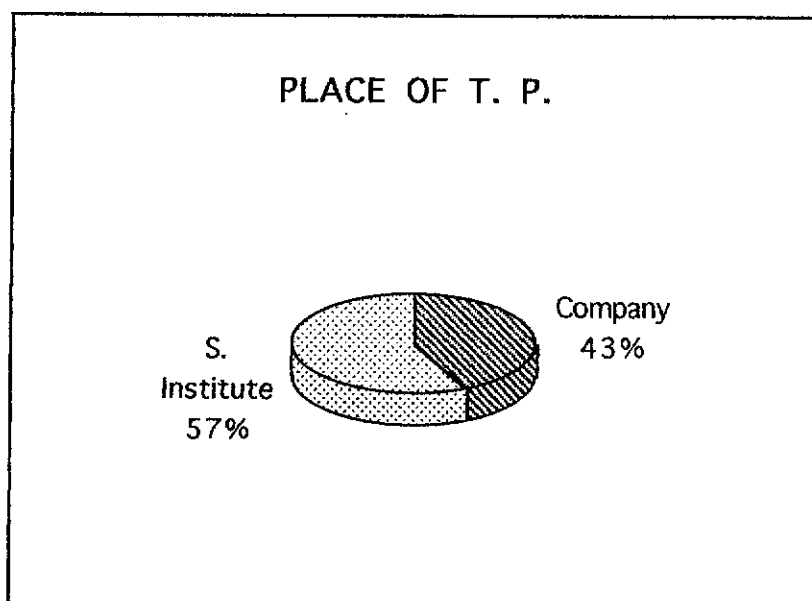
Q. 6 - How long did the training program extend ?

Table 4.5 shows that 50 % of the training programs extended for less than 30 days and the other 50 % extended for more than 90 days.

Table 4.5 Extension of Previous Training Experience.

	Frequency	Percentage	Cum. Perc.
L. T. 30 days	7	50.00%	50.00%
M. T. 90 days	7	50.00%	100.00%
Total	14	100.00%	

Figure 4.5 Extension of Previous Training Programs.
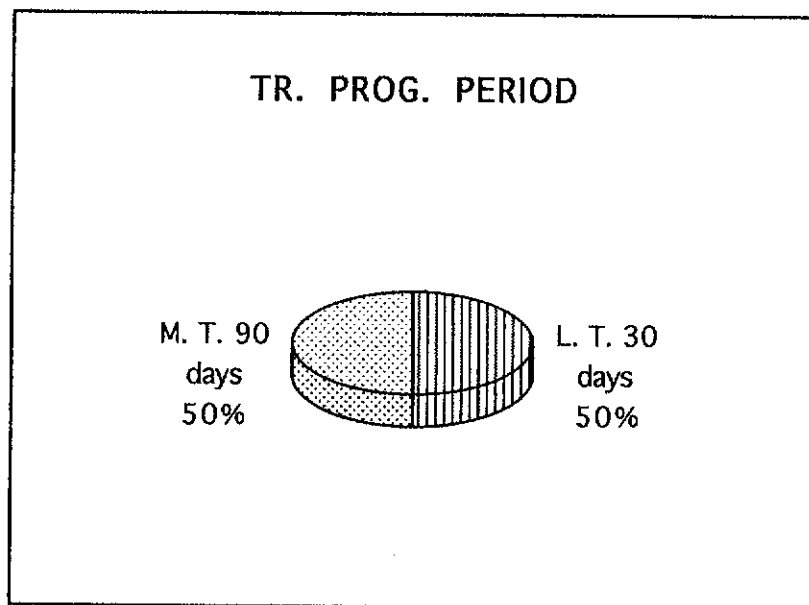
Q. 7 - *Who were the trainers ?*

50 % of the trainers were company executives or staff, and the other 50 % were special trainers hired by the institutes. See Table4.6 and Figure 4.6 .

Table 4.6 Who are the Trainers?

	Frequency	Percentage	Cum. Perc.
Company Staff	7	50.00%	50.00%
S. Trainers	7	50.00%	100.00%
Total	14	100.00%	

Figure 4.6 Who are the Trainers?
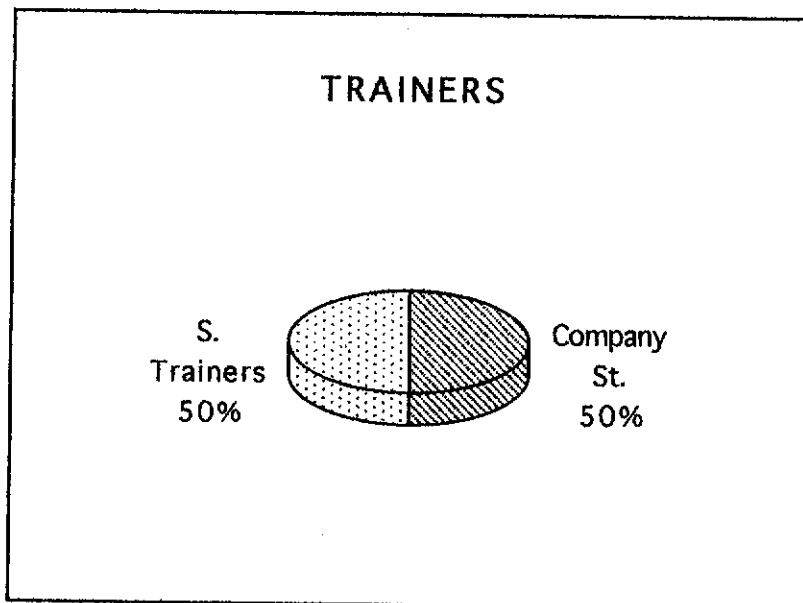
Q. 8 - *How many persons attended the training program ?*

93 % of the training sessions were attended by less than 10 persons and the other 7 % were attended by a number between 10 to 25 trainees. This reflects why the trainees prefer special training institutes. (Table 4.7 and Figure 4.7 show the above results).

Table 4.7 Distribution of Trainees.

	Frequency	Percentage	Cum. Perc.
L.T. 10	13	92.85%	92.85%
B. 10 - 25	1	7.15%	100.00%
Total	14	100.00%	

Figure 4.7 Attendance Distribution of Previous Training.

PERSONS ATTENDED

B. 10 - 25
7%

L.T. 10
93%
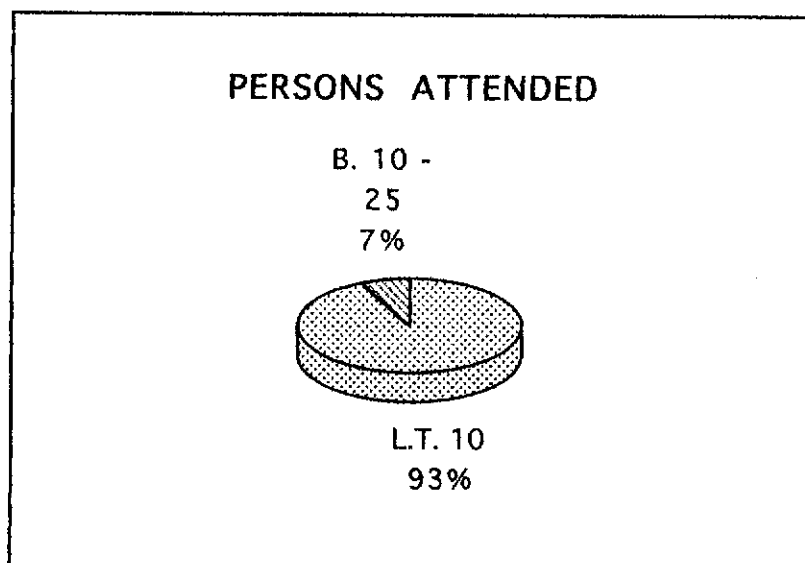
Q. 9 - *What was the nature (content) of the training program ?*

Table 4.8 shows that the nature of 78 % of the training programs was laboratory work, 14 % were lectures and the other 8 % was technical training to develop manual skills. That reflects the trainees preference for a laboratory setup , for it provides more individual attention from those running the training sessions. Therefore, the benefit is higher and the trainees take worth their efforts.

Table 4.8 Program Content of Previous Training Sessions.

	Frequency	Percentage	Cum. Perc.
Lecture	2	14.28%	14.28%
Lab work	11	78.57%	92.85%
Tech. Training	1	7.14%	100.00%
Total	14	100.00%	

Figure 4.8 The Nature of Previous Training Experience.

NATURE OF TRAINING

48
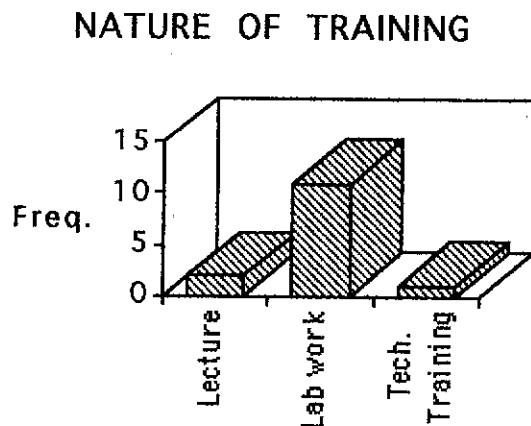
Q. 10 - *Was computer technology used in the training program ?*

Computer technology was used in 86 % of the training programs. That means that the training programs depended mainly on structured computer training techniques . This point helps the researcher concentrate further on the benefits of multimedia without worrying about the computer literacy deficiencies of the subjects. Table 4.9 depicts the results of question 10.

Table 4.9 Computer Use in Previous Training Experience.

	Frequency	Percentage	Cum. Perc.
C. Tech.	12	85.71%	85.71%
N. C. Tech.	2	14.29%	100.00%
Total	14	100.00%	

COMPUTER TECHNOLOGY

N. C. Tech.
14%

C. Tech.
86%
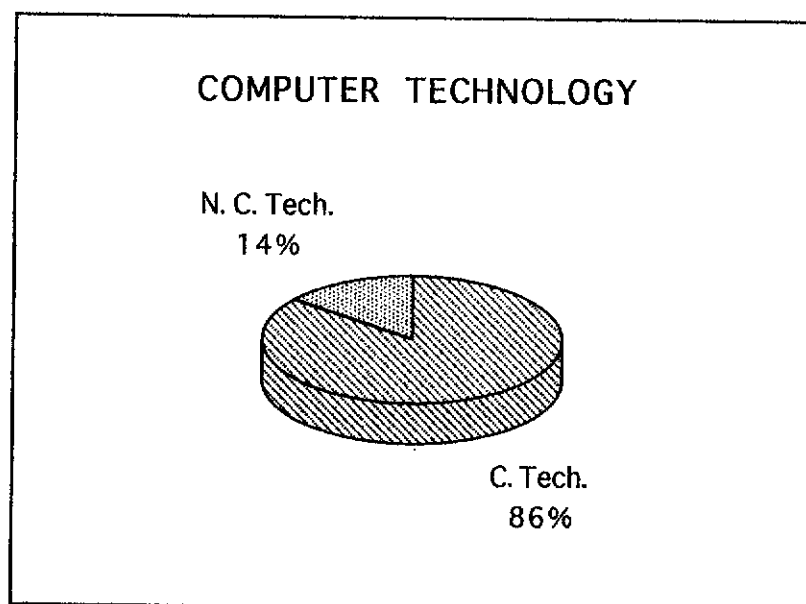
Q, 11 - *If yes, how frequent did you use the technology ?*

As shown in Table 4.10, the majority of the subjects, 92%, who constituted 47 % of those who attained training previously, were subject to the use of computer technology. 8% of those who attended training used the computer in less than 30% of the session.

Table 4.10 Computer Use During the Previous Training Sessions.

	Frequency	Percentage	Cum. Perc.
L. T. 30 %	1	8.33%	8.33%
30% - 60%	3	25.00%	33.33%
M. T. 60 %	8	66.66%	100.00%
Total	12	100.00%	

Figure 4.10 Computer Use During the Previous Training Sessions.

FREQUENCY OF USING TECH.
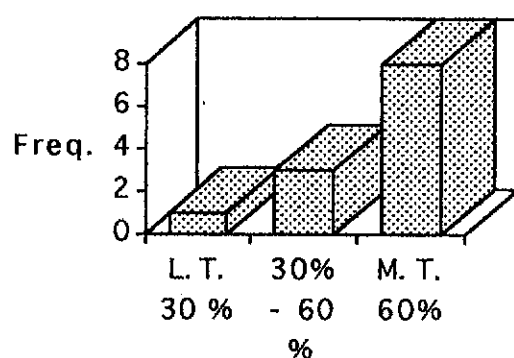
Q. 12- *Have you heard of Multimedia ?*

18 out of 30 (60%) of the subjects participating in the experiment have heard of multimedia in one way or another. The other 12 constituting 40% have had no idea about multimedia. However, that percentage may decrease with time due to the recent and numerous publications discussing the importance of interactive multimedia. See Table and Figure 4.11 .

Table 4.11 Have you heard about Multimedia ?

	Frequency	Percentage	Cum. Perc.
H. of Mult.	18	60.00%	60.00%
N. H. of Mult.	12	40.00%	100.00%
Total	30	100.00%	

Table 4.11 Have you heard about Multimedia ?

MULTIMEDIA

N. H. of Mult. 40%

H. of Mult. 60%
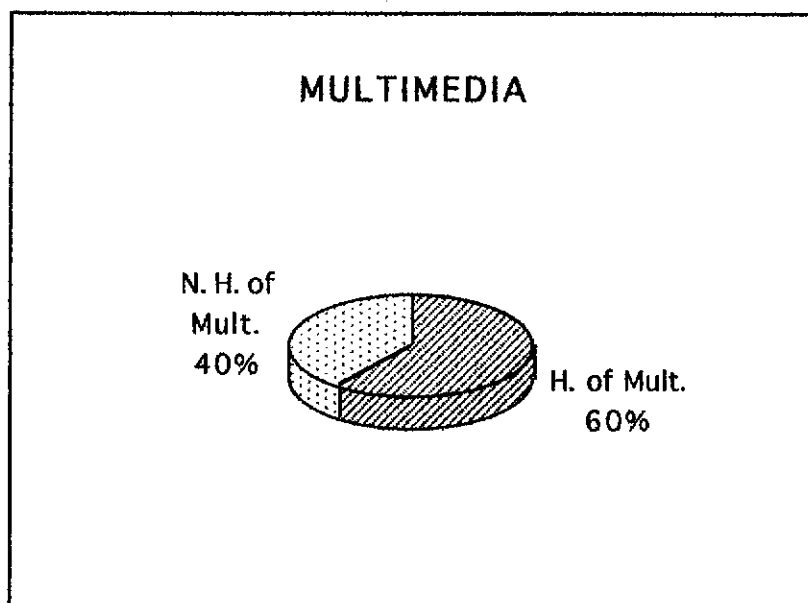
Q. 13 -According to your information, what is multimedia?

Table 4.12 shows that 72 % of the 18 subjects knew, in general terms, what is multimedia by stating that multimedia is a technology. The other 28 % considered that multimedia is a specific kind of software. That shows that the idea of multimedia was not completely understood by the minority of the users. Also, see Figure 4.12 .

Table 4.12 What is Multimedia?

	Frequency	Percentage	Cum. Perc.
Technology	13	72.22%	72.22%
Software	5	27.78%	100.00%
Total	18	100.00%	

Figure 4.12 What is Multimedia?

WHAT IS MULTIMEDIA?

Software
28%

Technolog
y
72%
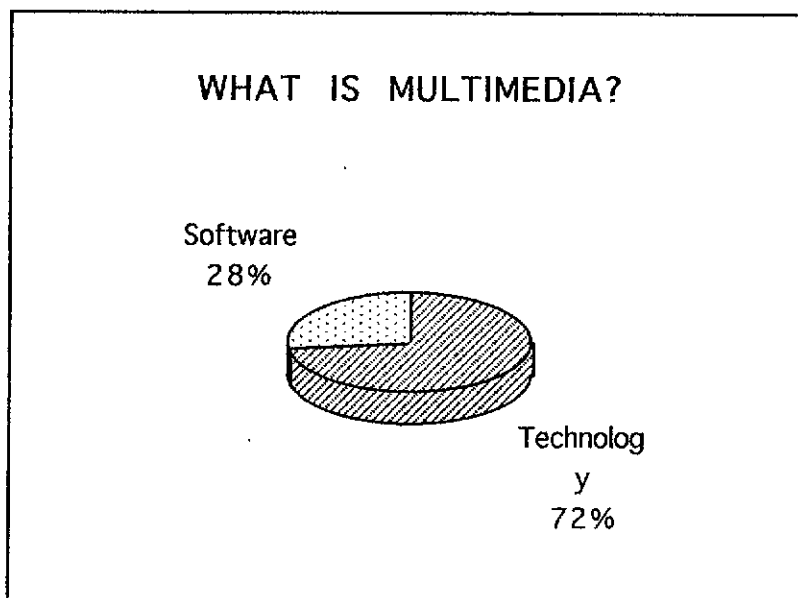
Q. 14 - *Have you used multimedia ?*

39 % of the subjects did not use multimedia at all. The remaining 61 % used it in some applications, mainly in entertainment. Therefore, this means that multimedia had been used by most of the computer users.

Table 4.13 Multimedia use.

	Frequency	Percentage	Cum. Perc.
Using Mult.	11	61.11%	61.11%
N. using Mult.	7	38.88%	100.00%
Total	18	100.00%	

Figure 4.13 Multimedia use.
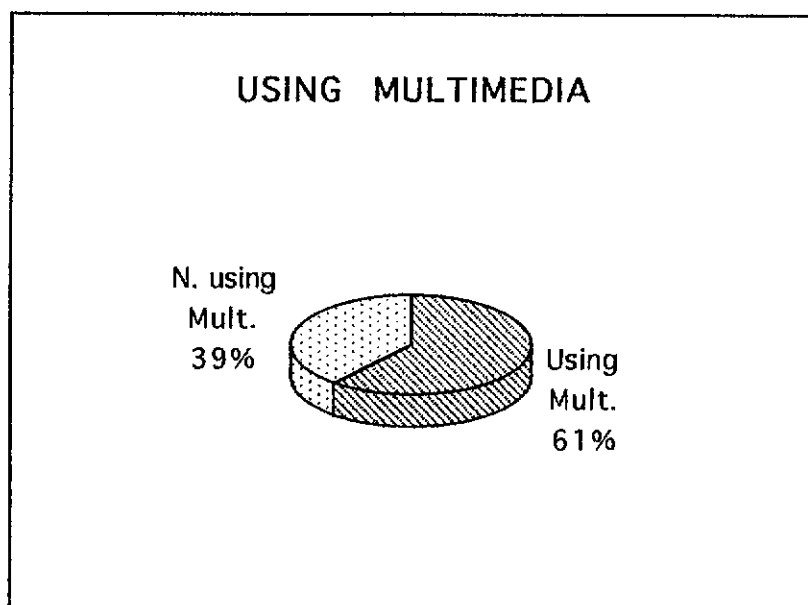
Q. 15 - *Where did you encounter multimedia ?*

Table 4.14 demonstrates that 8 out of 11 subjects (72%) who used multimedia encountered it at work. The remaining 3 subjects got acquainted with the technology at home.

Table 4.14 Where was Multimedia Introduced?

	Frequency	Percentage	Cum. Perc.
At work	8	72.72%	72.72%
At home	3	27.27%	100.00%
Total	11	100.00%	

Figure 4.14 Where was Multimedia Introduced?

ENCOUNTER MULTIMEDIA

At home
27%

At work
73%
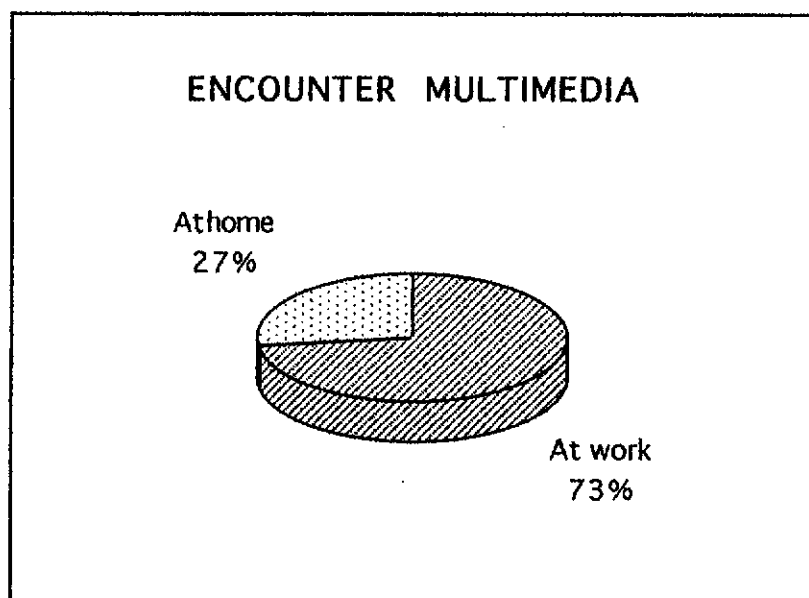
Q. 16 - *In what field did you use Multimedia ?*

45 % of the multimedia users used it in some business fields (Communication and Information). 10 % used it in education and learning. The other 45 % used it as entertainment (games and music). Therefore, the majority of the subjects using multimedia applications use the technology as information source in business and for entertainment. Table and Figure 4.15 show the results.

Table 4.15 Fields in which the subjects used Multimedia.

	Frequency	Percentage	Cum. Perc.
Business	5	45.45%	45.45%
Education	1	9.09%	54.54%
Entertainment	5	45.45%	100.00%
Total	11	100.00%	

Figure 4.15 Fields in which the subjects used Multimedia.
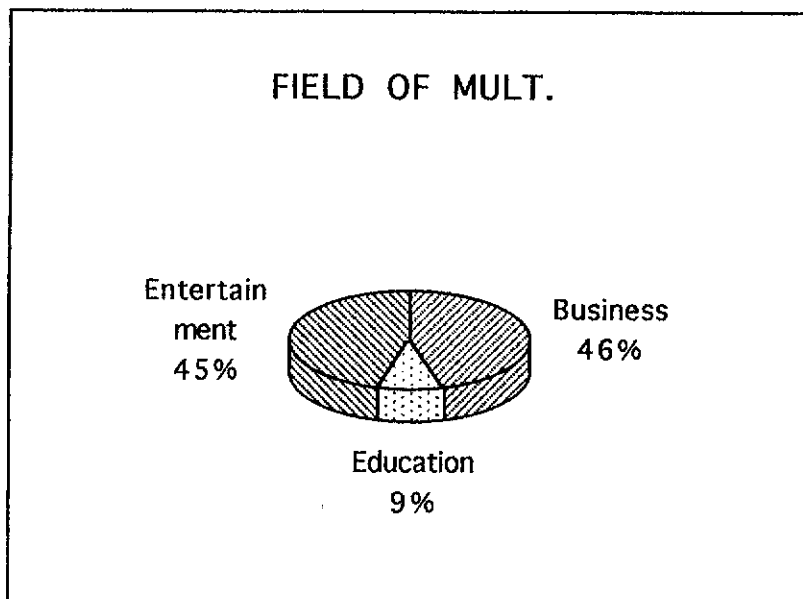
Q, 17 - *Please check three (3) characteristics you believe are associated most with multimedia.*

Table 4.16 shows that the 11 subjects who are acquainted with multimedia (100%) considered it easy and simple. 9 subjects (27%) considered it comprehensive, 7 (21%) stated that it is efficient, 4 (12%) said that it is time consuming for one spends long hours specially in entertainment, and the other 2 (6%) considered it required specialized training. It can be said that the majority considered that multimedia is easy, simple, comprehensive and efficient.

Table 4.16 Multimedia Characteristics.

	Frequency	Percentage	Cum. Perc.
E. & Simple	11	33.33%	33.33%
Compreh.	9	27.27%	60.60%
Efficiency	7	21.21%	81.81%
Time Cons.	4	12.12%	93.93%
R. S. Training	2	6.06%	100.00%
Total	33	100.00%	

Figure 4.16 Multimedia Characteristics.

CHARACTERISTICS OF MULT.

Time Cons. 12%

R. S. Training 6%

E. & Simple 34%

Effiency 21%

Compreh. 27%

56
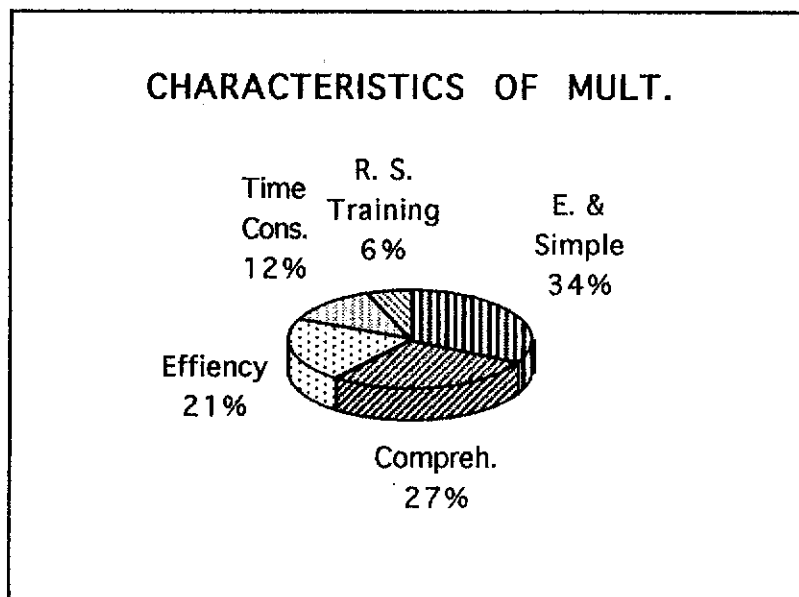
Q. 18 - *Are you in favor of using multimedia in general ?*

100 % of the multimedia users were in favor of using multimedia. Meaning that they are willing to use multimedia in their applications. This question reflects that once one knows the capabilities of the technology, even in entertainment, he/she will favor it for own usage.

Having answered all the questions pertaining to both subjects: Computer usage and multimedia acquaintance and usage, a training session was held to the subjects who were divided into two training groups. After the training sessions and after solving a Microsoft Excel problem by the selected subjects, two different evaluation forms were distributed to both groups to evaluate their perception and reaction of the computer system and interactive multimedia.

4.2 Findings collected from evaluation of responses pertaining to the subjects who did the multimedia exercise:

The data of the evaluation forms of the Multimedia based training was collected and analyzed. The findings are presented as follows:

Q. 1 - *I felt confused when I used the interactive multimedia.*

13 % of the 15 subjects who did the multimedia exercise strongly disagreed, 74 % disagreed and the remaining 13 % were uncertain.

Q, 2 - *When I used the interactive multimedia., I make errors frequently.*

7 % strongly disagreed, 60 % disagreed and the other 33 % were uncertain of making errors. It shows that multimedia is efficient and it can be used with minimum errors.

Q, 3 - *Using Multimedia is frustrating.*

20 % of the users strongly disagreed and the other 80 % disagreed. Meaning that using interactive multimedia is not frustrating.

Q, 4 - *I believe that using interactive multimedia requires a lot of help and reference manuals.*

13 % strongly disagreed, 13 % were uncertain, and the other 74 % disagreed. It can be concluded that using interactive multimedia does not usually require a lot of help and reference manuals.

Q, 5 - *I believe that using Interactive multimedia requires a lot of mental efforts.*

13 % strongly disagreed, 26 % disagreed and the other 61 % of the participants were uncertain. This reflects the fact that it is up to the type of interactive multimedia that determines what level and amount of mental efforts are needed.

Q, 6 - *The Interactive multimedia is flexible to react with.*

80 % agreed and the other 20 % strongly agreed. Concluding that interactive multimedia is very flexible and easy to follow.

Q, 7 - *I find it easy to remember how to perform a given task using interactive multimedia.*

86 % of the 15 trainees agreed, 7% were uncertain and the other 7 % strongly agreed. It shows that performing a given task using interactive multimedia is easy and simple.

Q. 8 - *Features learned in multimedia are understandable.*

The data shows that these features indeed are understandable because 83 % agreed while the other 17 % strongly agreed.

Q. 9 - *The features in multimedia are easy to learn .*

The answers show that the features of multimedia are easy to learn because 83 % of the subjects agreed and the other 17 % strongly agreed.

Q. 10 - *Overall, I find Interactive multimedia is easy to use.*

Reviewing all the above stated results one can say that interactive multimedia is easy to use. The above stated answers also show that when people are introduced to new technologies and understanding their capabilities , they get attached to them desiring to know more and even hoping to acquire those according to the applications of interest.

4.3 Findings resulting from evaluating the responses related to the subjects who followed the traditional training technique:

Q. 1 - *I felt confused when I used the computer system.*

40 % of the trainees disagreed. 20 % were uncertain and the other 40 % felt confused when they used the computer system.

Q. 2 - *When I used the computer system, I make errors frequently.*

73 % of the system users made errors frequently. The other 27 % did not.

Q, 3 - *Using a computer system is frustrating.*

67 % disagreed and 13 % strongly disagreed that using the computer was frustrating. The other 20 % were either uncertain or frustrated.

Q, 4 - *I believe that using a computer system requires a lot of help and reference manuals.*

Using a computer system requires a lot of help and reference manuals as stated by 80 % of the computer users. 20 % of them did not require any help or reference manuals. Meaning that using the computer system required special help as well as reference manuals.

Q, 5 - *I believe that using a computer system requires a lot of mental efforts.*

60 % of the trainees agreed that using the computer system required a lot of mental efforts, 27 % strongly agreed. The other 13 % were uncertain and disagreed that a lot of mental effort was required by the computer users.

Q, 6 - *The system is flexible to react with.*

53% agreed that the system they used was flexible to react with, 6 % strongly agreed, 27 % were uncertain, 7 % strongly disagreed and the other 7 % disagreed that the computer system was flexible.

Q, 7 - *I find it easy to remember how to perform a given task using the computer system.*

13 % of the respondents found that it was not easy to remember how to perform a given task using the computer system, 40 % were uncertain, 40 % agreed and the other 7 % strongly agreed.

Q, 8 - *Features learned in the system are understandable.*

Most of the respondents, 67 %, said that the features are understandable. The other 33 % were uncertain.

Q. 9 - *The features in the system are easy to learn .*

54 % of the computer users said that the features in the system were easy to learn. 40 % were uncertain, and the other 6 % found that these feature were not easy to learn

Q. 10 - *Overall, I find that the information system is easy to use.*

According to 73 % of the trainees, the information system was easy to use, 20 % were uncertain about the ease of use. The other 7 % found that using the information system was not easy.

4.4 A comparative study of the two approaches: The Multimedia perspective versus the Traditional perspective:

Comparison between using the Multimedia training method and the Traditional training method

	Using Multimedia training method			Using Traditional training method		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Confusion	0	13.33%	86.67%	40.00%	20.00%	40.00%
Making errors	0	33.33%	66.67%	73.33%	6.67%	20.00%
Frustrating	0	0	100.00%	13.33%	6.67%	80.00%
R. Help & manuals	0	13.33%	86.67%	80.00%	0	20.00%
R. mental efforts	6.66%	53.34%	40.00%	86.66%	6.66%	6.66%
Flexibility	100.00%	0	0	60.00%	26.66%	13.34%
Easy to remember	93.33%	6.67%	0	46.66%	40.00%	13.34%
Understandable	100.00%	0	0	66.66%	33.34%	0
Easy to learn	100.00%	0	0	53.33%	40.00%	6.67%
Easy to use	93.33%	6.67%	0	73.33%	20.00%	6.67%

As stated in this chapter the 30 subjects of the two groups have been set for an experiment to find out the effectiveness of using either training methods.

The demographic, training and evaluation data, collected from the subjects, were manipulated, tabulated and some statistical procedures were used to end up with a definite conclusion. The

following chapter will conclude the findings that resulted from performing the statistical procedures on some variable items of the collected data. It also gives definite recommendations for those researchers willing to make similar studies along the same line.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Experimental outcomes:

The purpose of this research is to highlight the importance and the implications of interactive multimedia in enabling to link data, information and ideas, and helping to make the connections which are critical to learning. By integrating text, graphics, sound, animation and video, it addresses a different learning style, providing a truly interactive learning environment that students and trainees can explore, add to and expose in, enabling them to become actively engaged in the learning process.

Based on the above, one would really like to assess the difference between using the interactive approach and the traditional one. Therefore the next paragraph will demonstrate and report the findings of the experiments ran and consequently show the advantages associated with interactive multimedia.

Negative Features

Table: 5.1

	Using Multimedia training method	Using traditional training method
	Agree	Agree
Confusion	0	40.00%
Making errors	0	73.33%
Frustrating	0	13.33%
R. Help & manuals	0	80.00%
R. mental efforts	6.66%	86.66%
Average	1.33%	58.66%

Positive Features

Table: 5.2

	Using Multimedia training method	Using traditional training method
	Agree	Agree
Flexibility	100.00%	60.00%
Easy to remember	93.33%	46.66%
Understandable	100.00%	66.66%
Easy to learn	100.00%	53.33%
Easy to use	93.33%	73.33%
Average	97.33%	60.00%

On averaging the negative and positive features of both methods; it is concluded that 1.33 % of the group using the multimedia training method agree that this technique is of negative impact (confusion, frustrating, needs extra efforts, etc.), and 97.33 % agree that this technique is positive (flexible, understandable, easy, etc.). This number is significant compared to its counterpart of 58.66 % agree that this technique is of negative impact and 60 % agree that it is positive. The answers to negative and positive features take us to the immediate conclusion that a technique like multimedia is by no doubt superior to a traditional approach.

5.2 Statistical significance of the findings:

To find out if using the multimedia training method is effective, T-Test, ANOVA and Regression analysis were applied on the answers of the ten questions presented in the evaluation forms distributed after the solving problem session.

In testing whether multimedia is effective, the researcher assessed the difference in the post-test performance (at the end of the experimental period) for the experimental group (EXP.) and that of the control group (CONT.). To guard against accepting or rejecting a false hypothesis, the researcher brought in the variables age, sex, and education and kept their effect constant.

In sum, the researcher tested the difference in performance for the two groups after holding the effects of age, sex, and education content.

Using: T-Test, ANOVA and Regression analysis, they showed that a difference between the two groups exists as shown in Tables 5.3 through 5.6.

In testing the hypothesis :

$H_0 : Y_{EXP} = Y_{Cont.}$ Post-performance of the group using multimedia is equal to that of the control group.

$H_1 : Y_{EXP} > Y_{Cont.}$ Post-performance of the group using multimedia is greater than that of the control group.

It is found that the difference, statistically speaking, is significant.

Hence, Multimedia Training method is effective. Details of the analysis are shown here below.

5.2.1.   T-tests.

t-tests for independent samples of EXP

Table: 5.3

Variable	N. of Cases	Mean	SD	SE of Mean
TOT				
EXP 1	15	31.2	1.821	0.47
CON 0	15	34.4667	4.486	1.158

Mean Difference = -3.2667

TOT. or the total score on the post test of the 10 questions.
EXP. or the experimental group that use the multimedia training method.
CON. or the controlled group that use the traditional training method.

Levene's Test for Equality of Variances : F = 6.206   P=0.019

t-test for Equality of Means
Table: 5.4

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-2.61	28	0.014	1.25	(-5.828, -0.706)
Unequal	-2.61	18.49	0.017	1.25	(-5.893, -0.640)

The computed t = 2.61 is significant and larger than the tabulated t-value of 2.048 with &, Alpha = 5% which means that the post-performance of the group using multimedia training method is better than that of the controlled group using classical lecture method. Therefore, this confirms the qualitative findings stressing that multimedia could be effective in training.

To examine the availability of significant differences in both the controlled and experimental groups, a One-Way ANOVA was used. Table (5.2.2) shows the result of the One-Way ANOVA test conducted for this purpose. This result was obtained at a significant level of 0.05 (p<=0.05). When using One-Way ANOVA , the observed significance level is obtained by comparing the F to the values of F distribution with K-1 and N-K degrees of freedom, where K is the number of groups and N is the number of cases in the entire sample. The observed significance level is the probability of obtaining an F-Statistic at least as large as the one calculated when all the population means are equal. If this probability is small enough the hypothesis that all population means are equal is rejected. In other words, if $F_{statistic} < F_{calculated}$, then there is a significant difference between the means. Since in this case F_{prob}. is = 0.0143 and since it is less than the F significance = 0.05, then one can say that there is significance meaning that using the multimedia training method is effective.

5.2.2. ANOVA.
ANOVA

Variable TOT
By Variable EXP

Analysis of Variance

Source	D.F	Sum of Squares	Mean Squares	F Ratio	F Prob.
B. Groups	1	80.0333	80.0333	6.8293	0.0143
W. Groups	28	328.1333	11.719		
Total	29	408.1667			

B. Groups: Between Group
W. Groups: Within Group

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean
Grp 0	15	34.4667	4.486	1.1583	31.9824 to 36.9509
Grp 1	15	31.2	1.8205	0.4701	30.1918 to 32.2082
Total	30	32.8333	3.7516	0.685	31.4325 to 342342

GROUP	MINIMUM	MAXIMUM
Grp 0	28	46
Grp 1	26	34
Total	26	46

F= 6.8293 is significant   t= 2.61

Meaning that the multimedia training method is effective.

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. TOT
Block Number 1.   Method: Stepwise   Criteria   PIN 0.5 POUT 0.1
EXP

Variable(s) Entered on Step Number
1..   EXP

Multiple R	0.44281
R Square	0.19608
Adjusted R Square	0.16737
Standard Error	3.42331

Analysis of Variance

	DF	S. of Squares	M. Square
Regression	1	80.03333	80.0333
Residual	28	328.1333	11.7191

F= 6.82934   Signif. F= 0.0143
t=   2.61

Variable in the Equation

Variable	B	SE B	Beta	T	Sig T
EXP	-3.26667	1.250016	-0.4428	-2.613	0.0143
(Constant)	34.46667	0.883895		38.994	0

End Block Number 1 POUT = 0.100 Limits reached.

Dependent variable = TOT.

TOT. = 34.46667 - (0.0143) EXP.

The negative sign results due to coding.

As shown in Table 5.2.3 that the significant T = 0.0143 which is less than the alpha (0.05) or the 5%, this will lead to say that using multimedia training method is effective.

Significance of the Regression Equation

R^2, the coefficient of determination, is equal to 19.61 %. This implies that 19.61 % of the variations in the performance of the experimental group could explain the total performance of the multimedia technology approach.

By using the analysis of variance, the usefulness of the regression equation is tested using the F-distribution. From the output presented, $F = 6.82934$. Comparing the significant value to P-value used $= 0.05$, it could be concluded that there is a relationship between TOT and the variable included in the equation. This result shows that the regression model is a significant one.

Significance of the Regression Coefficients

The significance of the correlation coefficients could be derived from examining the P-value of the T-statistic. This P-value is listed above under Sig. T. Taking into consideration, that the level of significant (alpha) $= 0.05$, then one would conclude that a statistically significant relationship exists between the variable (holding others constant) and the dependent variable TOT.

Interpretation of the Equation

The interpretation of the equation is quite straight forward. As to EXP, the value $b = -0.4428$. This indicates that for each added value in experimental performance concerning the total performance (while holding other variables constant), the effect of multimedia will add 0.4428. The negative sign (which resulted due to coding) shows that there is a positive and direct relationship between the resulting performance due to using multimedia and the overall performance of the experiment using both techniques. This could be attributed to the fact that multimedia technology offers many positive attributes as compared to the classical approach as reflected in Tables 5.1 and 5.2.

The t-test, ANOVA, and regression analysis showed that the difference in performance between the two groups is significant at (Alpha) = 0.05 , 5%, level of significance and due basically to treatment only.

The computed t-value of 2.61 is greater than the t-table value of 2.048. A difference exists due to the multimedia effect, holding the effect of other variables constant, meaning that using multimedia training method is effective.

5.3. Conclusion

Training is the core of success of any business. Employees and executives should be trained on the various activities they perform in order to achieve better performance and higher productivity.

As mentioned before; companies, schools, and institutions can adopt either traditional instructional training method or multimedia training method. Each method has its effects on the training, learning and performance.

In training programs, the interactive multimedia technique has important effects on the progress of the trainees. It is helpful and valuable in improving and accelerating the training process. The most important characteristics provided to its users may be summarized as follows:

5.3.1 Interactivity

Users interact with the computer through applications that have the ability to react with the user needs. A direct ongoing communication between the users and the system will improve and facilitate the training and learning process. It helps and encourage the users to be involved in the training process. It provide a comprehensive way of learning.

5.3.2 Direct feedback

A feedback provided to the users directly informing them if their work is correct and is of great importance in a training process. It directs the trainee during his training and insures that his performance is on the right track.

5.3.3 Tutorial teaching

Interactive multimedia insures that there is a professional and patient trainer. Trainees can refer to their trainer at any time and everywhere during the interaction.

Trainees of different mentalities and abilities, can interact with multimedia, learning through it and checking if they are doing well.

5.3.4 Simulation and real life scenarios

One of the most significant characteristics of training using multimedia is that it can produce a typical work situation that the trainees will face in their jobs. It helps them to make choices, alternatives, and select strategies for solving problem. Also it assists in improving their performance and conditions at work.

5.3.5 Time effectiveness

Time effectiveness is reflected because the tutorial characteristics of interactive multimedia provide the trainees with an opportunity to complete training program outside the work-hours.

5.3.6 Cost effective

All the beneficial characteristics of the interactive multimedia mentioned before might be outweighted by the

issue of cost effectiveness. The cost of developing an interactive multimedia application is paid once during its production. When it is produced the same package can be used by different users at different times and different places.

5.4 Recommendations.

Based on the expertise acquired while performing this research work in particular and a whole career of multimedia development, the following recommendations may be raised:

1 - Establishing multimedia educational centers and hiring multimedia specialists for developing and training purposes.

2 - Giving lectures to present the importance of adopting interactive multimedia.

3 - Attending workshops using multimedia facilities to improve the managerial and administrative capabilities of the executive staff.

4 - Providing publications discussing the effectiveness and simplicity of interactive multimedia, and listing the various tittles and topics developed by multimedia techniques.

5.5 Recommendations for future research:

1 - An experiment parallel to the one executed in this research project should be conducted but with a sample of subjects invited from specific industry running a real case of training.

2 - Investigate and assess the behavioral characteristics of multimedia users based on statistical modeling. The purpose will lead to a model relating learning abilities to multimedia interface features.

APPENDIX

Utilities of Microsoft Excel™.

A - Worksheets

One can store, manipulate, calculate, and analyze data such as numbers, text, and formulas on a worksheet. One can add a chart directly to the worksheet. Also, one can add graphic elements such as lines, rectangles, text boxes, and buttons to the worksheets, macro sheets, and charts. Finally, one can use redefined formats to create tables.

B - Databases

Are helpful to conveniently sort, search, and manage a large amount of information on a worksheet, using standard database operations.

C- Charts

Used for quickly presenting worksheet data visually in a chart. In addition to choosing from the many built-in variations of two-dimensional (2-D) and three-dimensional (3-D) chart types, one can customize any chart to appear the way desired.

D - Presentations

Using cell styles, drawing tools, chart gallery, and table formats one can create high-quality presentations. Also, can display these directly on the screen or print them.

E - Macros

One can automate frequently performed tasks, perform specialized calculations, and customize Microsoft Excel by creating and storing own macros. Microsoft Excel package includes several learning tools to help get the most from Microsoft Excel applications.

F - Microsoft Excel Functions

In Microsoft Excel, functions are calculation tools that can be used to perform decision-making, action-taking, and value-returning operations automatically. Microsoft Excel provides a wide variety of functions that perform many different types of calculations.

F-1 - Microsoft Excel has two types of functions:

- worksheet functions.

- Macro functions.

One can use worksheet functions on both worksheets and macro sheets. Some functions are available only on macro sheets and are instructions used in macros to perform actions. Many macro functions also accept and return values. Functions on a macro sheet are calculated only when the associated macro is run.

G - Function Categories

In Microsoft Excel, functions are organized by category, as shown in the following table. These categories appear in the Paste Function dialog box. To see the Paste Function dialog box, choose the Paste Function command from the Formula menu.

Category	Action
Financial	Performs financial actions on values.
Date & Time	Returns chronological information.
Math & Trig	Performs mathematical actions on values.
Statistical	Performs statistical actions on values.
Lookup & Reference	Manipulates references.

Database	Rectums information about a database.
Text	Performs actions on text values.
Logical	Returns logical values.
Information	Returns information about parts of the Microsoft Excel environment.
Commands	Performs actions equivalent to choosing commands or tools.
Customizing	Customizes Microsoft Excel.
Macro Control	Controls macro execution.
DDE/External	Performs actions on objects that are not part of Microsoft Excel.
Engineering	performs engineering calculations on values.

H - Worksheet Functions

One uses worksheet functions on worksheets and macro sheets to calculate and return values based on information provided. Worksheet functions take a value or values, perform some operation on them, and return a value or values. Functions on a worksheet are calculated as soon as enters them.

I - Customizing Functions

One can use customizing functions to carry out actions that can be performed only by macros, such as creating custom menus, commands, tools, toolbars, and dialog boxes.

J - Macro Functions

Microsoft Excel's macro language contains more than 400 macro functions. One can use macros to automate anything done manually, such as choosing commands, selecting options in dialog boxes, entering data on worksheets, and changing the current selection. One can also use the macro language to create custom functions that perform specialized calculations.

K - Command-Equivalent Functions

Using a command-equivalent function is the same as choosing a particular command from one of the Microsoft Excel menus. For example, using the FILE.DELETE function is like choosing the Delete command from the File menu. The arguments to a command-equivalent function correspond to the option buttons, check boxes, text boxes, and list boxes associated with that command. Instead of being listed in the Commands category, some functions that carry out commands are listed in categories that are more appropriate to their function. For example, the SET.DATABASE function is part of the Database category, even though it is equivalent to the Set Database command on the Data menu.

Option buttons are represented by number values. For example, in the Alignment dialog box, seven option buttons represent the seven horizontal alignment options. In the ALIGNMENT macro function, one selects one of the options by specifying a number from 1 to 7 corresponding to those buttons. To see the Alignment dialog box, choose the Alignment command from the Format menu.

Check boxes are represented by logical values. If an argument is TRUE, Microsoft Excel selects the check box; if FALSE, Microsoft Excel clears the check box. If an argument is omitted, the current state of the check box is usually not changed.

List boxes are represented by numbers or text values. One can make a choice from a list of items in a list box. One either specifies a number (for example, to select a color in the Display

dialog box) or text (for example, to select a format in the Number dialog box).

Text boxes are represented by text values.

L - Dialog-Box Functions

Every command that displays a dialog box has a dialog-box form of the command-equivalent function. The dialog-box form has the same name as the command-equivalent function, but its name is followed by a question mark. This form displays a dialog box while the macro is running. The dialog box remains on the screen until one selects the options wanted. After closing the dialog box by choosing the OK or Cancel button, the macro continues to run. In dialog-box functions' all arguments are optional.

M - Other Action-Equivalent Functions

Action-equivalent functions correspond to actions taken without choosing a command, such as selecting a cell (the SELECT function), scrolling through a window (the HSCROLL and VSCRoLL functions), or using a tool on a toolbar. Action equivalent functions are included in the Commands category.

PROBLEM 1.

Sport Application.

After 20 games of the season the Engelvale College women's basketball team individual scoring (point) totals were:

NAME	SCORE
Weston	340
Davis	300
Norris	271
Speer	109
Collins	99
Dressler	72
Danelo	36
Pankovich	27
Brown	9

Instructions

Prepare a spreadsheet template that will show the total points scored for the season by the Engelvale College women's basketball team.

Step 1. Open a spreadsheet file.

Step 2. Enter the cell definitions:

    A.   Place a class administrative label in the upper-left-hand corner of your template beginning in Cell A1 (Column A, Row 1). Enter your name in Cell A1, filename WOMEN in Cell A2.

B. Place a report title on the template " FUTURE COLLEGE WOMEN'S BASKETBALL TEAM" in Cell A3, and the report date "June 06, 1995" in Cell A4.

C. Place "NAME" in Cell A6, "SCORE" In Cell B6, and "Percentage" in Cell C6. Select Cell A6, B6 & C6 then click on Bold Font Format button and Centering Text button simultaneously.

D. Place "Tot. Scores:" In Cell A18, "Avr. Scores:" in Cell A20 Select Cells A18 & A20 then click on Bold Font Format button and Centering Text button simultaneously.

Step 2. Enter the cell contents:

A. Starting with Cell A7, enter the name of all players.

B. Starting with Cell B7, enter the Scores of all players.

Step 3. In Cell B18, enter the sum function "=SUM(B7:B15), then press enter.

Step 4. In Cell B20, enter the Average function "=SUM(B18/9), then press enter.

Step 5. In Cell C7, enter the Percentage function "=SUM(B7/B18)", then press enter.

Step 6. Select the Cells from Cell C7 Till Cell C15, then choose "FILL DOWN" from the EDIT menu.

Step 7. Select the Cells from Cell A6 Till Cell B15, then Click on ChartWizard button.

Step 8. Save the file as "FUTURE".

Step 9. To check the accuracy of your spreadsheet, manipulate the template data by entering the following changes:

    i. Change Weston's total points to 380. What is the new team total?.

    ii. Change Norris' total points to 281. What is the new team total?.

    iii. Change Speer's total points to 119. What is the new team total?.

    iv. Change Collin's total points to 110. What is the new team total?.

    v. Change Danelo's total points to 21. What is the new team total?.

Step 10. Exit the template and spreadsheet program.

Good Luck.

QUEST

Multimedia new learning technology of today.
Delivering information and training with Multimedia.

Dear Trainee,

This questionnaire is part of a graduate research that seeks to provide information about the training programs in Lebanon, and to assess the impact of multimedia on these programs. Your opinion and remarks about the easiness and flexibility of using the various computer applications are of high importance. Your responses will be confidentially treated and discarded after data analysis is completed.

Your time and effort are highly appreciated. Thank you for your cooperation; it is highly needed for this study.

Yours Sincerely,
Mohamad A. Malli
Student, Master Program
Business Management
School of Business
Lebanese American University.

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1- Age: _____

2- Sex: _____ Male   _____ Female

3- Education:

____ Graduate (Ph.D., MS, MA)   ____ Undergraduate (BS, BA)

____ Technical school   ____ Others

Training

4- Did you attend any training programs?
____ Yes   ____ No

* If you didn't attend any training program please go to question no. 12.

* If you attended more than one training program, please answer questions 5 to 11 based on the last training program attended.

5- Where did you attend this training program?
____ At the Company I work for.
____ At a special institute;

Name:_____

6- How long did the training program extend?
____ Less than 30 days   ____ 30 days-90 days
____ More than 90 days

7- Who were the trainers?
____ Company staff.
____ Special trainers (Experts).

8- How many persons attended the training program?
____ Less than 10 persons.
____ 10-25 persons.
____ More than 25 persons.

9- What was the nature (content) of the training program? (check all that apply)

_____ Lecture / conference   _____ On the job training.
_____ Lab work   _____ Technical training
                                            (to develop manual skills)

10- Was computer technology used in the training program?
_____ Yes   _____ No

11- If Yes, How frequent did you use this technology?
_____ Less than 30% of training prog.
_____ 30% - 60% of the training prog.
_____ More than 60% of the training program.

12- Have you heard of Multimedia?   _____ Yes   _____ No

* If No, Please Stop Here and Thank you.

Multimedia

13- According to your information, what is multimedia?

_____ A kind of computers.   _____ A software.
_____ A technology.   _____ I don't know.
_____ Other; Determine: _____

14- Have you used multimedia?
_____ Yes   _____ No

     * If No, Please Stop Here and Thank you.

15- Where did you encounter multimedia?
_____ At work.
_____ At training program in a specialized institute.
_____ Other, determine: _____

16- *In what field did you use Multimedia?*

_____ Business field (Communication, Bus., information, etc.)

_____ Education / Learning.

_____ Entertainment (games, music)

_____ Other,Determine: _____

17- *Please check three (3) characteristics you believe are associated with multimedia.*

_____ Easiness & simplicity _____ Complication.

_____ Comprehensivness _____ Time consuming

_____ Efficiency _____ Requires specialized training

18- *Are you in favor of use of multimedia in general?*

_____ Yes _____ No

———————————————

<u>FORM (1)</u>

Please answer the following questions by choosing one of the following answers:

1 = Strongly disagree.
2 = Disagree.
3 = Uncertain.
4 = Agree.
5 = Strongly agree.

1 - I felt confused when I used the Interactive multimedia.   1 2 3 4 5

2 - When I used the Interactive multimedia, I make errors
    frequently.   1 2 3 4 5

3 - Using Interactive multimedia is frustrating.   1 2 3 4 5

4 - I believe that using Interactive multimedia requires
    a lot of help and reference manuals.   1 2 3 4 5

5 - I believe using Interactive multimedia requires a lot
    of mental efforts.   1 2 3 4 5

6 - The Interactive multimedia is flexible to react with.   1 2 3 4 5

7 - I find it easy to remember how to perform a given
    task using the Interactive multimedia.   1 2 3 4 5

8 - features learned in the multimedia are understandable.   1 2 3 4 5

9 - The features in the multimedia are easy to learn.   1 2 3 4 5

10 - Overall, I find the Interactive multimedia is easy
     to use.   1 2 3 4 5

Thank you very much for your time
and effort.

MAM

<u>FORM (2)</u>

Please answer the following questions by choosing one of the following answers:

        1 = Strongly disagree.
        2 = Disagree.
        3 = Uncertain.
        4 = Agree.
        5 = Strongly agree.

1 - I felt confused when I used the computer system.   1 2 3 4 5

2 - When I used the computer system, I make errors
    frequently.   1 2 3 4 5

3 - Using the computer system is frustrating.   1 2 3 4 5

4 - I believe that using the computer system requires a lot
    of help and reference manuals.   1 2 3 4 5

5 - I believe that using the computer system requires a lot
    of mental efforts.   1 2 3 4 5

6 - The system I used is flexible to react with.   1 2 3 4 5

7 - I find it easy to remember how to perform a given
    task using the computer system.   1 2 3 4 5

8 - Features learned in the system are understandable. 1 2 3 4 5

9 - The features in the system are easy to learn.   1 2 3 4 5

10 - Overall, I find that the information system is easy to use. 1 2 3 4 5

Thank you very much for your time
and effort.

MAM

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BIBLIOGRAPHY

BAILEY, R.W., (1983). <u>Human Error in Computer Systems.</u> New Jersey: Prentice-Hall.

Barker, J., Tucker, R.N., (1990). <u>The Interactive Learning Revolution: Multimedia in Education and Training.</u> New York: Nichols Publishing.

Barrett, O.B., (1991). <u>Computer and Learning.</u> England: Addison-Wesley.

Ghutmy, H.A., (1994). <u>The Effects of Various Methods and Computer Interface on Learning Performance and Ease of Use.</u> BUC thesis project.

Goldenberg, P.E., et al., (1984). <u>Computers, Education and Special Needs.</u> London: Addison-wesley publishing company.

Graham, N., (1983). <u>The Mind Tool: Computers and Their Impact on Society.</u> New York: West Publishing company.

Hutchinson, S.E., Sawer, S.C., (1992). <u>Computers: The User Perspective.</u> Boston: Hymewood, Il.

Pont, T., (1991). Developing Effective Training Skills. London: McGraw-Hill book company.

Rosentberg, S.R., (1992). The Social Impact of Computers. USA: Harcourt Brace Jovaovich.

Toigo, J.W., (1991). Automated Training Development Systems: A Cost Effective Strategy for Corporate Excellence. New Jersey: Youdon press.

Nuwayhed, W., (1994). The Use of Multimedia in Training Programs. BUC thesis project.

Yagi, H., (1992). Designing Multimedia Instructional Systems. Paper AUB.

Multimedia today, (1994). Volume II, issue 4.

Multimedia solutions guide for multimedia production.