CHAPTER 1

Introduction
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INTRODUCTION

Changes in science and technology have had considerable impact on the educational system, which aims at developing the people’s ability to keep pace with each other in order to effectively apply technology to raise the level of job efficiency. Therefore, the educational system must be changed. It will not be restricted in any way; on the other hand, new features using computer-assisted technology for educational purposes can provide examples of its role, function and utility in dynamic response to the people’s needs and global change.

Looking towards the future developments in education, Wayne Holtzman (1970) predicts the disappearance of look step, self contained classroom and the uniformly prescribed curriculum. Instead, he says, there will be learning resource centers with computerized libraries and individual study carrels hooked and remotely located computers. The computers will take over most of the drudgery of scheduling, allocating learning resources to individuals and groups, maintaining progress records.

Computer applications in education cover many more areas. The programmed simulation of learning processes and the development of computer based models for learning provide powerful tools for developing and testing theories of learning; just as we can map the logical relationship inherent in a calculation and write a program from a resulting chart, we can also map the possible logical relationships which we expect to exist among the functional components of the mind. However, we may choose to define it and write a program, which stimulates those functions.

In the area of school administration and planning, daily records keeping, the preparation of reports and class programs or schedules can be taken care of efficiently and dependably by a computer. Most sophisticated tasks involving statistical analysis and the perfection of estimates based on a variety of assumptions can be performed, whenever the need arises.

Informational retrieval and the maintenance of reference facilities are called applications, which make very effective use of the computer’s ability to provide immediate access to information in a very large collections to alter or add or display in a variety of forms or the data.
Classroom applications include programs which provide drill in various subject matters, skills and programmed assistance for teachers in lesson planning or course development. The use of the computer to extend the creative capacity of teachers and to maintain or manage various forms of class organization, makes possible the implementation of computer bringing some exciting innovations to education. To summarize, following are the areas in which computers are helping education:

- computers take over much drudgery of schooling like classifying children according to abilities, preparing time table, schedules etc.
- computers allocate learning resources to individuals and groups.
- computers maintain progress cards and preserve them confidentially.
- they provide easy access to files of information for reference and guidance.
- they provide direct interaction between student and the subject matter to be learned.
- they engage students in tutorial interaction and dialogue.

Computer based model can be implemented on any subject along a continuum of various degrees of automation. Automation assists the teacher in carrying out and managing the process. Based on automation Lawrence Stolurow and Daniel Davis (1965) have found three main computer applications in the field of education. The three main computer applications are:

- **Computer Assisted Learning**: The programs of this application are designed to encourage knowledge by finding out and learning rather than by drill and practice. The material is so presented that a student learns by investigation. In this application often simulation is used.

- **Computer Managed Instruction**: Here the computer can serve as classroom terminal assisting the teacher in diagnosing and prescribing a course of instruction for the student. The actual instruction may be self-instruction packages or supervise a test and also to direct each student as an individual to the next appropriate set of tasks. The computer also retains each student’s record so that the teacher can find out at any time an individual student’s progress.

- **Computer Assisted Instruction**: Here the student, as a means of instruction uses the computer. It can be applied to display lesson material, reinforce learning, simulate environmental conditions, provide drill and practice and administer tests and so on.
Essentially the computer program issues a piece of information and then raises a question about it. The learner supplies an answer if this response is correct, the program moves on to the next step. If it is not so and if response is incorrect, then the information is presented again and a retest, is administered.

The most exciting innovation in the Educational Technology is the Computer Assisted Instruction. Though, it is still in the experimental stage, its relationship to teaching and learning requires a great deal of research. The day is not far-off, when it will revolutionize the whole process of instruction.

**COMPUTER ASSISTED INSTRUCTION**

The use of computers in education in various models, e.g. Computer Assisted Instruction tends to be higher in both educational institutions and commercial enterprises. Hence, it is necessary to train instructors and trainers to become capable and efficient designers of Computer Assisted Instruction.

Broadly speaking, it is the use of a computer to interact directly with the students for learning and testing students’ achievement. Due to the computer’s flexibility and capacity to provide branching instruction, it can assume the guidance role of the teacher, while providing the students with necessary reference materials, simulated laboratory facilities services depending upon the capabilities of the computer use by the students. Some of the applications of CAI are to display lesson material, provide drill and practice, reinforce learning, simulate environmental conditions and display relevant stimuli and administer test.

Since 1960s, many research workers had believed that computer would acquire a key role in education through the development and use of programs which would teach topics from a wide variety of different subjects. CAI has its roots in the earlier works on programmed learning, both share strictly a behavior philosophy. The similarity is best illustrated by the drill and practice programmed in elementary mathematics, languages and working with such a program, a child seated at computer’s terminal is given a question to answer such as typing a number in response to an addition/sum or fill in the blanks in a work appropriate letters. The child’s answer is checked, and if, it is correct, a new question is framed. However, if his answer is wrong, he is asked to try again. If incorrect a second time, he is told the
correct answer before proceeding to a new question. In brief, learning by doing is the 
catch phrase of this brand of education.

According to Hall (1971), one of the basic problems in the early development 
of computer-assisted instruction was that most systems were built around modified 
business computers and terminal devices. Suppes & Macken (1978) write that 
International Business Machines (IBM) developed the first computer-assisted author 
language, Coursewriter I. Educators were then able to directly program their 
curriculum ideas into the system.

During the 1960s the University of Illinois was engaged in a computer-assisted 
project, PLATO (Programmed Logic for Automatic Teaching Operations), in 
connection with Control Data Corporation and the National Science Foundation. 
PLATO was one of the largest and perhaps most sophisticated computer systems 
designed for education. This system supported approximately 1000 terminals at 
different locations within the United States and abroad and provided each site with 
access to a central library of lessons (Alderman, 1978; Magidson, 1978; Suppes & 
Macken, 1978; Kulik, 1980).

In 1963, a computer-assisted instruction research project began at Stanford 
University. The Institute for Mathematical Studies in the Social Sciences (IMSSS) at 
Stanford University developed an instructional mathematical program for elementary 
students. The first instructional program consisted of a tutorial curriculum in 
elementary mathematical logic. The program was developed and tested in the spring of 
1964. The study consisted of 41 fourth graders who were given daily arithmetic drill- 
practice lessons in their classroom. These lessons were given on a teletype machine 
that was connected to the Institute's computer by telephone lines. In the early 1970s, 
computer-assisted instruction was being implemented in different ways. A unique 
computer-assisted instruction program, Computer-Assisted Remediation and 
Evaluation (CARE), was designed to help classroom teachers to identify children with 
particular mental handicaps that would adversely affect academic progress. The CARE 
project was a self-contained college level course. The special feature of this computer- 
assisted instruction program was the method of dissemination. A mobile CAI unit was 
driven to teachers who requested the program. By 1972, the unit served teachers in 

In 1972, the Mitre Corporation of Bedford, Massachusetts and C. Victor 
Bunderson and associates at Brigham Young University developed the Time-shared;
Interactive, Computer-Controlled, Information Television (TICCIT). The TICCIT combined mini-computers and television receivers in an instructional system with the display capabilities of colour televisions. The aim of the TICCIT program was to provide a complete and independent alternative to entire college courses in selected subjects (Kulik, 1980). Suppes & Macken (1978) noted that the purpose of the TICCIT system was to use mini-computers and television technology to deliver computer-assisted lessons and educational programs in English and mathematics to community college students. The TICCIT lesson was displayed on a colour television screen connected to a keyboard and a local computer where students could respond. One TICCIT system could serve 128 terminals (Kulik, 1980). Rota (1981) stated that the TICCIT system lessons were developed and designed by an assembled team of experts; whereas, the PLATO lessons were designed by teachers.

According to Rota (1981), the PLATO and TICCIT projects succeeded in introducing effective computer-assisted systems into schools. Each project led to the development and reliable operation of computer systems dedicated to instruction. The PLATO system supported hundreds of active terminals, and it gave each site a powerful tool for teaching. The TICCIT system had the display capabilities of television and employed an innovative instructional design. Schools accepted these systems as additional resources for promoting student learning and as a part of the approved curriculum.

According to Rota (1981), the PLATO and TICCIT systems opened the gateway in the potential of a technology market in education. In addition, these two college-based, teaching programs were of many approaches that followed.

In 1975, the Computer Curriculum Corporation (CCC) was developed to offer a large variety of courses for elementary through junior college students. The CCC-CAI system consisted of an instructional computer that provided individualized lessons to as many as 96 teletype terminals simultaneously. The computer and terminal were located at the school site, and neighbouring sites were then linked to the computer via telephone lines (Suppes & Mackens, 1978).

According to Suppes and Macken (1978), mentions that members of the computer industry were also among the earliest to use computer-assisted instruction. In the late 1950s, the computer industry used computer-assisted instruction to train its own personnel by linking typewriters and teletypes terminals to computers. Instructional modules were presented to the learners who then responded with one-syllable
responses. The programming language for these modules was complicated and quite difficult for lay people to learn. Because of the complexity of the programming language, ways of simplifying such programming were explored.

The Computer Assisted Instruction is popularly known with its abbreviation CAI. In brief, CAI is an interaction between a student, a computer-controlled display and a response-entry device for the purpose of achieving educational outcomes. It is developed on the principles of programmed learning. The concepts of audio-visual education system analysis, data processing, communication and learning theories are also used in CAI (N.Venkataiah, 1996).

Recently, the use of technology in education and classroom teaching has increased across a variety of disciplines. In many cases, the use of multimedia instruction has been proven to be effective (Kulik, Kulik, & Cohen, 1980; Rota, 1981; Morrell, 1992). Specifically, there has also been an increase in the use of technology in counsellor education. Many counsellor educators are beginning to integrate this medium into their delivery of instruction.

Computer Assisted Instruction is an approach to complement and supplement traditional methods of teaching. It is not intended to supplant or replace teachers and instructors but to serve as a tool to actively engage and stimulate students by enhancing the learning process. There appears to be a significant interest in the use of computer-assisted instruction.

\* Effectiveness of Computer Assisted Instruction:

Educationists strongly feel that CAI helps to individualize and improve instruction. The teacher can be relieved from the daily routine and monotonous drilling activities. Day by day CAI is becoming increasingly popular in elementary and high schools all over the world. Although it has been available since 1960s its wider spread adoption in education and training did not occur until the advent of the microcomputer (N.Venkataiah, 1996).

Over the years, many research works have found the impact and the effectiveness of CAI which one of the scholars, Douglas H.Clement (1985) concluded as follows:

- Computer can be used to make instruction more effective, the use of CAI either improves performance or shows no difference when compared with traditional
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classroom approaches, regardless of the type of CAI, computers or measurement instruments used, it is approximately equivalent to individual tutoring.

- CAI usually yields this improved performance in less time than traditional instruction.
- Computer can make the learning experience more exciting, satisfying and rewarding for learner and teacher, students have a positive attitude toward CAI, frequently accompanied by increased motivation, attention span and attendance.
- Computers do not stifle the creative process, nor are they dehumanizing.
- None of these benefits is inherent in CAI; rather they depend on the abilities of the professionals involved. CAI is most effective when it is used as an adjunct under the control of the classroom teacher.
- It is still not known why CAI is effective or how to individualize instruction or maximize the positive effects.
- There is a dire need for quality courseware and new instructional design methodologies for technological media.

❖ PROCESS OF COMPUTER ASSISTED INSTRUCTION:

A computer is programmed with linear or branching programs. It acts like a super teaching machine catering to the needs of a number of students at the same time. The characteristic aspect of the CAI is its capacity to initiate flexible interactions with the student, which this can be brought about. The computer is able to record and store all the responses of all the students. It can use the information in deciding what information should be given to the student, next. It can branch not just in terms of one answer but also in terms of a whole series of previous answers. It can also record the time taken to answer a question and the degree of correctness of the student response. It uses the information in planning to determine, which branch to take.

Considerably, more progress has been made with the technical development of CAI than with the problem of writing instructional programs.

**Gentile Robert (1967)** describes some of the devices used in CAI. In the area of visual communication;

- a type writer asks a question under computer control and answer a question under student control;
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- **film projection devices**: on the basis of student responses, select film, present auditory and visual materials, and automatically score student responses;
- **displays**, superimposes on films;
- with a **cathode ray tube**, a pen can be used for drawing curves or indicating answers on a screen;
- **random-access slides** and films are available.

In general, students learn well with CAI in considerably less time. In a report on Computer Assisted Instruction (CAI) Research and Development, **Feldhusen, John (1969)**, discussed the capabilities of CAI in comparison with other media:

- Secure, store and process information about the students performance prior to and/or during instruction to determine subsequent activities in the learning situation;
- Store large amounts of information and make them available to the learner more rapidly than any other media such as films, slides, T.V., and demonstration equipment;
- give the author or teacher, an extremely convenient technique for designing and developing a course of instruction;
- Provide dynamic instruction between students and instructional programmed not possible with most other media.

**N.Venkataiah (1996)** observes that CAI employs a central computer with electric type-writers, light pens, audio-tape and other equipment as terminals for students. The system can be used in various modes: drill or practice, inquiry, tutorial instruction etc. Automated data-management aids to help instructors and administrators design curricula, monitor student performance and manage classroom instruction.

A lot of information stored in the computer is readily available to the learner. At a time, it can serve many learners by catering to the individual needs and can record responses of all learners with reliability. Simultaneously, the computer can record the time taken by an individual learner in responding to a question and the extent of correctness of the response. A learner can make progress at his own pace, receive and choose the material sequence and the level of instruction freely. Since each learner's performance is automatically recorded and can be fed back to the
teacher, learner’s performance can be evaluated and education be provided according
to the strategy that is best suited to the learner. CAI is considered to be a better
teaching machine because of its better flexibility and versatility.

A typical CAI installation consists of individual learning booths each with a
console. The student is seated. Facing him on the console is a television screen for
displaying information. Before he starts programs the student checks in with the
computer by displaying his identity number. This connects him with his part of the
learning programs. A computer package of information stored in a system is presented
sequentially. This information could take the form of videotape recording slides,
motion pictures, films, filmstrips etc. Student puts questions, computer responds by
printing out comments, answers and questions. Sometimes, the student may write
directly on the cathode ray tube, display screen with a light pen. His answer is picked
up by the computer and evaluated when he has finished. The computer assigns him
the next program, records his progress and prints out a report for his teacher.

The CAI starts by identifying the way a student seems to learn best. It reviews
his past history of learning and presents a program accordingly. Sometimes, the
computer stores all the information gained from all students, who have taken the
computer course previously. This information may be re-analyzed and much of
教学 strategies which were not effective, may be rejected and strategies which
have succeeded may be continued.

Computer Assisted Instruction is, therefore, not merely a sophisticated type of
programmed instruction but a different kind of instruction.

No doubts, it employs the principles of instruction but it also uses electronic
data processing, data communication, and concepts of audio-visual and media theory,
communication theory, systems theory and learning theory. Computer Assisted
Instruction proves better than all other aids in several aspects. There is not only saving
of time in learning, but it also performs miracles in processing the performance data.
This latter characteristic helps to determine subsequent activities in the learning
situations. The large amount of information stored in the computer is made available
to the learner more rapidly than any other medium. The dynamic interaction between
the student and instructional programme is not possible to be secured in any other
media. With CAI, we can completely individualize materials.
MULTIMEDIA

There is no firm definition of multimedia, except that it has been derived from the Latin *multus* (many) and *medium* (medium) and represents an integration of different media elements that essentially represent independent contents. Multimedia may be regarded as combinations of text, graphic, sound, animation, and video elements synthesized by means of computer. However, multimedia is also an adjective describing application and documents enhanced by addition of sound, animation or video, or all these media together, which is in a widest sense used in description of hardware allowing the users an access to these media (Rosenborg, Green, Hester, Knowles, & Wirsching, 1993; Vaughan, 1994; Colin, 1995; Cox, Manley, & Chea, 1995).

Multimedia is considered appropriate in any field where access to electronic information is required (Rosenborg, Green, Hester, Knowles, & Wirsching, 1993; Vaughan, 1994). Its implementation has been widely spread. Image and sound, in addition to animation and video, contribute significantly to better understanding of any system. An outstanding example for application of multimedia may be particularly found in various pleasure/entertainment and presentation materials, informative and educational systems, audio-video data bases and programs with separate emphasis on certain medium (film, music).

Levin (1985) puts forward the notion that children exposed to the milieu of video games from an early age develop enhanced domain specific perceptual and cognitive skills that aid in the parallel processing of multimedia information. Such ability may also produce the unwanted side effect of becoming disinterested with the standard linear approach to acquiring new knowledge in classroom situations. Once again, it is conjectured that multimedia CAI has the potential to be a partial panacea.

Media combinations are generally referred to as multimedia system. Multimedia means many-media. The term **multimedia instructional system** refers to the uses of appropriate and carefully varieties of learning experiences which are presented to the learner through selected teaching strategies which reinforce and strengthen one another so that the learner will achieve pre-determined and desired behavioural objectives. Experts are of the opinion that different media serve different
educational functions, so that various media should not be used in isolation, instead they should be integrated. Multimedia is the use of more than one medium in a single communication either sequentially or simultaneously (Dipika, 1988).

Soloway (1991) and Pea (1991) believe that different teaching styles must be adopted to improve the performance of schools. He sees current educational techniques as being a legacy of the Industrial Age and not being particularly well suited for the Information Age. Students should be self-motivated in learning how to learn. It is thought that multimedia can aid the learning process in this way and overcome inappropriate reliance on rote learning.

The concept of multimedia project management is relatively new in the field of education. There are many unknowns when embarking upon this type of development. When one considers that experts in the field of multimedia development, such as Greer (1992) and Golas (1994), suggest that development time for producing one hour of multimedia can range from 50 to 600 hours, there is no doubt that there will be ambiguity. However, it is the benefits of this type of development that attract educators, managers and designers.

Jannett N. Jackson (1995) found that once upon a time, the word multimedia was used to mean adding sound to motion pictures. Then as pedagogical research examined how we learn, it was realized that individuals learn in different ways. The use of multiple medias began to play an important role in educational theory. Multimedia in the larger sense relates to learning techniques that appeal to sight, sound, touch and smell.

Hofstetter (1995) stressed that multimedia is fast emerging as a basic skill that will be as important to life in the 21st century as reading today.

According to N. Venkataiah (1996) certain instructional situations require the use of more than one medium to achieve their objectives. When several media are used, it is because each conveys to the learners a message that for all practical purposes cannot be conveyed by any single medium. Most learning events, if not all, are multimediated. When systematically planned, multimediated learning events are more predictable of product, are more effectively refinable and are easier to produce and control than single mediated learning events.
Characteristic of Multimedia:

Venkataiah (1996) highlighted following characteristics of multimedia that have been traced here:

- Multimedia storage and retrieval systems contain more information than any human training agent can possibly embrace, and have any terminals through which students have access to the information.
- The development of multimedia instructional and support systems have provided the tools for creating learning centres in which a very large number of models of learning can be actualized over a great range of content with considerable variation in complexity.
- By employing media technology as support systems, we can offer to the students a large number of ways to learn a large number of things.
- What multimedia systems promise is a form which permits the delivery of a range of instructional and informational supports.
- Multimedia systems are not restricted to a single type of learning or instructional mode; they represent a support for a range of these systems.
- The capacity of multimedia systems is markedly greater than that of ordinary classroom practice, in creating a variety of learning models.
- A multimedia device is striking because it provides the opportunity to learn exceedingly complex skills, which are related to sets of diverse and precise theoretical knowledge bases.
- The development of multimedia educational systems permit many models of education that otherwise are inconceivable as long as we think of the classroom and the teacher as the primary mediator of instruction.

Multimedia Computer Systems

A multimedia application is created on a developer workstation and viewed on an end-user computer system. The right choice of an appropriate platform depends on personal inclination, finances, and the sort of material intended for utilization in a project. In any case, very fast performing computers with large memory and hard disk for both systems are dealt with. An end user might view multimedia on an office or home personal computer, a kiosk at an airport, a wireless laptop, or a personal digital assistant.
A multimedia developer personal computer system resembles the high-end multimedia computer in hardware configuration, with the addition of various cards for graphics display and audio and video digitizing, a large, high-resolution monitor and, as the most important difference, a variety of external peripheral devices to produce, store, and back up the applications being developed. A developer's system also requires sophisticated multimedia authoring software, such as Macromedia Director (Cox, Manley & Chea, 1995).

Large graphical, audio and video data files, as well as the multimedia authoring tools, require an increasing working memory to enable faster copying, pasting, arranging, linking and testing of the application itself. It is also the speed that counts, beside the working memory capacity, in data receiving and producing by the memory. The greater the working memory, the faster the performance speed of the whole computer.

Hard disks are the most common external storing devices that make part of any computer standard equipment. Like diskette, hard disks are magnetic storage of data as well as SyQuest removable cartridges.

Magneto-optical disks use a combination of the laser and magnetic technology for retrieval and storage of files. They are more frequently used in the making of multimedia project backup copies than in the original data storage for applications to be made.

CD-ROMs have become an integral part of multimedia. Various service routines and tools, graphics, audio, video, data bases, games, encyclopedia, dictionaries and educational software. CD-ROM is a distributable medium - its content cannot be either deleted or changed by end users, neither can any new data be recorded on it without the CD recorder using special empty CD-R (CD-Recordable) disks.

Input units depend primarily on the computer for which a multimedia project is made. Apart from standard inputs-keyboards and mice-there may be some other devices provided for user's input, such as trackballs, touch screens, graphics tablets, scanners, voice recognition systems, digital cameras.

Presentations using visual and audio components require, as output devices, hardware that doesn't have to be necessarily included in the multimedia computer itself: projectors, loudspeakers, amplifiers, monitors, video devices, etc (Vaughan, 1994; Cox, Manley, & Chea, 1995).
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> The Process of Developing Interactive Multimedia:

Classification of the varied forms and applications of interactive multimedia programs can be made using several criteria. Attempts have been made to segregate multimedia programs into categories that include:

- tutorials
- drill and practice
- games, simulations and
- microworld

While the nature and complexity of these strategies is varied, the general feature that distinguishes these programs from reference sources such as electronic encyclopedias and on-line data bases is the level of interactivity. The development of interactive multimedia programs focuses on those strategies that attempt to incorporate part or all of the essential features of teaching identified by Laurillard (1993).

Given the often substantial costs associated with the development of interactive multimedia, a systems approach to analysis, design and development is needed to ensure that the resulting product is educationally effective. This involves the justification of the use of technology. The rationale for using technology to support learning and teaching should be that the required strategies cannot be achieved in any other form. While Laurillard’s (1993) model may be applied to meet the needs of on-campus students, the same support is not easily achieved for distance students. In the case of distance students, the technology offers the chance to implement strategies that had previously been beyond the capabilities of the institution.

❖ Process of Multimedia Development:

A process of systems approach to analysis, design and production, has been presented in the following paragraphs.

➢ Analysis:

The model of interactive multimedia development used by the OLI is one of incremental prototyping proposed by Phillips (1996). This process begins with an
academic designer recognizing a learning need, and the educational designer responsible for the school seeing a possible solution involving the use of technology. The academic and educational designer will then need to consult the educational designer (technology) to produce a simple requirements specification that details the learning problem or need, the desired learning outcomes, and the proposed strategy for addressing these needs. The Senior Educational Designer (Technology) will assess these needs, as a decision to proceed with any further work will be influenced by several factors:

- identification of a clear role for multimedia
- the scope or complexity of the problem and proposed solution
- the number of students benefiting from such work
- whether the learning situation can be generalised to cover other cohorts across schools or disciplines
- the possibility that similar solutions already exist
- the resources available to complete the project
- potential for recovery of costs through marketing the product

Given resources for developments of this nature are limited, the OLI would find it difficult to justify the development of a major CD-ROM based product that consumed all available personnel and resources for a period of twelve months. Conversely, it is also impractical to spread resources thinly to attempt to do the greatest good for the greatest number. The resulting risk is that products are superficial and ineffective.

While the most efficient development process requires prescriptive guidelines, not all projects need to be so constrained, for to do so would stifle creativity and the sort of teaching discoveries that lead from experimentation and a willingness to try different approaches. There is certainly room for a constructivist approach to multimedia development, and the encouragement of learners as active members of the design team. The procedures described below are those that have been shown to facilitate the efficient production of the multimedia component of a teaching program. These guidelines are just that—they may require modification for specific circumstances.

The multimedia development requires a team approach, as it is unrealistic to expect any individual to possess all the skills required to undertake and complete such
a project. Such a team may include a subject matter expert (academic), educational
designer, project manager, and graphic designer. With effective project management
the key to success in such projects, it is vital such a person is formally appointed to
each project. This role may be performed by any team member with the appropriate
expertise-this may not be the subject matter expert.

Specialists such as graphic designers are currently available through the
Division of Information Technology; however this service is one of full cost recovery.
Effective interface design relies heavily on graphical appearance of the program, and
the importance of good graphic design cannot be underestimated. An estimate of the
cost of such design, and other specialist assistance, needs to be carefully calculated as
one of the factors that influence the decision to proceed with a proposal, will be
likely, the cost of such work. The resulting data obtained through the requirement
specification process may be used to support applications for funding for substantial
programs.

A summary of the critical components of the requirements have been listed
below:

- Reason for the proposal-identification of learning requirements
  that should highlight discrepancies between current and desired
  learning outcomes.
- Course or subject aims, broadly listing content, objectives,
  assessment
- Solution options that look at alternative methods of achieving
  the desired outcome.
- A statement of the preferred solution.

A feasibility study accompanies the requirements specification and contains
the following details:

- Identification of existing programs that may address this need,
  or may be modified to do so.
- Analysis of the target audience - their level of computer access
  and literacy, prerequisite knowledge.
- Details of the proposed method of delivery, the computer
  memory, hard disk space and processing power required to run
  the program
- The type of operating system.
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- The screen resolution and colour depth, especially where fidelity is an issue.
- Whether the program needs to run across an intranet or internet.
- The type of network connection required for remote users.
- The level of technical support available to users.
- Peripheral devices required such as CD-ROM and sound capability.
- Availability of development resources - hardware, software and personnel.
- Additional software required to operate the program.
- Methods of delivery - floppy disk, CD-ROM, mixed media.
- Installation and maintenance requirements.
- Funding arrangements.

Once approval to commence work on a project is given by the Senior Educational Designer (Technology), the team members will need to convene and more tightly define the Requirements Specification. During this design phase storyboards (keyboards) should be completed, and prototypes developed to demonstrate proposed features of the program to the rest of the team. An incremental prototyping model requires that ideas be quickly designed, developed and evaluated. Modifications can be made before the cycle begins again. The prototype is designed to demonstrate the general structure, navigation and interaction planned for the final product. There may be a tendency to overdevelop these prototypes, and spend too much time agonizing over minute design issues. This should be resisted as it wastes time and energy. It is better to separate the design and development stages, and discard prototype material once the development process begins.

➢ Designing Multimedia:

The storyboard design process is a critical one, for it allows all team members to visualize the concept. This requires that the functionality of the program be clearly defined, so that the content, navigation, type of interactions, animation, video, sound and graphic design elements are shown. Microsoft Powerpoint is a useful program to use for storyboards, as content may be cut and pasted into the final design, therefore avoiding the duplication of tasks such as text entry.
Modificationsto the storyboards are made by the design team, until all parties are satisfied with the design. The project manager needs to ensure such agreement is reached, at which point production work may begin. It is important to remind team members that once the design process is complete and agreement obtained, any further design changes cannot be made. Allowing changes to the product once production has commenced will almost guarantee that project milestones and budget will not be achieved. Even a relatively simple change late in the development cycle can lead to hours of reprogramming.

> Production Process:

The production process follows the design stage. Resources such as audio or video files are obtained, graphic designers transform the storyboard images into a final product, and programming commences. Formative evaluation is a critical component of this stage. Ideally, a sample of the target audience should be asked to use the program as production proceeds. Evaluation needs to identify problems with interface design, instructional design, and technical "bugs", but this process needs to be descriptive as well as quantitative. Evaluators should be observed while they interact with the program, and be encouraged to verbalize their thoughts as they proceed through the program.

Implementation and summative evaluation follows the development phase. The delivery platform should have been clearly identified during the specification writing phase. It is pointless trying to run the final product on a machine with a double speed CD-ROM when the data transfer rate of any video produced exceeds the capability of such a machine. Programs requiring 8 bit colour (256 colour display), and those with specific requirements such as sound and substantial memory should have a system of assessing the specification of the delivery machine built into the program. Students will be less than impressed by the slow performance of a program that is allowed to run on a low end machine.

A summary of the methodology for interactive multimedia design proposed by Phillips (1996) is shown below:
IMPACT OF MULTIMEDIA:

Multimedia learning experiences represent a natural way for learning to take place. Learning pace can be accelerated by involving maximum number of senses. Sensory experience forms the foundation of intellectual activity within any formal school situation; learners differ in the effectiveness of their sense reception. Multimedia learning experiences have the advantage of appealing to the individual, the learner’s pace, interest and readiness.

Besides, cognition and conceptualization depends on a chain of events, which begin with the learners’ perception of stimuli, be their auditory, visual, tactile and articulatory. It is important that these initial learning experiences be accurate, dependable and understandable. Unless the learner’s initial sensory impressions are accurate, it will be impossible for them to have reliable conceptualization and understandings. With the existing numerous kinds of aids, carefully organized presentation of information, through a variety of media should occupy the learner’s conscious attention to living stimuli (N.Venkataiah, 1996).

The impact of technology changes multi-media development of world-wide web course transportation of learning premises across media, such as use of multimedia tools over network for distance education and training at other places, role of computer and use of computer graphics Video- Conferencing, feature-film,
development of tale teaching activities; interactive TV, ITV, CCTV, ETV, use of hyper reach concept for students authentic in pury and intimate has been explored.

❖ APPLICATION OF MULTIMEDIA:

Multimedia applications significantly expand the scope of many instructional activities. Students no longer simply write essays but are able to develop presentations that include text and images and other media components. Software is readily available that takes images directly from incorporation into a composition or article. Multimedia software can control and edit sound and images from CD-ROMs and videodiscs to develop sophisticated video presentations. Multimedia applications continue to grow in popularity mainly because they appeal to and make use of a variety of sights, sounds and motions that stimulator the senses. Howard Gardner (2000) and other cognitive psychologists have written about and expanded the understanding of the importance of using multiple delivery mechanisms for accommodating different learnings of students. Multimedia learning applications, in particular, are frequently recommended for developing curricula that appeal to diverse learning styles (Howard Gardner, 2000).

Multimedia can be used for entertainment, corporate presentations, sales presentations, education, training, simulations, digital publications, electronic reference materials, museum exhibits and more.

- **Multimedia in entertainment:**

One of the earliest applications of multimedia was for games, and many people thought that was what multimedia was really useful for. There is no question that quality of games, and it is that very game-like quality that can enhance a learning experience. Parents watching their children play innovative games see how powerful multimedia is at teaching them how to read or solve math problems even though the children perceive the experience as just a game. Buildings on the power of these perception innovators have increasingly used multimedia to support all kinds of activities that are not just games.
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- **Multimedia in software training:**

  As computer applications programs become more complex, software publishers are building multimedia presentations into their programs to introduce new features and walk the user through them. In companies, this form of presentation will take a big load off the overworked technical support staff. For individuals at home or in small businesses, it will make programs easier to learn and use.

- **Multimedia in education and training:**

  Multimedia is extensively used for education and training in schools, businesses, and at homes. Multimedia education allows you to proceed at your own pace. A student can learn something by putting up his physical effort. But visual effects are so powerful that catch hold of the attention of the student with sounds, animations and movies. So that an input process will take place at the application of multimedia in education and training application of multimedia.

  Some multimedia applications are interactive. That is, through key-board, mouse, voice, or external controller such as a Musical Instrument Digital Interface (MIDI) key-board you interact with the system to control aspects of the presentation. Most of today’s computers are based on text display only, perhaps supplemented by simple graphics. With the added capabilities of stereo sound, animation, and video, multimedia computing offers a much richer and more efficient means for conveying information. Multimedia enables the fast dissemination of information in ways not possible with text-only systems.

  For example, consider the simple interactive tutorial that comes with Windows, the one that demonstrates Windows fundamentals and illustrates how to use the mouse. You may have run it shortly after installing Windows. That tutorial is rudimentary multimedia, integrating moving images and text. Now imagine expanding such a tutorial to include spoken instructions, music, realistic animation, and moving video images just as if you were watching TV. Animators, musicians, designers, writers, programmers, audio engineers, industry experts, and video producers are beginning to join forces to create multimedia applications such as:

  - A WordPerfect document that let you paste in video clips (with audio) from a VCR tape. Instead of displaying just a still graphic, the document will be alive with sight and sound.
• A music-education program on a CD-ROM from Microsoft that plays Beethoven’s Ninth Symphony, while displaying informative and educational text about each passage and about the composer.

• A dictionary, thesaurus, book of quotations, and encyclopedia on a CD-ROM from Microsoft that not only contain a huge amount of textual information, but actually pronounce the dictionary entries; read quotations aloud in the voices of Robert Frost, Carl Sandburg, T.S. Eliot, i.e. Cummings, Dylan Thomas, and JGK and illustrate scientific phenomena with animation.

• Programs that teach you how to play the piano, using a MIDI keyboard connected to your PC. The computer senses whether you play the lesson correctly and responds accordingly with a recorded high-quality voice. Similar programs teach music theory.

• Multimedia magazines on CD-ROM that let you choose what new topics you want to read. News is displayed like television, with high-fidelity sound and video.

• Interactive company annual reports, product demonstrations, presentations, or corporate training manuals for new employees.

• Interactive real-time video conferencing (“videoed conferencing”) on your desktop computer, where you can see your colleagues at several remote office locations while working interactively on your company’s newsletter, also displayed on the screen.

• Moving catalogs from mail-order houses, displaying everything from cars to boats via high-quality video and audio.

• An interactive geography test used at the National Geographic Society Explorer’s Hall in Washington, D.C.

• Interactive high-speed, random-access books, newspapers, or catalogs for the blind, using high-quality voice synthesis or recorded voices.

• Interactive training for hard-to-teach professions such as medical diagnosis, surgery, auto-mechanics, and machinery operation.

• Complex interactive games that incorporate stereo sound effects, flashy visuals, speech synthesis, and speech recognition, where you interact with the gram by speaking (Cowart R., 1993).
• **Multimedia on the web:**

  When the web was introduced, it was all texts. Soon graphics were added at opened up new possibilities. Photographs and drawings could be used to illustrate and explain products and accessories, to demonstrate the workings of technology and nature, or just to make pages more attractive. Multimedia was introduced using tools such as Java and Shockwave. Now Web pages display animations, play sound, and allow you to interact with them. It’s possible to experience full multimedia over the Internet or intranets.

• **Multimedia in office work:**

  Multimedia isn’t just for expensive commercial productions. It can be used to enhance ordinary communications. Using technology such as Microsoft’s OLE and ActiveX or OpenDoc, you can insert sound and movie objects into other applications such as word processing or spreadsheet documents. Double-clicking on the embedded icon in the document runs the media clip or plays the sound.

  Windows Media Player controls multimedia-hardware devices and plays media sequences, such as video clips, animations, and sounds. Media Player can be embedded in a document belonging to another application. It lets you start, pause, and stop the sound or movie or drag a solder bar to quickly move to a specific spot.

• **Multimedia servers and databases:**

  Databases called universal servers are now able to store the elements that are displayed on the screen. Fields are used to store images, text, sound files, and videos. The multimedia program draws on these stored elements to create the show. These powerful databases, accessed over networks, are the new organizational libraries. The still images you see in multimedia programs (and many that you see in print) have been created or manipulated on a computer in a digital format. There are two basic forms of computer graphics: bitmaps and vector graphics (Taxali R K, 2000).
❖ PROCESS OF MULTIMEDIA INSTRUCTIONS:

It began with games and now it has become dynamic Web pages, interactive courses, and catalogs with sound and video. It’s multimedia one of the fastest growing and most exciting areas in the information technology field. Like electronic French chefs, hundreds of thousands of people are stirring together the ingredients of text, pictures, animations, movies, and sound, following almost as many recipes. The results range from simple slide shows to dazzling, inspiring, interactive presentations.

In education, interactive multimedia programs allow you to study and progress at your own pace. You can even be a multimedia developer of sorts using traditional office applications. You can embed sound or video in spreadsheet or word processor document so that when recipients click an image or icon they get an explanation of key points.

Multimedia has entered the main stream because it is so attention-holding and effective. Holiday Inn uses it to train employees. When they click on topics the system “talks” to them. It has reduced training time on a new property management system from 16 days to 14 days.

Down through history, and over recent years, various media have been developed that inform or entertain: paintings, books, magazines, newspapers, movies, radios, and photographys. Using computers, multimedia fuses two or the premises that the combination is better than any of the individual components.

❖ Multimedia in Computer Assisted Instruction:

Technology use is a permeating the educational arena and computers and computer-related technologies are rapidly becoming vital instructional tools in many developed countries. CAI is one of the significant innovations which have emerged out as systematic thinking and exercise. The literature (Hiatt, 1991) implies a trend towards an increased use of multimedia technologies for instruction. Of all the new media and technologies, computer attracts most attention and has been in use in many classrooms in advanced countries. The developing countries also have begun to accept CAI as one for the most important approaches in teaching and learning. On account of several reasons, India has not been able to introduce the CAI on a substantial scale and computer is hardly used by the teachers as far as their classroom instructional
work is concerned. Very few schools and colleges have a computer in every classroom.

- **Multimedia CAI:**

  Multimedia CAI is a source for effective communication and providing new dynamic environment for learners. Also multimedia software has a great potential in facilitating students’ creativity. Tsuei, 1998 found that the various possible features incorporated with the multimedia CAI are colour, graphics (Still and animated), audio and hypermedia. These features may enhance the student’s attitude, motivation, amount of participation, skill acquisition, comprehension, efficiency, achievement, retention, etc.

- **CAI with colour:**

  A study by Latham (1991) showed that retained effect of students using the colour version of the lesson was higher that those using the achromatic version. Another study by Whattana (1991) of colour preferences on a computer screen indicated that the preferred colour combination was a white text and a blue background. The students also prefer white, yellow and green text with black background and black text with yellow background.

- **CAI with graphics:**

  Graphics refers to the use of various forms of static/dynamic image as a means of communicating ideas, information and knowledge Barket and Yeates (1985). Some of the teaching techniques and strategies provided by graphics facilities are unique to this medium. This graphic technology provides a very high bandwidth communication channel and presents information in ways that would otherwise be impossible.

  Animation on a PC is a series of images that are displayed in rapid succession, giving the illusion of movement. Animation effects can be produced purely by computational means and are used in illustrating concepts that involve movement. Though there are studies like Poppen (1990) and Ahern (1991) which found that the graphics utilized in the CAI did not enhance efficiency of the students, there are
supporting studies which demonstrate a significantly higher level of skill acquisition and knowledge attainment and high retention for the animated graphics group related to the still graphic group Holmes (1991) and Smith (1997).

- **CAI with audio:**

  Audio sound can reinforce the learners’ understanding much better and certain type of information can be conveyed effectively with sound effect only. A study by Nocente (1997) indicated that students with below grade level reading ability made greater gain, if audio was available. But on the contrary, another study by Barron (1999) showed that adding digital audio to Computer Based Training (CBT) found no significant difference in achievement gain from the CBT with redundant audio.

- **CAI with hypermedia:**

  Hypertext becomes hypermedia when sound, graphics and motion are added. Hypermedia features heavily indexed textual data bases and it requires a large amount of data for audio, video and animation. Hypermedia is currently being used as a versatile tool that has a variety of instructional applications. The most important feature of hypermedia is that it facilitates designing and producing CAI programmes Behrens’s (1990) studies reveal that hypermedia environment is effective in vocabulary learning Lai (1992).

  Hypermedia is the text that has been indexed and linked topically. The user reads the resulting document with the use of hypertext-retrieval engine. A non-linear flow allows for flexibility and ease of access. Hypertext documents can store large amounts of material in a very small space. Park’s (1994) and Lai’s studies indicated that hypertext approach was not more effective in facilitating learning of the corresponding printed version and linear approach. But Waite’s study (1999) supported the hypertext version of CAI.

- **CAI with artificial intelligence:**

  Artificial Intelligence (AI) techniques are used in CAI in order to provide computer based systems with some of the decision making, problem solving and reasoning skills that would normally be associated with intelligent human behavior.
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The major objectives of introducing AI techniques into CAI systems undoubtedly make them behave more like a human tutor.

Meanwhile, there were a few studies made by Kikuchi (1995); Chouman (1996) and Radwan (1997) conducted on Intelligent CAI. Radwan (1997) found that knowledge of CAI also makes significant improvement in the learning skills of the students.

For the present investigation a multimedia CAI package was developed and validated for use in Individual and Cooperative learning conditions. The details of multimedia CAI package have been given in Chapter II. However three instructional situations were proposed to be used in the present investigation viz: Cooperative learning, Individualistic learning and Conventional group learning.

The most common teaching used in classroom by the teachers is the Lecture. It is the teacher who controls the discussion and there is very little or no interaction between the teacher and the students and among the learners themselves. It is now believed by educational technologists that group dynamics can be harnessed for making the teaching process more engaging and productive. This can be made possible by making teaching learning process more interactive by ensuring group condition, which support learning in the group.

The cooperative learning approach occurs in groups that share a common purpose and task. The teacher broadens interaction and fits into the zone of maximum response opportunity that is common to most group numbers. And instead of bringing individuals to greater understanding and awareness of their own thinking, the goal is to help the group become more self-reflective, and aware of their own performance.

The importance of cooperation among individuals is underscored by many social problems that are faced by learners at home and in the society. Few doubt that a greater understanding of other viewpoints, and of the common goal towards which every community and nation must strive, is important for reducing the sources of these problems. Not only our learners must know how to get along in a turbulent and ever-changing society, but they also must be prepared to contribute productively to it. Cooperative learning is a way, our learners can build the skills they will need to
reason and problem-solve in the world and to acquire the social skills that can make their reasoning and problem solving effective.

Cooperative Learning (CL) is a process by which students work together in groups to master material initially presented by the teacher (Slavin, 1990). According to Slavin (1990) the goal of CL is for students to help each other to succeed academically. To be successful, all members in a group must achieve mastery of the material or contribute to the completion of a group assignment. Theoretically CL fosters a cooperative atmosphere in the classroom, rather than a competitive one, because students are interested in each other’s learning, not just their own. Furthermore CL is believed to enhance cognitive skills to the extent that students share ideas and explain their thinking while working together (Meloth, 1990).

Before dealing with the concept of cooperative learning, it is worthwhile to know the meaning of the term Cooperation. It refers to four distinct aspects:-

- **Cooperative Behavior**: It refers to actual participation and coordination of efforts between two or more individuals.
- **Cooperative Incentive Structure**: It refers to provide rewards to the group based on the performance of all group members.
- **Cooperative Task Structure**: It refers to a situation in which a group of two or more individuals work together on some task.
- **Cooperative Motives**: It refers to the predisposition to act cooperatively in preference to competitive or individualistic behavior.

‘Cooperative Learning Programs’ involve one or more of these above given aspects of cooperation.

**THEORETICAL PERSPECTIVES OF COOPERATIVE LEARNING:**

Slavin’s model of Cooperative Learning—Student Team Achievement Division (STAD) is followed by the investigator in this study and it is based on the following theoretical perspectives.

- **Philosophical Perspective**: Idea of cooperative learning is a contribution of John Dewey, 1913 to educational methods. According to Dewey, In a situation where individual learns by sharing his problems with his fellow, the intangible qualities of respect for another’s dignity, of mutual understanding and the realization that life’s problems common to all are expected to be made a part of the learner’s capital of
knowledge. Democracy is no longer just an idea to be taught it is brought into being in the life of a learner. Slavin (1991) and Davidson (1991) were instrumental in giving this philosophy a concrete shape and evolving what came to be later known as Cooperative Learning Approach.

- **Psychological Perspective:** During the past half century, Swiss psychologist Jean Piaget devised a model describing how humans go about making sense of their world by gathering and organizing information (Piaget, 1954, 1963, 1971a, b). According to Piaget, our thinking processes change radically, though slowly, from birth to maturity because we constantly make sense of the world. Piaget identified four factors; biological maturation, activity, social experiences and equilibration, that interact to influence changes in thinking (Piaget, 1970a).

  One of the most important influences on the way we make sense of the world is maturation, the unfolding of the biological changes that are genetically programmed. Parents and teachers have little impact on this aspect of cognitive development, except to be sure that children get the nourishment and care they need to be healthy.

  Activity is another influence. With physical maturation comes the increasing ability to act on the environment and learn from it. When a young child’s coordination is reasonably developed, for example, the child may discover principles about balance by experimenting with a seesaw. Thus, as we act on the environment as we explore, test, observe, and eventually organize information. We are likely to alter our thinking processes at the same time.

  According to Piaget, our cognitive development is influence by social transmission, of learning from others. Without social transmission, we would need to reinvent all the knowledge already offered by our culture. The amount, people can learn from social transmission varies according to their stage of cognitive development. Maturation, activity and social transmission all work together to influence cognitive development.

  Piaget’s fundamental insight was that individuals construct their own understanding; learning is a constructive process. At every level of cognitive development, you will also want to see that students are activity engaged in the learning process.

  Knowledge is not a copy of reality. To know an object, to know an event, is not simply to look at it and make a mental copy of image of it. To know an object is
to act on it. To know is to modify, to transform the object and to understand the process of this transformation and as a consequence to understand the way the object is constructed (Piaget, 1954).

All students need to interact with teachers and peers in order to test their thinking, to be challenged, to receive feedback and to watch how others work out problems. Disequilibrium is often set in motion quite naturally when the teacher of another student suggests a new way of thinking about something. As a general rule, students should act, manipulate, observe and then talk and/or write (to the teacher and each other) about what they have experienced. Concrete experience provides the raw materials for thinking. Communicating with others makes students use, test and sometimes change their thinking abilities.

- **Social Cultural Perspective:** An individual groups and develops through self-activity and this self-activity manifests itself in various forms, for which an individual has a strong desire to build and construct. Children show a natural eagerness to know more about their environment. The natural instincts such as curiosity, fear, and constructing, collecting, fighting, emulation are some of the basis for the formation of character and will of individuals and of communities and nations under the guidance and control of intellect. Human community loving is rather the result of a number of different urges and drives working together and modifying each other. Hence it is evident that one’s social behaviour is the result of a number of native urges, primary and secondary needs, acquired motives and ideals. The behaviour of the child and his learning is influenced by the interaction and communication between the child and its community environment. So, for the well development of an individual, a well organized community is necessary. In order to make healthy adjustments of an individual to others and work in co-operation with them for the realization of common ideals, the school community must have a continuous existence.

Vygotsky (1978, 1997) believed that social interaction, cultural tools and activity shape individual development and learning, just as Ben’s interactions on the beach with his father shaped Ben’s learning about sea creatures, safety, environmental responsibility and geography. By participating in a broad range of activities with others, learners appropriate internalize or take for themselves the outcomes produced by working together; they acquire new strategies and knowledge of the world and culture (Palincsar, 1998). Putting learning in social and cultural context is second wave constructivism (Paris, Byrnes & Paris, 2001). Culture creates
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cognition when the adult uses tools and practices from the cultural values like language, maps, computers, looms or music to steer the child towards goals of the cultural values, reading, writing, weaving, and dance. Cognition creates culture, as the adult and child together, generate new practices and problem solutions to add to the cultural group’s repertoir (Serpell, 1993).

Social perspective focuses on community collaboration. Vygotsky (1978, 1997) claims that our mental functions have their origins in social relationships. The theory lays great emphasis on a group’s common perspective and solutions to problems because they are arrived at through debate, argument, discussion, negotiation and dialectic. This collaboration of a community of learners is seen as indispensable for cognitive growth. According to Vygotsky, this collaboration by groups of learners is the means by which cognitive growth occurs and a provision for it must be made in schooling.

Johnson and Johnson (Learning Together and Alone, 1975), describes that the classroom as a social milieu in which there are a variety of possible forms of social interdependence that strongly affect its members both in terms of what is learned and how learning occurs.

This theory emphasizes teamwork. It is based upon the principle that pupil will work hard on those tasks which fail to yield reward. In Cooperative Learning the teacher employs the approval of other pupils in the group as a reward and expects other pupils to imitate the academic behavior, which is reinforced. Several Cooperative Learning practices are designed to provide incentives (like grades, marks, concrete rewards) for the members to participate in-group effort. In their absence, it is likely that students may not spontaneously help other group members.

- **Historical Perspective:** social constructionists do not focus on individual learning. Their concern is how public knowledge in disciplines such as science, math, economics, or history is constructed. Beyond this kind of academic knowledge, constructionists also are interested in how common-sense ideas, everyday beliefs and commonly held understandings about the world are communicated to new members of a socio-cultural group (Gergen, 1997; Phillips, 1997). Questions raised might include who determines what constitutes history, the proper way behave in public, or how to get elected class president. All knowledge is socially constructed and more important, some people have more power than others to define what constitutes such knowledge. Relationships between and among teachers, students, families and the
community are the central issues. Collaboration to understand a diverse viewpoint is encouraged and traditional bodies of knowledge often are challenged (Gergen, 1997). Vygotsky’s theory, with its attention to how cognition creates culture, has some elements in common with constructionism.

A difficulty with this position is that, when pushed to the extreme of relativism, all knowledge and all beliefs are equal because they are all constructed. There are problems with this thinking for educators.

First, teachers have a professional responsibility to emphasize some values, such as honesty or justice, over others such as bigotry and deception. All beliefs are not equal. As teachers, we ask students to work hard to learn. If learning cannot advance understanding because all understandings are equally good, then, as David Moshman (1997) notes, we might just as well let students continue to believe whatever they believe. Also, some knowledge, such as counting and one-to-one correspondence, is not constructed but universal (Geary, 1995; Schunk, 2000).

➢ BASIC ATTRIBUTES OF COOPERATIVE LEARNING APPROACH:

Over the past 30 years, cooperative groups have been focused on many empirical inquiries. Deutsch’s (1949) definition of cooperation has been used as a guide for structuring many of these investigations. He defined a cooperative social situation as one in which each individual can reach a goal only if all the individuals achieve their goals. When this is attained, the individuals are then said to be promotively interdependent. Deutsch (1969) outlined his view of the initiation of cooperative behaviors. He suggested that cooperative interactions enable the participants to experience a highlighting of mutual interests, coordinated efforts, equal power distribution, trust, helpful attitudes and honest and open communication. In a similar vein, Johnson and Johnson (1975) suggested that cooperative interaction is the coordination of behavior among individuals to achieve mutual goals.

Recently, several investigators have begun an exploration of the interrelationships among aspects of cooperative learning groups and their underlying mechanisms. For example, some investigators (e.g., Slavin, DeVries & Hulten, 1975) have shown that cooperative reward structures increase norms to enhance the attainment of the group’s goal.
Cooperative Learning refers to instructional method in which students work in small groups of four to six members, in a collaborative manner to complete predetermined instructional tasks. In this model, students are placed in small groups of five or six in which each student is given one segment of the day’s lesson and is responsible for teaching it to the other group members. It is the element of structure interdependence that makes this a unique and powerful learning process. By temporarily assuming the role of teacher, each student becomes a valuable resource for the others. Learning from each other gradually diminishes the need to try to outlearn each other, because one student’s learning enhances the learning of the other students instead of inhibiting it. In the cooperative paradigm, the classroom teacher learns to be a facilitating resource person who, instead of lecturing to students, shares in the learning and teaching process with the students. Rather than being passively dependent on the teacher as the sole human resource, each student is required to be an active participant and to be responsible for what he or she learns.

The five basic attributes of cooperative learning approach are:-

- **Positive Interdependence**: It is the perception that one is linked with others in a way that one can not succeed unless the other members of the group succeed and vice versa. Positive interdependence may be structured through common goals or rewards.

- **Face to Face Interaction**: Face to face interaction exists when students orally explain to each other how to solve problems and discuss with each other the nature of concepts being learned. This face-to-face interaction is primitive in the sense that students help, assist, encourage and support each other’s efforts to learn.

- **Individual Accountability**: Individual accountability exists when the performance of each individual student is assessed and the results given back to the group and the individual. Making each student realize that he/she is accountable for completing the assigned task helps to increase each student’s sense of personal responsibility to the group.

- **Collaborative Skills**: Collaborative Skills include leadership skills, decision making, trust – building, communication and conflict management skills. Groups cannot function effectively if students do not possess and use these collaborative skills.
• **Group Processing:** Group processing occurs when groups discuss which actions of the members are helpful or not helpful i.e.;
- how well they are working together towards achieving their goals
- make decisions about processing
- enable the members to receive feedback on their participation and
- facilitate the maintenance of effective working relationships among members.

❖ **Goals of Cooperative Group Learning:**

A goal is an outcome or attainment of an individual striving to accomplish (Locke and Latham, 1990). When students strive to read a chapter or make a 4.0 GPA, they are involved in goal-directed behavior. In pursuing goals, students are generally aware of some current condition, some ideal condition and the discrepancy between the current and ideal situations. Goals motivate people to act in order to reduce the discrepancy between where they are and where they want to be.

According to Locke and Latham (1990), there are **four main reasons** why goal setting improves performance:

- **Goals Direct our attention:** to the task at hand. Every time my mind wanders from this chapter, my goal of finishing helps direct my attention back to the writing.
- **Goals Mobilize effort:** the harder the goal, to a point, the greater the effort.
- **Goals Increase persistence:** when we have a clear goal, we are less likely to be distracted or to give up until we reach the goal.
- **Promote the development of new strategies:** when old strategies fall short. For example, if your goal is making an A and you don’t reach that goal on your first quiz, you might try a new study approach for the next quiz, such as explaining the key point to a friend.

The most common distinction in research on students’ goals is between mastery goals (also called task goals or learning goals) and performance goals (also called ability goals or ego goals) (Midgley, 2001).

The point of a mastery goal is to improve, to learn, no matter how awkward you appear. Students who set mastery goals tend to seek challenges and persist when they encounter difficulties. Because they focus on the task at hand and are not worried
about how their performance measures up, compared to others in the class. These students have been called task-involved learners (Nicholls and Miller, 1984). These people get lost in their work. In addition, they are more likely to seek appropriate help, use deeper cognitive processing strategies, apply better study strategies and generally approach academic tasks with confidence (Butler & Neuman, 1995; Young, 1997; Midgley, 2001).

Performance goals also called as ability goals or ego goal affect learning of individual. Some students don’t want to learn or to look smart; they just want to avoid work. These students try to complete assignments and activities. A final category of goals becomes more important as students get older-social goals. As students move into adolescence, their social networks change to include more peers. Nonacademic activities such as athletics, dating and hanging out, compete with schoolwork (Urdan and Maehr, 1995). Social goals include a wide variety of needs and motives with different relationships to learning, some help but some hinder learning. For example, adolescents’ goal of maintaining friendly relations can get in the way of learning when cooperative learning group members don’t challenge wrong answers or misconceptions because they are afraid to hurt each other’s feelings (Anderson, Holland and Palinscar, 1997). Certainly, pursuing goals such as having fun with friends or avoiding being labeled a nerd can get in the way of learning. But goals of bringing honor to your family of team by working hard can support learning (Urdan and Maehr, 1995).

Several goals of cooperative group learning have been identified in the Literature. Two primary goals identified by Dishon and O, Leary (1984) for students are:

- to assume leadership responsibilities in the group and;
- to participate equally and actively in the group process

Additional goals of Cooperative Learning include: fostering academic cooperation among students; encouraging positive group interactions; increasing academic achievement; developing self-esteem (Slavin, 1983; John and John, 1985; Hike, 1990; Slavin, 1991).
❖ EFFECTIVENESS OF COOPERATIVE LEARNING:

Specific characteristics of cooperative group have been shown to maximize the extent to which these goals are achieved, viz;

- **Heterogeneity of group members:**
  
  Research has shown that effective CL groups include relatively equal proportions of male and female students with diverse socio-economic and minority ethnic groups. Larson and other (1984) found that students who worked on reading assignments in heterogeneous ability groups scored significantly higher on measures of main-idea-recall than did students in homogeneous groups. They concluded that working in heterogeneous groups may benefit low ability students because they are able to observe strategies of high ability students in the group. One characteristic linked to the effectiveness of CL is heterogeneity of group members (Disher and O, Leary, 1984; John and John, 1985; Hilk, 1990; Slavin, 1991). In a study examining helping behaviors, Webb (1991) also found that groups with equal numbers of boys and girls promoted more explaining between students than did same sex groups.

- **Reward Structure:**
  
  A second feature of CL related to effectiveness is reward structure. According to Slavin (1983) the success of CL is highly dependent on the underlying incentive or reward structure. An important aspect of the classroom situation is the manner in which students relate to each other. Cooperative reward-structure situations seem to enhance interpersonal relations (Deutsch, 1949; Johnson and Johnson, 1972; Blanchard, Adelman and Cook, 1974). Recent research indicates that cooperative learning leads to more acceptance, more concern and more trust among the group members; in other words, the members come to value each other more than they do in competitive situations (Johnson and Johnson, 1974; Garibaldi, 1977; Slavin, 1977b). Research at the elemenry school level (Phillips and D’Amico, 1956), at the junior high school level (Gottheil, 1955) and at the college level (Deutsch, 1949) has indicated that cooperation leads to increased liking and better relations among classmates. There are three general types of reward structures students may receive:

  1. **Individual rewards for individual achievement:** Covington and Beery (1976) state that the lack of successful experiences and the scarcity of rewards in many classrooms can lead some students to learn to expert failure. These students...
give up and stop trying to succeed; low self-esteem and low achievement are maintained through negative self-fulfilling prophecies.

2. group rewards for group achievement: The emphasis in cooperative, interdependent interactions, however, is on all participants working together to accomplish a mutual goal. The students support each other in achieving success and this is likely to increase the positive feedback given to the group members.

3. group rewards for individual achievement: Cooperative interactions promote positive self-fulfilling prophecies and students who might be considered losers in traditional classrooms (e.g., Slow-achieving Anglos and minority students) seem to change their attributions about their performance from negative ones to more ego-enhancing ones. This accounts for the improved self-esteem and better achievement found in several studies (e.g., Blaney et al., 1977; Garibaldi, 1977; Lucker et al., 1977; Slavin, 1977b; Geffener, 1978).

- Record structure:

  The third type of feature which is called an independent record structure has proved to be most effective (Slavin, 1983). When students succeed as individuals (it is dependent on the success of other group members), students are more likely to work to ensure that peers learn the material.

- Task Structure:

  The final characteristic to enhance effectiveness of CL is task-structure. Two types of task structures can be incorporated into CL.

  i.) Students may either participate in group study or

  ii.) be assigned specialized individual tasks (task specialization).

  With a group study task-structure, all group members work cooperatively to learn material, solve problems, or final answers to questions. In contrast, when students are given specialized tasks, they are responsible for learning a particular section of material independently and then teaching it to the rest of their group. Both task structures have been more effective than competitive or individualistic methods, although there is little evidence to suggest that one type of task structure is more beneficial than the other (Johnson and Johnson, 1985). Research concerning the differential effectiveness of task structure remains inclusive because most researchers have invested only group study, not both the group study and task specialization.
Further more, task structure is embedded in an interdependent reward structure. Thus reward structure may account for positive outcomes more than task structure does.

**TYPES OF GROUPS IN COOPERATIVE LEARNING:**

Johnson, Johnson, and Holubec’s (1998) theory has identified three types of cooperative learning groups: formal, informal, and base groups:

- **Formal cooperative learning groups** range in length from one class period to several weeks. The teacher can structure any academic assignment or course requirement for formal cooperative learning. Formal cooperative learning groups ensure that students are actively involved in the intellectual work of organizing material, explaining it, summarizing it, and integrating it with existing conceptual structures. They are the hearts of using cooperative learning.

- **Informal cooperative learning groups** are ad-hoc groups that may last from a few minutes to a whole class period. The teacher uses them during direct teaching (lectures, demonstrations)
  - to focus student attention on the material to be learned
  - set a mood conducive to learning
  - help set expectations about material
  - what the lesson will cover, ensure that students are cognitively processing the material being taught, and provide closure to an instructional session.

- **Cooperative base groups** are long-term (lasting for at least a year), heterogeneous groups with stable membership whose primary purpose is for members to give each other the support, help, encouragement, and assistance each needs to progress academically. Base groups provide students with long-term, committed relationships.

**OUTCOME OF COOPERATIVE LEARNING:**

In addition to effective features of CL, researchers who studied elementary school children, have documented several academic and social benefits that resulted from implementing CL techniques (Didhon and O, Leary, 1984; Hilke, 1990; Johnson and Johnson, 1985; Slavin, 1993, 91). Although researchers have focused primarily on academic achievement, there is growing evidence that CL promotes positive affective and social outcomes as well. In their review of research, Johnson
and Johnson (1985) reported that for 35 out of 37 studies comparing cooperative with competitive and individualistic learning, CL promoted the most positive interpersonal relationships among students. Students specifically reported feeling of being liked and supported by other students in their group. Johnson and Johnson also found that CL promotes positive attitude towards the subject matter and towards school in general.

- According to Dishon and O, Leary (1984) cooperative learning improve students social skills such as;
  - initiating interaction,
  - sharing information and ideas,
  - asking questions,
  - following directions and
  - staying on task.

When students engage in appropriate social behaviors, they feel better about themselves and about others in their groups, enjoy time spent together, and produce high quality work. Dishon and O, Leary cautioned, however, that such benefits do not happen coincidentally. Classroom teachers must assume students for using appropriate social skills in groups. Thus the academic and social benefits of CL are likely to lead to higher self-esteem among students as well.

Cooperative Learning activities according to Borich (1992) install in learners important behaviors that prepare them to reason and perform in the adult world. Some of these are:

- **Attitudes and values:**

  Adult learners form their attitudes and values through social interaction. Although we learn much about the world from books, magazines, newspapers and audio-visual media most of our attitudes and values are formed by discussing what we know and think with others. In this manner we exchange our information and knowledge with others who have acquired their knowledge in different ways.

  These attitudes and values are often not provided in our schools. Many classrooms rely only on formally acquired knowledge, with learners competing with grades and re-enforcement. Yet, it is our attitude and values that are one of the most important outcomes of schooling because, they provide the framework for guiding our action outside the classroom. Cooperative learning is important in helping learners
acquire from the curriculum the basic attitudes and values they need, to think independently inside and outside the classroom.

- **Prosocial behaviour:**
  Models of acceptable behaviors that contribute to the common goals of the family, friends and community may not always be available at home today. This is due to the drastic increase in working couples, demanding occupations and single parent household. The quality time at home between adults and children is shrinking as our society becomes more technocratic, impersonal and complex.
  
  With the decreasing presence of adults at home of many school going children, the classroom becomes an important place which provides a substitute for them, when no one is present at home. So, Cooperative learning brings learners together in an executed setting. This can provide appropriate models of pro-social behavior.

- **Alternative perspective and viewpoints:**
  It is no secret that we form our attitudes and values by confronting viewpoints contrary to our own. Our likes and dislikes, the things we aspire to and avoid, come from our exposure to alternatives we could not have thought on our own, given the limitations of our immediate context and experience. These alternatives (some of which we borrow and some we reject) are the raw materials from which we form our own attitudes and values, Cooperative learning provides the context or meeting group where many different viewpoints can be orchestrated, from which we form more articulated attitudes and values.

- **Integrated identity:**
  One of the most noticeable outcomes of social interaction is its effect on how we develop our personalities and learn what we are. If we think and speak one way in one situation and think and speak another way in another situation, we can not help but notice our own inconsistency. We attempt to resolve such contradictions to clarify what we really believed and to believe what we really said. Our personality becomes more coherent and integrated and is perceived by others as more forceful and confident projection of our thoughts and feelings. Our time repeated social interactions reduce the contradictions until our views become singular and consistent.
Cooperative learning can be the start of stripping away of the superficial, irrelevant dramatic appendages that mask our deepest thoughts and feelings.

- **Higher thought process:**

  Critical thinking, reasoning and problem solving can not occur outside the context of attitudes and values prosaically behavior alternative identity. Cooperative learning provides the ingredients for higher thought processes to occur and sets them to work on realistic and adult like tasks.

  These higher thought processes required for analyzing, synthesizing and decision making are believed to be stimulated more by an interaction with others (peers and adult) than by books and lectures which are typically non-interactive. Books and lectures may be useful for teaching knowledge and application but they seldom are sufficient to bring about the private speech required for thinking critically, reasoning and problem solving. These behaviors require interaction with others as well with one self to unleash the motivation required for thinking and performing in complex ways. The model for cooperative learning has been illustrated in the following paradigm:

*Fig 1.2f: Model of Cooperative Learning (Borich, 1992)*
❖ GUIDING PRINCIPLES FOR IMPLEMENTING CL:

For successful implementation of CL the following guiding principles should be followed:

- **Definite task structure:** A specific learning task should be assigned to the learner’s group so that group interaction has a particular direction.
- **Assistance in problem solving:** Group members especially the higher ability level students should be encouraged to assist others in solving problems.
- **Supportive Learning Environment:** The group should provide a supportive learning environment in which any group member has freedom to unhesitatingly seek assistance from other members.
- **Division of Labor:** There should be assignment of specific tasks to various group members so that all members get an opportunity of active participation.
- **Group Acceptance:** Group should be formed in such a manner that each member of the group accepts and is accepted by other members of the group. Social environment and interaction pattern in the class must be taken into consideration while implementing CL in the classroom.

➢ PROCESS OF COOPERATIVE LEARNING

The essential elements of cooperative learning are the appropriate use of interpersonal and small group skills. In order to coordinate efforts to achieve mutual goals, students must:

1. get to know and trust each other,
2. communicate accurately and unambiguously,
3. accept and support each other and

Placing socially unskilled students in a group and telling them to cooperate does not guarantee that they have the ability to do so effectively. We are not born instinctively knowing how to interact effectively with others. Interpersonal and small group skills do not magically appear when they are needed. Students must be taught the social skills required for high quality collaboration and be motivated to use them if
cooperative groups are to be productive. The whole field of group dynamics is based on the premise that social skills are the key to group productivity (Johnson and F. Johnson, 1991).

The more socially skillful students receive more attention. Teachers play the role to teach and reward the use of social skills on the higher achievement that can be expected within cooperative learning groups. In their studies on the long term implementation of cooperative learning, Lew and Mesch (Lew et al., 1986a, 1986b; Mesch et al., 1988; Mesch et al., 1986) investigated the impact of a reward contingency for using social skills as positive interdependence and a contingency for academic achievement on performance within cooperative learning groups. In the cooperative skills conditions, students were trained weekly in four social skills and each member of a cooperative group was given two bonus points toward the quiz grade if all group members were observed by the teacher to demonstrate three out of four cooperative skills. The results indicated that the combination of positive interdependence, an academic contingency for high performance by all group members and a social skills contingency promoted the highest achievement.

Another essential component of cooperative learning is group processing. Effective group work is influenced by whether or not groups reflect on how well they are functioning. A process is an identifiable sequence of events taking place over time and process goals refer to the sequence of events instrumental in achieving outcome goals (Johnson and F. Johnson, 1991). Group processing may be defined as reflecting on a group session to:

1) describe what member actions were helpful and unhelpful, and
2) make decisions about what actions to continue or change.

The purpose of group processing is to clarify and improve the effectiveness of the members in contributing to the collaborative efforts to achieve the group’s goals.

While the teacher systematically observes the cooperative learning groups, he or she attains a window into what students do and do not understand as they explain to each other how to complete the assignment. Listening in on the students’ explanations provides valuable information about how well the students understand the instructions, the major concept and strategies being learned and the basic elements of cooperative learning.

There are two levels of processing; small group and whole class. In order to ensure that small group processing takes place, teachers allocate some time at the
end of each class session for each cooperative group to process how effectively members worked together. Groups need to describe what member actions were helpful and not helpful in completing the group’s work and make decisions about what behaviors to continue or change. Such processing:

- enables learning groups to focus on maintaining good working relationships among members,
- facilitates the learning of cooperative skills,
- ensures that members receive feedback on their participation,
- ensures that students think on the metacognitive as well as the cognitive level and
- provides the means to celebrate the success of the group and reinforce the positive behaviors of group members.

Some of the keys to successful small group processing are allowing sufficient time for it to take place, providing a structure for processing, emphasizing positive feedback, making the processing specific rather than general, maintaining student involvement in processing, reminding students to use their cooperative skills while they process and communicating clear expectations as to the purpose of processing.

In addition to small group processing the teacher should periodically engage in whole class processing. When cooperative learning groups are used the teacher observes the groups, analyzes the problem which they have been working together and gives feedback to each group on how well they are working together. The teacher systematically moves from group to group and observes them at work. A formal observation sheet may be used to gather specific data on each group. At the end of the class period the teacher can then conduct a whole class processing session by sharing with the class the results of his or her observations. If each group has a peer observer the results of their observations may be added together to get overall class data.

An important aspect of both small group and whole class processing is group and class celebrations. It is feeling successful appreciated and respected that builds commitment to learning enthusiasm about working in cooperative groups and a sense of self efficacy in terms of subject matter mastery and working cooperatively with classmates.
Introduction

An individual could take on more than one group role and that the group roles remained consistent across group members unless there was a change in one of the following four categories, all of which were related to the processes of group learning:

1. Context
2. Perspectives
3. Goal-Oriented Strategies
4. Social Structure

Context refers to the environment in which the group work took place. The coding system included the following examples codes that emerged with this category: ethnic make-up of the group, gender of group/class, the location of group in the classroom, attendance of group members and the instructor as a source of information. The context has been found to be directly related to group roles in many situations. For example, one situation that occurred frequently was a group that found itself with an absent member. This changed the nature of the context and therefore the students had to adapt to the change by accepting different processing roles than they were used to performing.

Perspectives were the attitudes students had about themselves in the context of the group and group work in general. This category was broken down into codes concerning students’ attitudes towards the class/activity, serious/humorous attitude, shared/different views based on ethnic background/gender, attitudes towards each other and accepting/rejecting group members. Research revealed that there were very rare occasions where student perspectives were observed to be changing as a function of group roles.

Goal-Oriented Strategies were the approaches students took when working in groups in order to meet their goals. The strategies category was further broken down into two subcategories: individual student strategies and group strategies. Examples of codes related to student strategies were intra-group interaction use of resources such as tools and using the teacher and/or other students within the group as a resource. Group strategies were defined as collectively choosing the best answer. These subcategories frequently interacted with one another. For instance, group members often turned to the instructor for hints concerning their task and incorporated these hint with other resources (such as the textbook) to arrive at the best answer.

Social Structure was defined as the types of interaction behaviors observed among group members. Examples of codes falling under this category were off-task
behavior, social goals and teasing behavior. Off-task behavior was frequently recognized as a behavior of non-contributors. These individuals frequently had stronger social goals than task goals. Teasing behavior was usually an indication of liking other group members and was done playfully rather than in a mean spirit.

METHODS OF COOPERATIVE LEARNING:

The most extensively researched and widely used cooperative learning techniques are the student team learning methods developed by Robert Slavin, David DeVries and Keith Edwards and Slavin, (1980b). Three of these student team learning methods are now in widespread use. These are:

- **Student Teams Achievement Divisions (STAD)**
- **Team Games Tournament (TGT)** and **Jigsaw II**.
- A fourth, **Team Assisted Individualization (TAI)**, has been more recently developed and evaluated.

**Student Teams Achievement Divisions (STAD):** In Student Teams Achievement Divisions, or STAD (Slavin, 1978b), students are assigned to four or five member learning teams. The teams are made up on high, average and low performing students, boys and girls, and students of different racial or ethnic backgrounds, so that each team is like a microcosm of the entire class. Each week, the teacher introduces new material in a lecture or discussion. The team members then study worksheets on the material. They may work problems one at a time in pairs, take turns quizzing each other, discuss problems as a group, or use whatever means they wish to master the material. The students are given worksheet answer sheets, so it is clear to them that their task is to learn the concepts, not simply to fill out the worksheets. Team members are told that they are not finished studying until they and their teammates are sure that they understand the material.

Following team practice, students task quizzes on the materials they have been studying. Teammates may not help one another on the quizzes; at this point they are on their own. The quizzes are scored in class or soon after class. These scores are formed into team scores by the teacher.
The amount each student contributes to his or her team is determined by the amount of the student’s quiz score. A base score is set at five points below each student’s average and students earn points, up to a maximum of ten, for each point by which they exceed their base scores. Students with perfect papers always receive ten points maximum, regardless of their base scores. This individual improvement score system gives every student a good chance to contribute maximum point to the team.

- **Teams Games Tournaments (TGT):** Teams Games Tournaments or TGT (DeVries and Slavin, 1978, DeVries, Slavin, Fennessey, Edwards and Lombardo, 1980) uses the same teams, instructional format and worksheets as STAD. However, in TGT students play academic games to show their individual mastery of the subject matter. The game rules are illustrated in Figure 1.3f (from Slavin, 1980b).

These games are played in weekly tournaments. Students compete in the tournaments with members of other teams who are comparable in past performance. The competitions take place at tournament tables of three students. Thus high performing students form the “Fantastic Four” might compete with a high performer from the “Pirates” and one from the “Superstars”. Another table might have average...
performing students from the “Pirates” the “Masterminds” and the “Chiefs” and
another could have low performers from the “Superstars”, “Tigers” and
“Masterminds”. The Students are not told which is the highest table, which is next and
so on but they are told that their competition will always be fair. While teams stay
together for about six weeks the tournament table assignments are changed every
week according to a system that maintains the equality of the competition. The high
scorer at each table is moved to the next higher table for the next tournament and the
low scorer at each table is moved to the next lower table. This equal competition
makes it possible for students of all levels of past performance to contribute
maximum points to their teams if they do their best in the same way as the individual
improvement score system in STAD makes it possible for everyone to be successful.

- **JigsawII method:** In Aronson’s (1978) Jigsaw method students are assigned to
  six member teams. Academic material is broken down into five sections. For
  example a biography might be broken into early life first accomplishment major
  setbacks later life and world events during his or her life time. Each team member
  reads his or her unique section except for two students who share a section (so that
  if one student is absent, all five topics can still be covered). Members of different
  teams who have studied the same sections meet in expert groups to discuss their
  sections. Then the students return to their teams and take turns teaching
  teammates about their sections. Since the only way students can do the sections
  other than their own is to listen carefully to their teammates, they are motivated to
  support and show interest in each other’s work. Jigsaw does not actually use a
  cooperative incentive structure. Following the team reports students may take
  individual quizzes covering all of the topics and then receive individual grades on
  their quizzes. However, Jigsaw is classed as a cooperative learning method
  because it uses a cooperative task structure that creates a great deal of
  interdependence among students.

  A modification of Jigsaw was developed by Slavin (1980b) and incorporated
  in the Student Team Learning program. In this method called Jigsaw II students work
  in four to five member teams as in TGT and STAD. Instead of each student having a
  unique section all students read a common narrative such as a book chapter a short
  story or a biography. However, each student is given a topic on which to become an
  expert. The students who had the same topics meet in expert groups to discuss them

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and then return to their teams to teach what they have learned to their teammates. Then students take individual quizzes, which are formed into team scores. Improvement scores are used to form team scores and the highest scoring teams and individuals are recognized in a class newsletter. Jigsaw II unlike original Jigsaw uses cooperative incentives (recognition or grades) as well as cooperative tasks.

- **Team Assisted Individualization (TAI):** Team Assisted Individualization (TAI) is the most recently developed of the Johns Hopkins Student Team Learning methods (Slavin, Leavy and Madden, 1982a). It is a combination of team learning and individualized instruction applied to the teaching of mathematics. In TAI students are assigned to 4-5 member heterogeneous teams as in STAD and TGT. After being placed in the appropriate unit by means of a diagnostic test each student works through a set of programmed mathematics units at his or her own pace. Students follow a regular sequence of activities, involving reading an instruction sheet working on successive skill sheets that break the skill into fine subskills taking a checkout to see if the skill has been mastered and finally taking a test. Teammates work in pairs of their own choice exchanging answer sheets and checking each other’s skill sheets and checkouts. When a student has passed a checkout with a score of 80% or better, he or she takes a final test which is scored by a student monitor. Students’ test scores and the number of tests they can complete in a week go into a team score and team members receive certificates for exceeding preset team standards. Because of this preset standard many number of teams can receive certificates.

  Because all skill sheets and checkouts are scored by students and monitors score teammates and all tests. The teacher is able to work with individuals and small groups on problems they are having or to prepare them for upcoming units.

  TAI is unique among all cooperative learning methods in its use of individualized, instead of class-paced instruction. It was developed to be used when a class is too heterogeneous to be taught the same material at the same rate especially when there are mainstreamed children who need the positive social interaction that takes place in the teams but also need to have material at their own level.

  In the present investigation Team Assisted Individualization (TAI) method was used for cooperative learning for experimental group.

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Individualistic Learning

Instruction is said to be individualized when it successfully takes into account differences in the learning aptitude found in students of a given age or grade. Critics have charged that conventional teaching ignores such differences and have often proposed replacing it with a more individualized approach. Some have recommended alternative forms of classroom organization, such as ability grouped class, non-graded class programmes of rapid promotion and open classrooms. Others have recommended extensive use of individualizing technological aids, such as programmed instruction, computer based teaching, individualized assignment learning modules, learning contracts and individual projects. According to Kulik (1982) all of these alternatives can be and have been discussed as Individualized Instruction.

Individualized instruction is perhaps one of education’s most misunderstood terms. Many teachers, elementary and secondary, have discovered learning centers to be one of the successful ways to meet individual learning needs of students. It is imperative, when applying specific solutions, namely the learning center approach to an instructional problem of meeting the varied needs of students, that practitioners should have a clear understanding of the concept of individualized instruction.

In very simple terms, individualized instruction is concerned with meeting the educational needs of a variety of students with a wide assortment of needs. In order to meet this challenge, students must be introduced to learning experiences, which are compatible with his or her individual learning style. For example, some students master new information better if it is presented to them visually as in a filmstrip or photograph. Others will learn the same information to a mastery level easily by reading written text. Still others may learn new information most efficiently when it is presented to them orally. Students should be given the opportunity to discover how they learn best. They must be given a multitude of learning experiences so that they may discover their individual learning style.

There could be many compelling reasons why instruction in the classroom must be individualized. Some of these reasons have been given below:

- It fits in with democratic principles.
- It caters to different learning styles, cultural diversities, individual interests,
abilities, skill levels, talents and temperaments.

- It nurtures creativity and diversity. To teach towards creativity is to teach towards the future of our society.
- It helps to develop self-concept, self-discovery, self-understanding, self-determination and self-actualization.
- It makes students independent and life long learners.
- It teaches Critical Thinking-by making them think for themselves, by encouraging them to question, by evaluating information, alternatives and options in today’s complex and conflict-ridden world.
- It creates intrinsic motivation.
- It challenges the individuals.
- It facilitates the most efficient way to education if one focuses on the end product rather than just the process.
- It helps us achieve the development of the individual to his or her fullest capability or potentiality.
- It assures success for all kinds of learners by personalizing learning.
- It teaches students to engage effectively in the process of decision-making.

Instruction is individualized to the extent that it adjusts to differences in learner. Instructional systems combine organized collections of subject matter content with procedures and rules for presenting the content to bringing about learning outcomes.

Individualization of instruction has been viewed as a key component of instructional effectiveness since at least the fourth century B.C. Kilik, 1982; Wang and Lindvall, 1984; Corno and Snoe, 1986; Reises, 1987.

B.F. Skinner (1954) and Gilbert (1958) observed that it was difficult to make students learn in-groups because of their individual differences.

Programmes are tailored to the learning speed of the individual students with as much practice as he needs. He can work individually and independently and as a consequence, recognize the fruits of his own labour. The teacher is free from the burden of providing information individually to all students. The fact that students work individually and independently without needing teacher’s help makes such instruction individualized.

Individualized instruction requires that students be placed individually within a curriculum or sequence of objectives, and that teaching methods be prescribed so as
to maximize individual growth and accomplishment. Both elements placement and prescription are essential to the process. It can be said that individualized method of instruction tends to emphasize the acquisition of the basic facts and skills in various subjects.

In conclusion there are general suggestions to be observed in individualized instruction:

- The promotion should be according to work or subject completed. It should be individual rather than general.
- The pupil should have accurate and well-kept records of his accomplishments or achievements.
- The pupil should be allowed to work at his own rate of speed and ability.
- The pupil should be given enough time for the completion of the unit.
- The curriculum should be graded into units of increasing difficulty, each measurable by achievement tests.
- Every pupil should be furnished with complete instructional materials that can be accomplished individually, and with corresponding self-administering tests.

Assumptions of Individualised Instructional Plans:

For years educators have attempted to find means to individualized instruction. Grouping practices, tracking schemes, project work, independent study, nongraded systems, dual progress plans, continuous progress plans and remedial systems have all been attempted to adapt to student differences. Cronbach (1967) has identified five patterns for describing education systems and their adaptability to the individual. He established a set of goals and learning outcomes with a variety of Instructional Techniques and resources with time to reach the desired competencies varying from student to student, most closely represents the intent of most individualized programs currently in use. Most programs seem to have the following assumptions in common:

(a) They can be adaptive to the abilities, interests, backgrounds and needs of the student.
(b) They can provide optional means for different students to achieve the same goals.
(c) They can provide the opportunity for different students to pursue different goals and to differing degrees of attainment.
(d) The goals to be attained by the student are individually planned.

Due to the complex nature of most of the systems developed to adapt to learner differences, program developers have turned their attention to improving; learning materials; strategies for teaching; environments for learning; procedures to involve students in their own goal planning and organizational arrangements to facilitate shared planning, decision making and instruction. At the same time evaluators have turned their attention to developing better conceptual schemes for instructional evaluation including the study of factors related to student outcomes (Cooley and Leinhardt, 1975; Rosenshine, 1976).

Outside the field of education the word programme has come to mean either
(a) a listing of a series of events, such as the items in a concert or a show or
(b) the series of events themselves, considered collectively or
(c) a definite plan for an intended set of proceedings or performance.

Something is said to be programmed if there is a predefined sequence of events that has been planned in advance. In particular, the term is used to describe distinctive segments of radio and television transmissions which have been separately scripted and are capable of being repeated in recorded form. These are called radio or television programmes and distinct sets of instructions for computers to execute, these are called computer programs. In both broadcasting and computing contexts it soon became normal to distinguish between hardware (machines, devices, instruments, etc.) which was the responsibility of engineers and software (content, instructions, materials, etc.) which was the responsibility of communications specialists or information scientists. A program was a unit of software that was planned as a discrete entity and could be used independently of other programs. When Skinner and Crowder began to experiment in the mid-1950s with different types of teaching machines, it was natural for them to describe the rolls of paper or film which carried their information for students as programmes and the process of preparing these instructional sequences as programming. So, when Glaser, (1960) devised a means of presenting Skinnerian programmes in book format, they called their new product a paper teaching machine or sensing that this term might cause some confusion, a
programmed textbook. This new term did not resolve the definition problem because, according to the earlier definition, all textbooks could be regarded as programmed in some sense.

Though there had been earlier work of relevance, the man who brought programmed learning into prominence was B. F. Skinner, whose publications between 1954 and 1968 commanded the attention of the scientific and educational communities and even the general public. Unlike many educational innovations, Skinner’s work was based on a clearly articulated theory of operant conditioning. According to this theory, behaviour is only learned if it is immediately reinforced, that is, followed by some pleasurable event such as food, praise or attention. So the task of the programmer or indeed any teacher, is to arrange the contingencies of reinforcement so that correct responses to some questions or assignments are immediately rewarded whilst incorrect responses are not rewarded.

Skinner’s early teaching machines shared certain common features. Only one step in the instructional sequence appeared at a time. This came to be called a frame, as it appeared in a frame or window on top of the machine and was limited in length by the size of this window to about 30 words. Each frame demanded an overt response from the students, viz: writing a word, punching a hole or pressing a key, according to the type of machine. The student then discovered if he or she was correct by comparing the answer with the correct one, when he or she turned the roll or in the case of punched responses, by the automatic presentation of the next frame. The student’s responses are nearly always correct if the programme has been properly prepared by good design and testing and revision. Confirmation of this correctness is assumed to be reinforcing. The student can work at his or her own pace and gradually acquired the chunk of knowledge that the programme is designed to teach.

The principle features of these Skinnerian or linear programmes (because each student follows the same linear sequence of frames) are:

(a) Division of the subject matter into a logical sequence of small steps,
(b) Revision of this sequence until the error rate is low,
(c) Overt responding by the student,
(d) Immediate confirmation of the correct response,
(e) An individual mode of working which allows students to proceed at their own rate.
Introduction

Thirty years earlier Pressey (1926) had designed a series of self-teaching devices based on different principles from those of Skinner but these aroused little interest at that time. Pressey had noted that students can learn from the experience of taking tests, especially when provided with immediate feedback on their performance. So he devised a testing machine which required students to press keys to answer multiple-choice questions and only presented the next question after correct key had been pressed. The assumption was that, after students had been exposed to some initial instruction either written material or a conventional lecture or lesson they would consolidate their learning by going through an appropriate machine presented test until they had mastered all the questions and ceased making any mistakes. The crucial distinction between Pressey and Skinner was that while Skinner treated errors as something to be avoided, Pressey regarded them as useful feedback to the student. A further development of Pressey’s position was to use errors to direct the student to an appropriate explanation or remedial sequence and this was initiated by Crowder (1954).

Crowder’s background was in training troubleshooters to find malfunctions in electronic equipment where he soon found that the coach and pupil method was the most successful. However, there was a scarcity of coaches; so Crowder attempted to automate the coaching procedure by devising a simulated tutor. This was achieved by giving the student some information, asking a multiple-choice question and then providing a different response for each answer chosen. Thus students proceeded through a programme along different routes or branches and care could be taken to see that they understood each point before they proceeded to the next.

Typically, Crowder’s frames were much longer than Skinner’s and he presented new material through a paragraph at a time. When he turned to education, he chose topics from secondary school mathematics and computing. The approach to instruction was not shaping behaviour but explanation and reasoning. This appealed more to sophisticated adults and to brighter students for whom getting easy questions right was more tedious than reinforcing.

From 1960 researchers embarked on experiments to compare linear with branching programmes and to investigate design variables such as step size, error rate and response mode, which developers concentrated on training programmers and writing programmes. Implementing programmed learning in schools and colleges drew attention to the major problems of matching the right student to the right
programme and managing classes where students did not all proceed at the same rate. After the initial excitement of the pioneering decade 1954-1964 a more mature, reflective and practical range of approaches developed.

❖ PREPARING A PROGRAM:

_Skinner and Holland (1958)_ described the initial stages of preparing a programme to teach verbal knowledge in the following terms:

- **Specifications of a course**: The programmer must know what verbal behavior, the student is to have in his repertoire after completing the course and how precisely and extensively he is to talk about the field.

- **Knowledge previously acquired**: The student is assumed to possess some verbal behavior in the area before he starts the course. This must be stated and the programmer must not at any time appeal to material not included in the statement or not provided by earlier parts of the program.

- **Ordering the knowledge to be acquired**: At each step the programmer must ask, What behavior must the student have before he can take this step? A sequence of steps forms a progression from the initially assumed knowledge up to the specified final repertoire. No step should be encountered before the student has mastered everything needed to take it.

- **Listing the terms**: Before writing frames for each set, the programmer should make lists of (a) the terms to be covered, (b) the processes or principles, (c) a wide range of illustrative examples.

These developments were relatively simple extrapolations from Skinner’s original procedures, for it was not until the third and fourth stages of programme preparation that major problems arose. Here it was soon realized that Skinner’s ideas about “ordering the knowledge to be acquired” and “listing terms” provided insufficient guidance for the programming of complex conceptual material. Nor could the stages be readily separated. The term “task analysis” was imported from the industrial training field to describe the difficult but crucial stage of programme preparation. Though some authors are prone to present their views without much modesty, task analysis remains an area where there is little general agreement on the appropriate approach.
Two quite distinct approaches have evolved to classification by knowledge type: one is based on Bloom’s *Taxonomy of Educational Objectives* and various developments of it many of them subject specific (Bloom *et al.*, 1971) the other is based on the typologies of learning psychologists which seek to differentiate between such categories as discriminations, chains, concepts and principles (Gagne, 1977).

The greatest contribution of programmed learning was probably attitudinal. Programmers accepted that it was their responsibility to get their programmes to work for any student in their target population. Hence the focus of developmental testing was on course improvement and it was not until a later validation stage that they sought firm evidence of the effectiveness of their final version (Markle, 1967). Clues for revision were more important in the earlier stages than statistics and programmers soon found that more useful feedback was gained from intensive work with individual student than from large-scale testing. This allowed them to discuss mistakes and to try out alternative explanations on the spot. Indeed one group of lean programmers suggested changing the usual programme writing sequence to:

(a) prepare a sequence of criterion frames
(b) tutor a few students through these frames, recording the dialogue on audiotape
(c) use this experience to write the first draft of the programme.

Among the alternative approaches there is a focus on a more individualized approach to instruction, where the traits of the individual learner are given more consideration. Each approach to individualizing instruction is different but they all seek to manipulate the three following fundamental variables:

- **Pace**: the amount of time given to a student to learn the content.
- **Method**: the way that the instruction is structured and managed.
- **Content**: the material to be learner.

Most proponents of individualized instruction saw the computer as a way to further improve the design and delivery of individualized instruction now in an electronic environment. With the advent of the computers, came the potential to deliver individualized instruction in a more powerful way. This potential was anticipated long before the proliferation of the home computer. John E. Coulson, 1970; Stressed that a modern computer has characteristics that closely parallel those
needed in any educational system that wishes to provide highly individualized instruction.

CAI became the forerunner in individualized instruction during the 1980s and early 1990s, as the home computer became more powerful and less expensive. The changes that the computer environment helped to make, were predominantly a change in the delivery mechanism of individualized instruction, rather than a fundamental change in purpose or method. In a sense, the computer, especially the home computer, offered a convenience that other delivery mechanisms lacked. This convenience was accelerated with the proliferation of the Internet in late 1990s. Starting as an extension of computer based instruction, online education became increasingly popular and eventually began to supplant CAI as the predominant form of individualized instruction.

Programmes could be used as supplementary resources on an occasional basis or the instructional systems which were used but would have to be redesigned. Though using programmes for occasional topics and occasional students was compatible with existing classroom practice, the problems of selecting, purchasing and maintaining teacher awareness of what was available were considerable.

Many people now regard programmed learning as a historical curiosity. Yet some of its products still rank amongst the most useful and effective materials available. The term is still associated with the low-quality programmes that flooded the market in its early days, while many of its ideas have been incorporated into other new approaches to individualized learning. The corpus of literature on programmed learning is a major contribution to instructional design and designers still have much to learn from careful inspection of some of its most successful products.

❖ CHARACTERISTICS OF INDIVIDUALISTIC LEARNING:

In the study of Thomas L. Good and Jere E. Brophy (1987) has mentioned some of the most important characteristics of individualistic learning as follows:

- General competence and aptitude
  - Does the student process and comprehend information rapidly?
  - What is the student’s cognitive style?

- General developmental level
  - Is the student preoperational?
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- **Reading ability**
  - How effectively does the student process written information?
  - Often closely related to aptitude, but not always

- **General personality adjustment**
  - Is the student peer-oriented?
  - Anxious?
  - Dependent?

- **Work mode preference and general work habits**
  - Does the student prefer to work alone, with the whole class, or in small groups?
  - Does he/she prefer written or verbal performances?

**Student Aptitude:**

Aptitude makes a difference. Brighter students can process information quickly; less capable students need more time to assimilate and integrate material. Fast students can watch a demonstration and perform; slow students need to manipulate objects themselves and need several examples. Similarly, bright students often enjoy difficult assignments; less capable students prefer easy assignments.

**Student Developmental Level:**

The developmental stage of students has important instructional implications. Younger children’s attention span are shorter than those of older students, and they generally need relatively short lessons and frequent reviews. Very young children need rest periods built into the school day. Older students can benefit from longer assignments, more complex choices, and more independent work. Preoperational students need numerous concrete examples; students at certain developmental stages avoid members of the opposite sex, but a few year later the opportunity to work with members of the opposite sex in small groups may be highly motivating for some learning tasks, such as those that are not very complex and do not demand total attention. Young students generally want to please adults; subsequently, peer expectations and influences and influences rival adult influences.
• **Student Reading Level:**

Reading level may seem to be an obvious consideration, yet many teachers with students who vary considerably in reading ability try to implement individualized programs with reading assignments that are similar in difficulty. In such instances, the materials will be much too demanding for some students and too easy for others. Teachers who employ many individual assignments that require students to read material, directions, and so forth on their own need to be especially alert to the need for materials that vary in reading difficulty. Teachers who use individual assignments must also consider students’ general abilities and desire to work independently.

• **Students Personality and Work Habits:**

Student personality is also a major consideration in assessing whether or not a learning environment will be successful. Dependent students seek teacher structure and support; independent students want little of either. Some students want to be with peers; others are more introverted and prefer more solitude. A student’s personality also influences the degree, frequency, and type of feedback that is need or preferred.

Preferred work mode depends to some extent on student personality (dependent students prefer to be with the teacher), but some work styles are independent of personality and aptitude or cognitive style. For example, some students enjoy writing reports and stories but dislike answering questions; other students have the opposite preference. Some students prefer a variety of working assignments; other students like only one mode (whole class, individual, and so forth).

Work habits are also important considerations. Some students are careless and poorly organized. Other students are enthusiastic bookkeepers but somehow cannot alter such work habits. Learning activities will have to be designed with this in mind. In the meantime, such activities will have to be minimized and carefully monitored.
Personality with its great interesting features has emerged as a major field of probing throughout the history of mankind. Personality includes those underlying relatively stable, psychological structures and processes that organize human experience and shape person’s actions and reactions to the environment. Personality refers to the impression, which an individual makes upon others, to those characteristic attributes, which make an individual stand out from others, which make him attractive or non-attractive. So, personality represents the sum total of that, an individual is, of everything that constitutes a person’s physical, mental, emotional and temperamental make up. Our experiences, memories, knowledge, day-dreams, study, learning, habits, thoughts, attitudes, beliefs, sentiments, intelligence, goals and ideas, in fact all that we are and all that we hope and aspire to become, constitute our personality. Our taste, our understanding, our enthusiasm and ambitions, our principles of life, and conduct, and the like colour our personality, which makes it unique. Each individual differs from others in one or the other aspect. Personality is the product of its own functioning. What we do today, depends on our accumulated experiences of past. These experiences are accumulated by continuous interaction with external environment.

Personality may be described as collection of traits. These traits are consistencies in the characteristic modes of behaviour by an individual in diverse settings. So, it is distinguishable, relatively ending way in which one individual varies from other as helpful, honest, lazy etc. Various psychologists have tried to explore the personality based on various traits. Depending upon these studies various factors have been discovered. Perseverance or Persistence represents one of the variables representing these factors. I. Kunt and W. Wundt (1903) gave the human typology depending on four major variables i.e. emotional, non-emotional, changeable and unchangeable. They took persistence/perseverance as one of the characteristics describing the variables-unchangeable and non-emotional. Fernald (1912) said success or failures of an individual depend largely on ability to endure and to continue to strive for the sake of achievement in spite of fatigue and discouragement. According to Woodworth (1918) and Holt (1931), it is the capacity for work, which determines the extent to which an individual may exert himself. Ryans (1938) called it as persistence or endurance which appears as a general activity, to be a general
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native capacity of organism for continuous energy release. Thonton (1939) stated that in school work there is a good reason to believe that persistence or sticking to a task, is one of the main factors that helps to supplement or compensate for ability. Persistence is also a prime factor of success in the work-a-day world. Even Eysenck (1947) supported this view, among the qualities, which make for the efficient use of a person’s abilities, is his persistence.

Albert Einstein (1949) once defined insanity as doing the same thing over and over again, but expecting a different outcome. His comment is a great place to begin thinking about what it means to be Persistent.

Similarly, Eysenck (1951) while describing organization of personality took two aspects into consideration as introversion and extraversion. He took persistence as one of the characteristics to explain introversion. Edwards (1954) gave 16 factors describing the personality and took endurance as one of the factors. Mac Arther (1955) defined persistence as quality by virtue of which an individual continues steadfast pursuit of an aim in spite of difficulties or obstacles. Cattell (1957) did the factor analytic studies of personality and discovered A-O (15) factors. One of these actors (D) i.e. excitability and insecurity described persistence as one of the characteristics.

Carroll (1963) defined persistence as the time a person is willing to spend learning. Persistence is related to student attitude and interest in learning. According to Husen (1967) Persistence or Perseverance is not fixed; increasing the frequency of reward and evidence of learning success can increase it. Even the need of persistence can be decreased by high quality of instruction.

Persistence is regarded as a mental attitude, which arises as the result of definite environmental situation that would tend to hinder the free unfolding of a course either begun or planned by an individual.

According to Sinha, D. (1970) Perseverance is considered to be one of the motivational variables, here persistence or perseverance implies a strong drive and level of motivation. It is a condition reflected in continuance of an activity inspite of failures. In general persistence is related to student’s attitude and interest in learning.

According to Arthur Costa and Bena Kallick (2000) persisting is one of the Habits of Mind associated with intelligent behavior. Persistence is a set of teachable behaviours for approaching problems, challenges and for working to reach other academic or non-academic outcomes. Persistence is used to describe the individual
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student’s efforts to seek encouragement and support to persevere in his/her studies despite the challenges that he/she may face (Louise Horstmanhof & Craig Zimitat, 2003).

To persist is to continue trying to accomplish a task in spite of difficulties, influences, opposition or discouragement. In other word, to go on resolutely or stubbornly (Marriam Webster Collegiate Dictionary, 2005).

➢ Characteristics of Persistence:

Ryans (1938) did factorial investigations of persistence using eighteen measures for persistence. He found three factors and interpreted one of them as persistence factor.

Thonton (1939) identified five aspects of persistence as follows:
- discomfort to achieve a goal (WD);
- keeping on at a work (PI);
- sex strength;
- feeling of adequacy;
- mental fluency.

Eysenck (1957) said that persistence is another trait found to discriminate between extraverts and introverts, a difference, which demands to be derived from his theory. From Eysenck (1960b), the direction of the difference between the personality tests can be clearly predicted; that the normal are more persistent as compared with neurotics, as measured on leg test. In general theory of extraversion-introversion, Eysenck (1960), extroverts build up reactive inhibition more quickly than introverts and dissipate it more slowly. So, it is expected from this that extraverts would be more persistent on a physical task and less on mental task than introverts who take less pauses and less signals. The data obtained on hand dynamometer showed that the more extraverted individuals were found to be significantly more persistent than introverts.

With regard to physical persistence Costallo and Eysenck (1961) predicted, on the basis of Eysenck’s (1947, 1957) general theory and drug postulate that the extraverted individuals have more of cortical inhibition and less of cortical excitation as compared to their counterpart, introverts have less of cortical inhibition and more
cortical excitation. Thus, the resulting physical persistence was greater in the extroverts than in introverts.

The Instructional Services developmental education program at Southern Illinois University Edwardsville, draws its practices from theoretical perspectives that focus on student attrition as well as those that focus on student-centered learning and development. Hackman and Dysinger (1970) found that students with lower competence but with moderate to high commitment tended to persist unless forced out due to failing grades.

Braxton et al. (1997) indicated that the following five perspectives account for constructs about college student’s Persistence:

- **Economic**: This focused on the costs of college attendance weighed against future fiscal benefits. In other words, will the investment pay off down the road? If so, then to what degree?
- **Societal**: This focused on the societal factors that influence student dropout. Like, how many friends did the student make during orientation week? What kind of peer support system, student had in place?
- **Psychological**: This focused on the maturity of psychological characteristics as related to persistence.
- **Organizational**: This focused on organizational characteristics as related to student dropout. Lack of campus activities, large class sizes, and inadequate staffing were just a few of organizational issues.
- **Interactionist**: This focused on the interaction between the student and the college. Key to this approach was the value that the student placed on formal and informal levels of the college community.

Wehlage (1997) believed that there were four core values that together constitute a positive teacher culture facilitating engagement for students.

- Teachers accepted personal accountability for student success.
- Teachers believed in practicing an extended teacher role.
- Teachers accepted the need to be persistent with students who are not ideal pupils.
- Teachers expressed a sense of optimism that all students can learn if one builds on their strengths rather than on their weaknesses.
Arthur Costa (2000) experiences on teaching Habits of Mind led him to see patterns regarding Persistence. Persistence is a set of teachable behaviors for approaching problems, challenges and for working to reach other academic or non-academic outcomes. The behaviors of persistence include the ability to:

- Define, refine, clarify and analyze the problem.
- Develop and use a system, structure or strategy of problem attack including knowledge of steps to be performed, what data needs to be generated or collected, and what resources are available.
- Identify appropriate resources, including knowing who and where to turn for assistance.
- Collect evidence that the strategy is or isn’t working.
- Recognize when a theory/strategy must be rejected and another employed.
- Apply alternative strategies/theories when it is appropriate to do so.
- Keep working toward solving the problem.

A teacher can limit his students to some specific strategies that he has taught, or he might allow students to brainstorm their own. It is important that students understand that in order to practice persistence they should generate a number of possible strategies so that they will have choices. Half-way through a problem, the students may decide to switch strategies, and it is useful to have already identified possibilities even if the student ultimately chooses a strategy that was not on her original list of possibilities. Persistence is about being conscious of choices, criteria and outcomes.

Motter, Kristi Lynn’s (2003) research does identify an individual trait called persistence (i.e., the ability of keeping on at a task) which is distinct from either simple endurance or an involuntary inability to shift one’s train of thought. Students do differ in their persistence for a particular kind of learning task probably because of their history of prior success or failure on similar or related tasks.

➢ Correlates of Persistence:

Burt (1954) says, among all the qualities, which are responsible for the success, the strength of persistence is an important factor. So, it has been assumed that persistence is an important factor in determining the success or failure of an individual on schoolwork or in any other achievement. Feather (1960) tried to find...
out the relationship of persistence at a task to expectation of success and achievement related motives and proved that there exists a relationship between the two variables. Persistence is one of the important factors affecting the Academic Achievement of a student Husen (1967).

A child’s Perseverance in his studies or completing a particular task can be influenced by various factors.

- **Home** – Home plays a major part in influencing a child’s Persistence. It involves how much interest parents show in their child’s education. How much they motivate him to pursue a particular task? What atmosphere or facilities they provide to their child? All these influence his perseverance for a particular task or his studies on the whole.

- **School** – School environment also plays its influence in a child’s Perseverance. Influence of teachers, school atmosphere and the encouragement given in the form of prizes etc., can reduce or increase the level of Perseverance in a student.

- **Self** - Perseverance also varies from child to child. In a same situation, certain students show better Persistence for that task than others. This can be due to two reasons.
  1. **His genetic (mental) make-up:** the child may or may not have the ability to do that particular work.
  2. **His interest in that particular task.** If a child is made to do a task of his own choice, ability and interest, he can do it better and in less time.

- **Peer group** – Peer groups also influence the Persistence of a child. A child working in a group can enjoy and pursue his task in a better way than working alone. Sometimes the feeling of being the best in the group proves to be a healthy influence on his performance. The competitive spirit or the feeling of shame, in case the performance is not good, may motivate the child to pursue his task in a better way.

A logistic regression model was obtained for persistence in engineering, which estimated direct and indirect effects of reversal independent variables (Adams, 1988). The model included the variables:

- Support received from family, friends and educators.
- Academic and social background.
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- Past experiences with technology.
- Academic and social experiences in college.
- Student’s assessment of these experience.

Catarina, Mathilda Braceros (1990) studied to determine whether a group of antecedent variables would predict dropout or persistence behavior. Whilst psychological approaches have been used, they have tended to examine persistence by comparing and contrasting stayers and leavers in terms of personal characteristics (Tinto, 1993).

Mason (1995) reported a working model and suggested that the background and defining variables have strong direct effect on persistence; on the set of academic variable; on the set of environment variables; and on the set of psychological variables. The set of academic variables and outcomes, environmental and psychological outcomes and variables, are all interrelated and have relationship to persistence.

The working model used based on a model developed by Bean and Metzner which investigated the role of student background and defining variables, academic variables, environment variables, academic outcomes, psychological outcomes, and intent to leave behavior and their relationships to persistence.

The model developed in this study illustrates the relationships of the sets of variables that were investigated: the background and defining variables have strong direct effects on persistence; on the set of academic variables; on the set of environment variables; and on the set of psychological outcome variables. The sets of academic, academic outcome, environmental, and psychological outcome variables are all interrelated and have relationships to persistence. The ability to articulate and internalize educational goals are the variables that have the strongest positive effect on persistence. Stress and intense feelings of helplessness/hopelessness are the variables that have the strongest negative effect.

The findings of this study suggest that urban community colleges could become safe havens of intellectual development for African American male students, and the level of persistence of these students could increase if the necessary activities, program enhancements, and management of services based on student needs were instituted.
Leslie Pendleton Graham (1997) designed a study to investigate a phenomenon, persistence of undergraduate women in their engineering majors, from a qualitative paradigm. A developmental life-span and social learning perspective called for an examination of factors relevant to engineering major choice and persistence from early childhood to the present time, including family background and individual factors, environmental factors and experiences with the engineering culture, and social factors relevant to major choice and persistence.

It has been revealed by research literature that persistence may be related with the following aspects:

- Quickness, Introversion and low Verbosey (Crutcher, 1934).
- Success in school achievement (Ryans, 1938).
- Withstanding discomfort, feeling of adequacy, mental fluency (Thonton, 1939).
- Habit of keeping on at a task once it is started, a preservation or physical inertia factor, a willingness or ability to endure discomfort, a sex strength, a radical conservation continuum, natural tempo and Intelligence (Rethlingshafer, 1942).
- Initial estimates of probability of success (Feather, 1963).
- Initial behavioral outcomes (Ziemerman and Blotner, 1979).
- Frequent contact with faculty (Pascarella and Terenzini, 1980).
- Emotionally stability (Dillon, David, Eugene, 1982).
- Academic achievement (Andrew, 1987).
- Have positive coping cognitions (Glasscock, Patricia Ann, 1987).
- Social and economic background and post learning experiences (Adams, 1988).
- Past and present academic performance in case of women and social support in case of males (Adams, 1988).
- Attendance in school, Their estimation to finish task, No. of working hours, Level of support from family, friends, Motivating force of their level, Attitude about the task, Gender (Key, Roby Van, 1988).
- High task completion expectancy (Hess, 1993).
• Beliefs, values and attitudes about themselves, Goals & Aspirations, Social and academic support systems (Kala, 1993).
• Ability to articulate and internalize educational goals, low level of stress and feeling of helplessness (Mason, 1995).
• Age, instructional time and learning style (Mickens, Caesar, 1995).
• Gender (Kim Rapp, 2003).
• Background characteristics, personal resources, aspirations, completion of task (Cohen, 2004).
• Ethnicity (Hoef, 2004).
• Quality of the programme and academic experience (Ivankova, 2004).

➢ Types of Persistence:

Persistence is also a prime factor of success in the work-a-day world. Even Eysenck (1947, 1960b) supported this view, among the qualities, which make for the efficient use of a person’s abilities in his persistence. Several researches have been done on persistence and used various kinds of tests. Some research workers regard persistence as unitary trait, while others break the trait into distinct group factors. Eysenck divided persistence into two broad categories:

• **Ideational persistence**: which means: (a) **Persistence against time**. Time spent on word building, i.e. making up words from a set of given letters; insoluble puzzles, i.e. time spent on tasks which have no solution, and so forth. (b) **Persistence against difficulty**. Difficult writing, i.e. continuing reading of a story where the printing is so arranged that the difficulty of reading becomes greater and greater, e.g. by printing alternate letters in capitals, by omitting punctuation, by running words together, and so on; working against distraction, i.e. reading a text interspersed with interesting pictures, etc.

• **Physical persistence**: which has two aspects: (a) **Persistence against boredom**. Persistence in some physical task, which is not in itself painful or creative of discomfort but which is devoid of any intrinsic interest. (b) **Persistence against pain discomforts and fatigue**. Holding one’s breath as
long as possible, pulling a dynamometer at two-thirds maximum strength
as long as possible, or enduring an electric shock as strong as possible,
etc., which in the light of further investigations, has subsumed under the
general factor of persistence.

In addition to this general factor of persistence, we find group of activities
which cluster together and define more specific types of persistence, such as
persistence in physical or ideational tasks.

**Jackson and Edmiston (1949)** measured persistence taking three aspects into
consideration as:

- **Mechanical:** The physical factor is characterized by some tests as
  maintaining dynamo-meter grip, endurance of shock, length of breath is
  held and length of time pain is endured.
- **Linguistic:** The ideational factors is measured by such tests as the time
  spent on word building, on difficult reading material, practice on an
  aiming test, and so on so forth.
- **Quantitative persistence:** The corresponding factors of measuring
  persistence are sex-strength, feeling of adequacy and mental ability, which
  are correlated to ideational types.

**Mac Arther (1955),** while doing an investigation of persistence in secondary
school boys pointed out that there are two factors of persistence;

- **Mental:** intelligence, verbal ability and numerical ability.
- **Physical:** spatial practical ability and age strength.

He suggested the need to use mental and physical persistence in the study of
relationship between persistence and personality or any other variable.

➤ **Measurement of Persistence:**

Ever since research started to be conducted on persistence, its measurement
became difficult. Most of the researchers relied on some physical measures, time-
converted tools, tests etc.

Earlier, persistence was measured taking one or the other aspect of personality
into consideration. But, this trend has changed. Now, persistence is estimated keeping
in mind all the aspects of personality i.e. cognitive, affective and psychomotor.
Methods of measuring and validating these efforts and linking them to a plan of
learning developed within a program context would transform some dropouts into persistent learners who are not presently attending formal classes or tutoring sessions.

Among the experimental approaches towards the study, the earliest investigations of Fernald (1912) on twelve non-delinquents and one hundred sixteen delinquents, subjects were asked to *stand on their toes* as long as possible.

There was an attempt to judge the persistence *subjectively and rationally* through relationship between persistence and other traits, the important one is of Webb (1915). He ascertained the co-relation between ratings on intellectual and character qualities. It appeared that there exists a high co-relation between different character qualities like tendency not to abandon task, trust-worthiness and consciousness. He isolated W factor and called it as *will*.

The Downy Will-Temperamental Test (1923) relied upon links between handwriting and personality traits. Another significant study was of Morgan and Hull (1926). They asked the judges to rate hundred pupils on a scale of persistence, consisting of 9 qualitative grades. Burt (1923), Chapman (1924), Cushing (1929), Welson (1931), Howells (1933), Porter (1933) and Clarke (1935) used standing on toe tip as the measure for persistence on physical task and *continuance of reading* in spite of the letters running together for persistence on ideational level.

Perseverance or one might call it *stick-to-itiveness*, is probably the most difficult component of all to measure or to predict. In theory, it is a function of the time the student is willing to spend on active learning, not just passive reception or the kind of daydreaming that often occurs while the student seems to be studying or learning. One proposal is to measure how much time the student is willing to spend by observing how much time he does spend. Margaret Wang (1932) at the Pittsburgh Learning Research and Development Center tried to do this, observing a time sample of each student's behavior while he was working on a unit of study and determining the *percent of time* that he appeared overtly attentive to his lesson materials.

Wang (1932) proposed *questionnaire method* to measure persistence. The first phase of the Persistence Study revealed that these categories do not tell us much about how to help adults persist in their education. The only significant finding was that immigrant, those over the age of 30 and parents of teenage or grown children were more likely to persist than others in the study.
• Positive and Negative forces that help and hinder persistence:

In searching for a framework for analyzing data, the study team sought a theoretical model that would both place the adult learner in a central position and be useful to program managers seeking practical advice on how to increase persistence. The study team chose to employ a force-field analysis as developed by the sociologist Kurt Lewin. Lewin’s theory places an individual in a field of forces that support or inhibit action along a particular path (Gilbert, Fisk and Lindzey, 1998; Lewin, 1999). Understanding the forces, identifying which are strongest and deciding which are most amenable to manipulation provide an indication of how to help someone move in a desired direction, such as reaching an educational goal.

Programs must help students to develop an understanding of the negative and positive forces that affect their persistence. Building on that understanding, each student must make plans to manage these forces so that persistence is more likely. The plans that come out of such an exercise should include strategies for persistence when the forces that affect a person’s life cause them to drop out and these plans must be revised as adults persist their studies and these forces change.

Once the crucial forces are identified, students can plan to build their supports and reduce their barriers. As happens in some programs, staff must be open to having the outcome of this activity be early dropout for students who, for any reason are not ready to persist in their studies.

• Building self-efficacy:

The educational program must help adults students build self-efficacy about reaching their goals. The term self-confidence is used more often in adult education literature, but self-efficacy is a more useful term to describe this support. Self-confidence is a global feeling of being able to accomplish most tasks. Self-efficacy is focused on a specific task and represents the feeling of being able to accomplish that task, which in this context is successful learning in Adult Basic Education (ABE), English for Speakers of Other Languages (ESOL) or Adult Secondary Education (ASE) programs. The study drew from the theory of a social scientist, Albert Bandura, for advice on building self-efficacy (Bandara, 1986). Educational programs should provide the following experiences to their participants as a means to build self-efficacy.
Mastery experiences allow an adult to be successful in learning and to have authentic evidence of that success. Vicarious experiences are those provided by social models. Some programs employ successful present or former students as speakers during intake and orientation activities, while others recruit past learners as counselors, teachers and directors. Social persuasion is support from teachers, staff, counselors, fellow students, family and friends that reinforces self-efficacy. These verbal assurances are needed, in part, to overcome the negative self-efficacy about learning built up during previous schooling. Addressing physiological and emotional states is the acknowledgement that negative feelings can result from poor self-efficacy and can also lead to low self-efficacy. Bandura’s theory of self-efficacy can act as a powerful framework within which programs can improve on the activities they have already undertaken, and ensure Persistence.

- **Establishment of a goal by the student:**
  This process begins before a student enters a program. A learner who could be classified as a potential student experience an event in his or her life that causes him or her to enter an educational program. The staff of the educational program must help the potential student define his or her goals and understand the many instructional objectives that must be met on the road to meeting that goal. Teachers must then use these student goals as the context for instruction and intermittently review, since they may change.

- **Monitoring progress towards reaching a goal:**
  Since goals are important supports to persistence, students must make progress toward reaching their goals. They must also be able to measure that progress. Programs must provide services of sufficient quality that students make progress and programs must have assessment procedures that allow students to measure their own progress. Much of the recent interest in measuring progress has come from the need to build systems of program accountability. Helping students’ measure that their own progress may require tools and methods that are not appropriate for accountability purpose. Accountability systems need measures that are easy to collect and quantify. These may not be useful to students and difficult to integrate into instruction. Portfolio and authentic assessment approaches may have weaknesses in an accountability system but might be very useful for students who
want to measure their own progress. These kinds of assessments can be an integral part of an instructional approach.

Any kind of Research needs a familiarity with the literature to discover or explore something new which has been already existing and known. The study of literature provides a wide scope for any kind of investigation in any problem area to search what other researchers have already attempted to find out, the methodology they have used and to what extent they have been successful in their research and what problems still remain to be solved. Considering the pros and cons of premier research and the success of the investigators and educationist in these areas, the present project has been forwarded with the review of literature related to the main issues discussed, which the investigator could gather with all the resources available within her premises.

❖ REVIEW OF LITERATURE RELATED WITH MULTIMEDIA:

Adams, Steven M. (1989) conducted a study entitled *The development of a computer-based interactive multimedia program for teaching interpretive aspects of wind instrument notation*. The purpose of the pilot study was to design and field test an interactive multimedia computer program for teaching interpretive aspects of music notation to high school wind instrumentalists. A computer program was developed for instruction in tempo, dynamic, articulation, and indications of form and simple ornamentation and special effects. The program integrated professionally recorded audio examples that related directly to the educational content of the program. These examples were stored on the computer's hard disk and played back through its speaker system. Using the program individually, students heard the examples played on their own instruments and were instructed to imitate what they heard. Utilizing a randomized pretest-posttest design, student performance of interpretive aspects of notation was measured through four short musical examples and evaluated by experts. The adjusted means between groups were different at the alpha = .10 level; therefore, the hypothesis was supported. It would appear that the
Segall, Ricki Goldman (1990) conducted a study entitled Learning constellations: a multimedia ethnographic research environment using video technology for exploring children’s thinking. This study was an examination of five years of research, which includes: an ethnography of children’s epistemologies-in-depth case studies of three children from the Logo constructionist culture called Project Headlight. Three preferred thinking styles emerge from this study—the empirical, the narrative and the social/interpersonal. This study was investigated by recording these conversations on video, what we learn about children’s thinking when we listen carefully to how they link their experiences together in coherent ways. The result of research revealed that each child represents a preferred style of thinking: empirical, narratives and interpersonal.

Nishino, Alan Koki (1993) studied An exploratory investigation to determine the effects of a multimedia computer-based science learning environment and gender differences, on achievement and attitudes and interests of students in an eighth-grade science classroom. The purpose of this study was to determine the relationships of a multimedia computer-based science learning environment and gender differences on achievement and attitudes and interests of students in an eighth grade science classroom. The control group received instruction based upon traditional science teaching methodologies while the experimental group received instruction using a multimedia computer-based science learning environment. The following relationships were found:

- Students in the experimental classroom had significantly higher posttest mean score in self-concept than the students in the traditional science classroom.
- Female students in the experimental classroom had a significantly higher posttest mean score on “self perception as a student” than both the males and females of the traditional science classroom and the males of the experimental classroom.
- Students in the experimental classroom had a significantly higher posttest mean score on the Hueneme Computerized Interactive Test on science than the students in the traditional science classroom.
Introduction

Nelson, Carole Sheets (1993) conducted a study entitled *The effect of teacher scaffolding and student comprehension monitoring on a multimedia/interactive videodisc science lesson for second graders*. The purpose of this study was to examine age-appropriate uses of a multimedia/interactive videodisc (IVD) science lesson for second graders in two areas.

- First, the unique properties that these media offer as a stand-alone teaching tool were assessed.
- Second, the non-technologies of teacher scaffolding and comprehension monitoring as supplements to IVD programs were investigated.

A learner controlled multimedia/IVD instructional program was specifically designed for this study. Sixty second grade students from a public school system were administered one of four levels of treatment: the IVD lesson only, comprehension monitoring only, teacher scaffolding only and teacher scaffolding with comprehension monitoring. An analysis of covariance (ANCOVA) was conducted on the adjusted dependent measure. The independent variable was treatment level. The dependent measure was the posttest knowledge score on 25 item multiple choice test. The covariate was the pretest knowledge score. The IVD lesson only group registered significantly higher adjusted knowledge test scores after controlling for preexisting difference. The comprehension monitoring only and teacher scaffolding only groups recorded significantly higher test scores when compared to the IVD lesson only group. The teacher scaffolding with comprehension monitoring group made statistically higher scores when compared to each of the other three treatments. However, no significant group difference was registered between the teacher scaffolding only and the comprehension monitoring only groups.

Clark, Barbara Irene (1995) studied *Understanding Teaching: An interactive multimedia professional development observational tool for teachers*. This study examined the use of Understanding Teaching, an interactive multimedia program on CD-Rom. Significant results were the outcome of the investigation. The program was used in an elementary mathematics methods course for preservice teachers. The effect of using hypertext, animation and full-motion video vignettes on preservice teachers’ abilities to recognize, understand and explain the NCTM Professional Standards for Teaching Mathematics, were tested. It was hypothesized that *Understanding Teaching* would increase preservice teachers’ classroom
observational skills by helping them to recognize and explain elementary classroom instructional situations that applied the NTCM Teaching Standards. In fact, preservice teachers who used the program were able to recognize, identify and explain more Teaching Standards than preservice teachers who used the NCTM Professional Teaching Standards for Teaching Mathematics publication. The data were consistent with recent findings in the use of interactive multimedia as an instructional tool.

**Domoto, Maria Elena (1998)** studied *Demystifying: A multimedia software package for a multicultural age*. The software prototype utilizes Japanese themes to present curricular benchmarks and objectives in integrated units that are sensitive to culturally diverse classrooms. The primary audience for the software is K-5 teachers and students. It provides teachers with a culturally-sensitive model for thematic units that not only compare and contrast issues globally but involve students metacognitively in their own learning process. Curricular areas in the package include communications arts, second language, social studies, science, mathematics, health, and the arts. This package shows how the curricular issues must be paramount in design. Once the curricular design and objectives are clear, the curriculum specialist and the computer designer can collaborate to produce a program that graphically appeals to but also scaffolds the child's learning processes. By integrating computer multimedia into curricular design as an integral tool in the learning process, students can control their own learning by interacting with the interface at their own speed and skill level. Feedback and positive reinforcement were instantaneous. Thus, multimedia software can especially benefit students by providing greater contextualization, extra scaffolding, foreign language setting, multisensory approaches.

**Yearwood, David Nathaniel (1999)** made a *comparative analysis of interactive multimedia and instructor-led demonstration in teaching operation networked computers*. This study examined the efficacy of utilizing a computer interactive multimedia module as a tool for increasing student understanding of network computers at UND-Lake Region. Ninety-four incoming freshman students enrolled at UND-Lake Region for the 1998/1999 academic year participated in a study comparing two methods of instruction. The control group received instruction via the traditional instructor demonstration method while the experimental group utilized the constructed multimedia module. The three achievement factors were
mechanics (knowledge), usage, and general information. There were differences (p < 0.05) in the general information variable indicating that the experimental group retained more information about common aspects of computer operation and policy guidelines; there were differences between the two groups in the attitude factor uneasiness (p < 0.05) indicating discomfort among those in the control group concerning use of the computers, and differences in the layout variable (p < 0.01) indicating a strong preference for the design elements among those in the experimental group.

Lain Burt (2001) studied The Use of Multimedia for Practitioners in Art and Design. The aim of this study was to identify the nature of interactions between multimedia technologies and working processes of Art and Design practitioners in relation to higher education contexts. These interactions have been explored, developed, and analysed using a multi-method approach to gathering and examining evidence. An examination of how to document and present research material was an intrinsic part of the investigation in this digital thesis. Four methods of gathering and generating data were employed. These were:

- a survey of Art and Design practitioners' research methods in relation to the use of new media
- interviews with Multimedia practitioners
- the researcher's own practice in multimedia and
- case studies to evaluate through practice the transferability of techniques and processes developed to practitioners in Art and Design.

A survey of practitioners in Art and Design was carried out to discover attitudes to the use of electronic media in practice. The survey revealed that gaining digital media skills for use in the Art and Design development process was thought potentially useful, but may require facilitation and collaboration with an 'expert' user or system. The Research has shown that the digital interface, digital Art and Design development methods, and multimedia for analysis and presentation are procedures of considerable value in development of visually based Research and in the practices of Artist and Design.

HCI Research Group (2002) studied Multimedia and Learning: Realizing the Benefits. This work demonstrates the importance of considering the wider context when designing for learning with interactive multimedia and informs the integration
of multimedia into the curriculum. The result was a curriculum integration framework, which highlighted the need to locate the application design in the context of use and advocated user involvement throughout the design and development process. Curriculum integration should be designed for at the outset and evaluated as ongoing activity. Advice was given on how to do this. This study also explored problems associated with conducting research in real-world learning contexts.

Mumtaz Mokhtar, Mohd Tajalli Abdullah (2002) studied *Teaching and Learning Design Fundamentals Using Multimedia As a Tool*. The purpose of this study was:

1. to investigated the use of new technology in computer concerning graphic design
2. to investigate the present use of teaching aid, identifying the strengths and limitation
3. to identify the problems associated with the use of computers and conventional way of producing teaching aid.

This study found that in order to produce an interesting and effective tool, quality-based content was required. At the same time to balance up multimedia capabilities. Several art and design books and web-sites were reviewed. This study showed that Discipline-Based Art Education was a comprehensive approach for teaching and learning art. It also revealed that student's intellectual, spiritual and physical will be developed as what Malaysia aim for their nation. This study compared the elements found in books, web-sites and Malaysian art education syllabus and indicated the elements of digital art and design fundamental for multimedia tool.

Denise L. Wiksten, Jarrod Spanjer and Kanthy LaMaster (2003) studied *Effective use of multimedia technology in athletic training education* to examine the effectiveness of using a CD-ROM, *Sports Injuries 3-D* by Cramer Products (Garner, KS) in an introductory athletic training laboratory class as a supplement to traditional lecture instruction. Attitudes toward the CAI and usefulness of the CD-ROM program were also examined. Students in 2 introductory athletic training laboratory classes from one institution were randomly assigned to either a traditional lecture (n=11) or traditional-lecture/CD-ROM (n=15) group. Finding that no significant differences were found between groups on either the written or practical
examination scores. The journals and interviews both indicated that subjects used their lecture notes (8/11 in the control group 14/15, in the CD-ROM group) most frequently, while several students used a combination of lecture notes and the laboratory manual when studying for their examinations. Although they did not list it as their primary resource, most subjects in the experimental group reported accessing the CD-ROM for anatomical landmarks on a weekly basis.

**Konukman, Ferman (2003)** studied *The Effects of Multimedia Computer Assisted Instruction (CAI) on Teaching Tennis in Physical Education Teacher Education*. The purpose of this investigation was to determine the effects of multimedia CAI on undergraduate Physical Education Teacher Education (PETE) majors teaching of the serve in tennis. The data were obtained from 18 undergraduate students enrolled in a PETE evaluation and assessment course at Virginia Tech. Subjects were stratified by gender and randomly assigned to three groups as Computer-Assisted Instruction group (CAI) (n=6), Teacher Instruction group (TI) (n=6), and Control group (CG) (n=6). The results of this study were gathered from three tests: Tennis Serve Content Knowledge Test, Tennis Serve Skill Analysis Test, Tennis Task Sequence Test. In addition, two six minutes micro teaching sessions were conducted and data was collected via Tennis Serve Pedagogical Content Knowledge (PCK) Assessment Sheet, and finally, an open ended survey was completed to understand students attitudes toward CAI. There were two independent variables in this study. These were Computer-Assisted Instruction (CAI) and Teacher Instruction (TI). A pre-test and post-test experimental design was applied. The results of this study indicated that CAI can be an effective way of instruction in certain conditions: CAI had significant effect on content knowledge and PCK-Appropriate demonstration. In conclusion, the 21st century will be an information age and computers will be an essential part of the education system in all grades and ages. Physical education teacher education programs and physical education lessons in K-12 education are no exceptions. Computers and instructional technology should be an integral part of PETE and K-12 physical education without sacrificing the physical activity.

**Bump, Douglas Edwin (2004)** conducted a study entitled *The effect of computer multimedia interactive mathematics program on the mathematics achievement of developmental mathematics college students*. This study was to
describe the effect of computer-based multimedia, interactive mathematics program on the mathematics achievement of developmental mathematics college students. Therefore a quasi-experimental pretest-posttest nonrandomized research design was used to test the hypothesis in this study. In this study, the independent variable was method of instruction in mathematics, the Prentice Hall Interactive Mathematics Program or the traditional lecture-based delivery. The dependent variable was mathematics achievement (as measured by the departmental mathematics final examination). This study is significant because it addressed two very real issues. The first problem involved the possible identification of effective CAI in the mathematics area. The second issue was that although colleges using CAI claim computers help, there is very little empirical data that supports this claim. Research in this area is needed so that the effectiveness of new programs can be measured. The results indicated that there was a statistically significant difference between the mathematics achievement of students who participated in a computer multimedia interactive mathematics program and the mathematics achievement of students who did not participate in a computer multimedia interactive mathematics program. The results of this study suggested that the computer multimedia interactive mathematics program had not been effective with regard to mathematics achievement.

Clafin, M. Susan (2004) studied The efficacy of using interactive multimedia delivery of a research-based strategy for teacher professional development. This study examined the efficacy of using an interactive multimedia package as an alternative to traditional professional-development activities for instructing teachers to deliver instruction of a complex skill. Eight middle-school teachers volunteered to complete independent professional-development instruction using a CD-ROM package to learn the knowledge and skills needed to provide instruction in a research-based reading comprehension strategy in their classrooms. A multiple-probe across-teachers experimental design was used to measure the level of implementation of strategy instruction in classroom settings. While results of the knowledge test did show a significant increase in posttest scores compared to pretest scores, the scores indicated that the participants did not retain much of the information from the CD-ROM package. Satisfaction Questionnaire results indicated overall dissatisfaction with this CD-ROM tool, although participants did indicate openness to the use of interactive multimedia as an alternative professional-development delivery method.
Hamilton, Heather Suzanne (2004) studied *The effect of different types of image annotations in a scientific text on different learning outcomes in multimedia learning environment*. The purpose of this research was to extend the current theoretical understanding of multimedia learning by assigning a specific function to visual information as an aid to learning and comprehension. This research was designed to determine if differences could be found in a learner’s comprehension of a scientific text when the learner was presented with visual annotations that served to aid in selecting, organizing or integrating content information. Learner were assessed in terms of their abilities to recognize, comprehend and transfer knowledge dependent on the function of the visual annotations provided in a treatment lesson. The hypothesis was that presenting visual annotations that independently supported each of the three aforementioned processes would cause different learning outcomes. A series tests were conducted to assess different types of learning. A Word Recognition Test and Word Definition Test were designed to measure knowledge. In the experiment carried out for this study, participants read a text describing how cell phones work and viewed either no annotations (text-only group) or annotations designed to support the section (section group), organization (organization group) or integration (integration group) of information. As predicted, participants who viewed the visual annotation designed to support the selection process (section group) scored higher on the Word Recognition Test than all other groups. These findings indicated that visual annotations can be designed to support participants who viewed the visual annotations designed to support the integration process. Integration group scored higher on the Comprehension Test than individuals in the selection group and the text-only group. These findings suggest that visual annotations can be designed to support Comprehension.

Waid, Kimberly Beth (2004) conducted a study entitled *Assessing teachers’ preactive decisions using multimedia case studies*. The purpose of this study was to create and evaluate a multimedia case-based instrument that would effectively evaluate a teacher’s preactive decisions. To accomplish this objective, the Assessment of Preactive Decision (APD) was created. The APD was field tested on 120 subjects in March and April of 2003. The participants included 30 Arts and Sciences students from the University of Virginia, 30 first-year Curry School of Education students, 30 final-year Curry School of Education students and 30
practicing teachers. The results from this field test were used to evaluate the reliability and validity of the APD, as well as the ability of the APD to discriminate between participants based on amount of teaching experience and education. Group scores from the APD, as well as sub-scale scores from the four domains of planning and three types of knowledge were compared using the statistical procedures ANOVA and MANOVA. It was hypothesized that individuals with educational training and classroom experience would score better on the APD than individuals with little to no educational training and classroom experience. Based on the results, two (out of three) of the research hypotheses were accepted. Results gathered from participants’ responses to a pair of Likert-type questions indicated that the APD has high face validity.

Hernandez, Sylvia Sepulveda (2005) conducted a study on the effects of video and captioned text and the influence of verbal and spatial abilities on second language listening comprehension in a multimedia learning environment. The study investigated how English as a Second Language (ESL) learners with different verbal and spatial abilities acquired vocabulary and overall listening comprehension skills in a second language (L2) through four different modes of multimedia presentations of a dialogue. It examined whether captioned text and video helped or hindered L2 listening comprehension, and for whom (verbal or spatial learner). Participants included 115 ESL students from a community college who completed verbal and spatial ability tests and were randomly assigned to four treatments: audio only (A), audio+video (AV), audio+text (AT), and audio+video+text (AVT). Afterwards, they took a vocabulary test, a listening comprehension test, and an attitude survey. Some participated in an interview discussing their perceptions of the treatments. Findings suggested that for the vocabulary test and listening comprehension test, high-verbal ability students perform best with the A or AVT treatments; the low-verbal ability students perform best in the treatments with video AV and AVT. High-spatial ability students performed best when video was present; the performance of low spatial ability students was not hindered when video was present. Students in the A1 treatment performed lower on the outcome measures than expected, pointing to a heavy cognitive load due to the transient nature of the L2 captioned text. Overall, the data suggested that the AVT treatment provided the greatest support for vocabulary acquisition and listening comprehension. Students attended to the mode video or text.
that provided the most support for comprehension. Thus, evidence supported the Dual Coding Theory (Paivio, 1986). Participants’ comments about the treatments indicated a favorable attitude toward having both video and captioned text to support listening comprehension of the dialogue.

McNeill, Andrea L. (2005) conducted a study on the effects of training, modality, and redundancy on the development of a historical inquiry strategy in a multimedia learning environment. Research in the area of multimedia instruction has yielded results that indicate that learning is better when verbal information is presented auditorily instead of visually and when redundant on screen text is removed from the instructional environment. The present study aimed to extend these finding by exploring the effects of presentation modality and redundancy of verbal information on students’ ability to apply and recall a historical inquiry strategy. Fifty-six students were randomly assigned to three treatment groups, which differed according to the presentation mode combination used to present the strategy instruction. Specifically, students received the instruction either as animation and narration, animation and text, or animation, narration and text. The students were engaged in a multimedia strategy intervention for a total of five days, for approximately 25 minutes a day. Three strategy application test pre-test, post-test, and maintenance test, a recall test were used to measure the students’ learning. Data attained through the strategy application tests and recall tests were analyzed using Analysis of Variance (ANOVA) procedures. The results of the study revealed significant differences in the training main effects analysis indicating that strategy instruction can be effectively provided in a multimedia learning environment. However, no significant differences were found for the modality and redundancy main effects indicating that there was no difference in strategy application or recall between the groups.

**REVIEW OF LITERATURE RELATED TO COMPUTER ASSISTED INSTRUCTION:**

Beaulieu, John E. (1985) conducted a study entitled *A study of the effects of selected feedback delay intervals upon retention of science material in a CAI task with junior high school students*. To investigate this question, eighty-six seventh and eighth grade students participated in an investigation of the effect of delaying
intervals upon retention of science material in a CAI lesson in computer terminology. The lesson was presented using microcomputers in two separate sessions on two days. Each session consisted of subjected reading of 20 paragraphs and immediately answering 20 questions. Feedback was given after a response to each question. If a response was incorrect, the subject was given the same paragraph after which he received the same questions again. Each session was followed by a 20 items immediate, 24 hour and 7 days, 4 alternative multiple choice test. No feedback was give during these tests. No significant differences for either session were found between the immediate or delayed feedback groups on any of the three retention tests. Data collected on the correctness of initial responses to questions indicated that the material chosen for this experiment was too easy for the subjects which resulted in range restriction of retention scores. All treatment groups showed a high level of initial learning and retention of the lesson material.

Brown, Stephen Francis (1985) studied *The use of learning theory in the application of artificial intelligence to CAI of physics*. The purpose of this research to develop and test an artificially intelligent, learner based, computer assisted physics tutor. In the first phase of the research, the system was constructed using Ausubel’s advance organizer as a guiding learning theory. The second phase of this research consisted of the testing of ARPHY. Volunteers from four levels of first semester physics classes were instructed that their goal was to solve three complex physics problems related to accelerated motion. Nine of the ten students correctly solved the three problems after being tutored for an average of 116 minutes. ARPHY’s pedagogical parameters stabilized after 6 students. It is recommended that future research into intelligent tutoring systems for science incorporated the principles and theories of learning which this research was based upon. An authoring system based upon the control structure of ARPHY should be developed.

Hessemer Stegemann, Jane (1986) studied *The effect of CAI on motivation and achievement in fourth grade mathematics*. This study investigated the processes by which variation in format for presenting multiplication problems (CAI versus paper and pencil) may influence children’s motivation and achievement. A sample of 69 fourth grade children was classified in one of two groups, labelled “achiever” or “unachiever”. Group assignment was based on a comparison of each student’s standard score on the mathematics subtest of the comprehensive tests of basic skills.
with that on the test of cognitive skills. The students were randomly assigned to one of three instructional methods:

1. CAI multiplication drill and practice with a reward game (CAIm).
2. CAI multiplication drill and practice without a reward game (CAI).
3. an equivalent multiplication paper and pencil drill and practice without a reward.

Results indicated that both achievement and motivation were related to instructional method, the CAI and CAIm students were more motivated than the paper and pencil students. When achievement was defined as the number of multiplication problems completed correctly, the CAI students achieved more than the CAIm students, followed by the paper and pencil students. When achievement was measured by pre and post achievement test comparison, there was no significant. There were no significant interactions between method of instruction and type of achiever.

**Hurst, Jesse Henry (1986)** investigated *The effects of a CAI tutorial program on the academic performance and attitudes of college athletes*, 40 students athletes enrolled at a university located in Southwest Texas were randomly assigned to one of two groups (20 in the experimental group and 20 in the control group). The experimental group was assigned a series of CAI tutorial lessons to be done in three months while the control group was tutored by the traditional method during the same period of time. A result of the findings of this study; firstly it was concluded that CAI had significant effect on the academic performance of college athletes. Secondly it was concluded that the exposure of college athletes to CAI did not have a significant effect on their attitudes toward CAI. Thirdly it was concluded that the sex of student athletes did not have a significant effect on their attitudes toward CAI.

**Kinzie Berdel, Mable Barbie (1988)** studied *Motivational and achievement effects of learner control of CAI*, the effects of providing ninth-grade boys and girls with either learner or program control over content review within computer assisted science instruction. The effects of providing subjects with a choice of control type were also examined. Subjects also responded to pre and postmeasures of motivation for science study and computer use. Results indicated that males performed better with program control than learner control in session one, but not session two. Females scored slightly, but not significantly higher under learner control in both session. Differences in time to completion also indicate the likelihood of differential effort by
Introduction

sex. The data revealed a strong preference both for learner control and for instruction via computers.

Strieker, Andrew Gerald (1988) investigated Application of an intelligent CAI tutoring system to spelling instruction for learning by disabled students. The purpose of this study was to investigate the impact of an intelligent CAI tutoring system on the spelling knowledge of students with learning problems. To do this, four pairs (2 male and 2 female) of learning disabled students were matched for age, sex, aptitude, reading and spelling achievement were instructed in spelling for four weeks (45 minutes a day, five days a week) on two versions of a microcomputer instructional program (spelldown and lobo). At the beginning of each week, each pair was presented with a new 10 word spelling list that contained regular words and highlighted specific phonetic features. Analysis of the results may be interpreted to suggest that the instructionally enhanced version of spelldown produced improved quality in student’s spelling errors as well as increases in the number of words correctly spelled relative to performance attained using the control version of the program.

McCuistion, Patrick Jay (1989) conducted a study entitled Static vs. dynamic visuals in CAI. The objectives of the study were to ascertain if a series of static visual presentations or a series of dynamic visual presentations would allow students to achieve higher performance test scores and higher mental rotation test scores. Six descriptive geometry concepts were chosen for the subject matter. Six CAI lessons were developed (three static and three dynamic) along with relevant performance tests and an opinion questionnaire. A mental rotation pretest was given to all subjects during the week prior to the experiment. All subjects were administered the lessons and tests on Monday, Wednesday and Friday. The following week the same mental rotation test was given as a posttest. The result of the experiment revealed that, overall the students who viewed the static presentation achieved higher scores on the performance tests while the students who viewed the dynamic presentation made larger gains on the mental rotation tests. The lower 25% of the sample recorded a very large gain in the mental rotation tests.

Coorough, Randall Phillip (1990) conducted a study entitled The effects of program control, learner control and learner control with advisement lesson control strategies on anxiety and learning from CAI. The purpose of this study was to examine the effects of three CAI locus of instructional control strategies on anxiety.
Introduction and learner achievement. The three CAI locus of instructional control strategies examined were learner control (LC), learner control with advisement (LCA) and program control (PC). To examine the effects of the CAI lessons on learner anxiety and achievement, split-plot and pre-posttest experimental designs were used. The subjects in this study (N=106) were undergraduate students enrolled in a general humanities course. The results of the study indicated that there was no significant achievement difference between subjects assigned to the PC, LC and LCA locus of instructional control strategies. Finally, the LCA group required a significantly greater amount of time to complete the CAI lesson than was required by the LC group, yet had no associated achievement gain.

Vernon, Robert Fletcher (1990) conducted a study entitled *The effect of software quality on the adoption of CAI in post secondary education.* Concern about the quality of CAI software has dramatically increased as the number of computers on college campuses has grown. This study investigated the relationship between the quality of one CAI software and the extent to which it was actually used for teaching. Hypotheses predicted that adoption intensity should be positively related to the users’ assessments of software quality. Measures were derived from the evaluation instrument used for the Annual Software Awards Contest. Measures were derived from teaching routines such as the degree of student involvement and the extent that the software was integrated into the syllabus. The study found two distinctly separate user subgroups: low intensity and high intensity adopters. High intensity CAI adopters were significantly sensitive to software quality and the degree of use. These users comprised half of the adopters and a fifth of all faculties capable of adoption. Adoption may hold value for less empowered groups of faculty. Faculty expertise with computers may not be a good predictor of adoption.

Hicken, Sam (1991) conducted a study entitled *Learner control and incentive in CAI.* This study investigated the effects of two general approaches to the provision of learner control and of two types of incentive on achievement use of options and attitude in CAI. In the FullMinus approach, a full instructional program is the default but learners can opt to bypass elements of instruction. Criterion measures consisted of a 32 item embedded posttest and an on-screen 11 item post instruction questionnaire. Learner control results indicated that posttest scores for the FullMinus treatment were higher than those for the Leanplus treatment and that the FullMinus groups had more positive attitudes. Yet subjects in the FullMinus treatment spent no more time on the
program than leanplus subjects. The findings relate directly to the design of instructional computer programs as well as to results from previous learner control studies and to the design of future studies.

Clayton, Ida Long (1992) conducted a study entitled *The relationship between CAI in reading and mathematics achievement and selected student variables.* This study was designed to determine the effectiveness of CAI on reading and mathematics achievement, attitude toward reading and mathematics, and the effect of CAI on reading and mathematics achievement, attitude for low socioeconomic students. The study involved students in grades 2-5 in five elementary schools. Findings indicate that CAI improved reading for students at the fourth-grade level, and increased positive attitude toward reading for third and fourth-grade students in the low socioeconomic category. The CAI students in grades 2, 4 and 5 made significant gains in mathematics achievement. A more positive attitude toward mathematics was shown by students in grades 3 and 4 following CAI.

Roberts, Michael R. (1993) conducted a study entitled *A comparison in the effectiveness of the delivery of an interactive CAI module to a traditional lecture/lab delivered module.* This study examined the use of a state-of-the-art computer based multimedia interactive learning system to determine if the learning of a conceptual predictive technological concept was more effective with interactive computer assisted instruction (CAI) or with traditional instruction (TI). The content of the technology education module stemmed from the Appalachian Technology Education Consortium (ATEC). A review of literature was conducted to determine if the predictive concept had been studied using CAI and to determine the effectiveness of CAI on learners. The experimental study utilized a control and an experimental group to compare the adjusted mean posttest scores of the two groups. The main finding was that learners in the experimental group who score higher on the pretest, had a significantly higher adjusted mean posttest score than those learners in the control group.

Stanton, Dana Gordon (1993) conducted a study entitled *Utilizing HyperCard for tutorial CAI in advanced professional training.* Two methods of presenting factual knowledge in an advanced professional topic were investigated and compared to determine which was more effective and more efficient. A comparison of cognitive learning strategies characteristics between the experimental and comparison groups was studied. The CAI program was developed on the computer with hypercard
as the authoring language. The 24 experimental subjects were paired with 24 comparison subjects by class ranking. Paired t-tests were used to analyze the difference in means of the paired data. The comparison indicated no significant difference in achievement between CAI and conventional lecture. Analysis of results on the motivated strategies for learning questionnaire found only one significant difference among fifteen characteristics of motivation and cognitive learning strategies between the experimental and comparison group of students that difference was on the scale for elaboration. The CAI mode of presenting course material appears to be an effective and efficient method to study a complex knowledge base.

Albers, Randy Paul (1994) conducted a study entitled Effective change strategies: Implementation of CAI in elementary classrooms. Study examined the influence of selected intervention actions on the implementation and use of an integrated learning system in fourth and fifth grade classrooms. Seven categories of actions were provided to teachers in an effort to facilitate the implementation of an integrated learning system into fourth and fifth grade classrooms. One hundred eighty-five unique interventions were recorded from teacher interviews. Classroom use of the technology increased as revealed by the innovation configuration matrices. Seven categories of interventions combined to positively influence the use of the technology in the classroom. Educators attempting to implement an innovation that requires significant change must be prepared to provide consistent support to teachers. This study provides detailed descriptions of the interventions utilized to implement technology into elementary classrooms.

Jia, Chengxiang (1994) examined the associations of learning styles and attitudes toward computer as well as the relationships of learning styles, attitudes toward computer and student mathematics achievement in a mathematics course using a CAI lab. The number of subjects in each learning style dimension (concrete, abstract, sequential, random) and the number of subjects' attitudes towards computer high and low (general attitude. Anxiety, confidence, liking) were counted and tested for significant with Chi-square test of association. The dimension of learning styles of concrete and abstract however was found significantly associated with computer liking. Further, a higher proportion of concrete learners liked computers than did the abstract learners. Analyses regarding relationship of learning style, attitude towards computers and math achievement revealed no significant difference between sequential learners and random learners, no significant difference between student
with low and high attitude towards computers and no significant interaction of
learning styles, and math achievement. Finally, a significant difference was found
between concrete learners and abstract learner.

This research’s objectives were to synthesize the experimental researches in CAI. The
study focused on the effectiveness of CAI in learning achievement, research these of
Doctoral and Master degree from the faculty of education in Thailand, published
during B.E. were collected. A total of 37 research theses were selected for effect size
calculation. The results indicated:

- For all 138 research theses, a large number of research were conducted at
  the Chulalongkorn university and Srinakarintaraviroj prasammitra
  university, designed by using tutorial CAI type, concentrated on
  mathematics subject 6, studied in secondary education level between 1-4
  weeks.

- Effectiveness of the outcomes which were learning achievement, retention
  and attitude towards instruction, comparing to traditional, were
  respectively shown an average effect size as 0.91, 0.89 and 0.58 for all the
  education level.

- For learning achievement, most of the average effect size was related to
  subjects and duration of instruction. For retention, most of the average
  effect size was related to education level and source of population or
  sample groups. For attitude, most of the average effect size was related to
  source of population of sample groups.

Miller, Lynn Louise (1997) conducted *A Formative evaluation of CAI
computer literacy (undergraduates, community health majors).* The purpose of this
study was to conduct a formative evaluation of a computer assisted instruction (CAI)
module on computer literacy among undergraduate community health majors. This
was a qualitative study. The subjects for this study comprised a convenience sample
of 28 students enrolled in undergraduate Health Studies courses at Texas Woman's
University (TWU), recruited as volunteers in the spring semester of 1997. The first
five participants comprised the pilot test group. Evaluation criteria developed by
Barker and King (1993) for interactive multimedia courseware were used by the
subjects in this study as a checklist for evaluating the CAI module during use and the
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interview process. Content analysis was conducted on data collected in the interviews. Notes and transcripts were coded to identify consistent comments, then further analyzed to determine patterns in the responses. Pearson correlation coefficients were calculated to determine the relationship between time spent using the CAI module and the amount of topics chosen.

The relationships between the amount of time spent using the CAI module and previous computer experience or training and between topic selection and previous computer experience or training was determined by calculations using a 1-sample independent t-test and chi-square test, respectively. A significant difference was found between having previous computer training or not in terms of the amount of time spent using the module, t(26) = 2.08, $p<.05.$ There was a direct relationship between time spent using the module and the amount of topics chosen $(r=0.813, p<.001).$ A significant difference was found between having previous computer training or not in terms of the topics selected, $\chi^2 (61) = 624.22, p<.01.$ In general, the participants perceived the CAI module positively. Some of the participants expressed negative perceptions about the mechanics of navigating in the program. The negative perceptions seemed to have no relationship to previous computer experience or training, time on task, or topics viewed.

Sukkasam Auyto (1997) conducted a study for the development of a CAI lesson on history of photography for Bachelor of fine art. The purpose of this study was to develop a computer assisted instruction (CAI) lesson on the history of photography. It would be used by undergraduate student enrolled in B.F.A. program. The development of a computer assisted instruction (CAI) lesson on the history of photography were divided into four units

1. The development of photography
2. The development of photography process
3. The development of the camera and
4. The development of the thought on photography.

The CAI programs on those contents were developed by using three steps. The sample of the study employed 45 first year students in the Faculty of Fine and Applied Arts. The first step employed 3 students for one-to-one evaluation. The purpose of this step was to determine how clear the information and procedures of instruction were to learners. The second step employed 12 students for small group evaluation. The purpose of this step was to evaluate the CAI program on program
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efficiency. The last step employed 30 students for field trial, to evaluate the CAI program on program efficiency using the criteria 90/90. The learning efficiency of the CAI lesson on the history of photography was 91.83/91.11.

Thanit Dokrakklang (1998) conducted *A comparative study of learning on CAI of cartoon lessons in English between using the narrated text and narrated sound*. The purposes of the study were to seek

1. the standard efficiency and
2. the comparison of lessoning achievement between lessoning by Computer Assisted Instruction cartoon lesson in English with narrated text and narrated sound.

The sample consisted of 40 students from Prayaprasertsoontarasai School, Bangkok. The study was analyzed on first semester in the year of B.E.1998. The sample students were divided to 2 groups: group A was assigned to learn by Computer Assisted Instruction cartoon lesson with the narrated text and group B was assigned to learn by Computer Assisted Instruction cartoon lesson with the narrated sound. The methodology of the study were to use the Randomized Control group posttest only design and the data was analyzed by t-test. The results of the study were:

1. two types of Computer Assisted Instruction of computer lessons were standard efficiency at 80/80 and
2. the learning achievement of the Computer Assisted Instruction cartoon lesson with the narrated sound was higher than the Computer Assisted Instruction cartoon lesson with narrated text at level .05 statistical significant.

Choltira Arayavongwal (1998) studied *Effects of using CAI lesson on introduction to computer for training the government saving bank personnel’s*. The purpose of this research was to compare the learning achievement of the Government Savings Bank personnels who were trained by using computer assisted instruction and by traditional trainning, on the topic of *Introduction to Computer*. The samples were 50 employees of the Government Savings Bank. The samples were equally divided into two groups: the experiment and the control groups. The control group was trained in the classroom in traditional way while the experimental group used the computer assisted instruction lesson, on the topic of *Introduction to Computer*. The Randomized Control Group Pretest-Posttest Design was used in this experiment, for analyzing data
by using t-test. The result was found that learning achievement of the experimental
group was statistically significant higher than that of the control group at .01 level.

Chan, Josephine S. (1999) studied the predictors of achievement using CAI:
self-efficacy for achievement and control of learning beliefs. The primary goal of this
study was to examine the relations between self-efficacy for achievement and control
of learning beliefs and academic achievement while controlling for prior knowledge.
The secondary goal of this study was to investigate whether time using CAI was
positively related to prior knowledge, self-efficacy for achievement and control
beliefs. In addition, the kind of learning strategies that students employed using a CAI
program were also explored. Thirty three baccalaureate occupational therapy students
from an urban university were given four weeks to learn the topic of human anatomy
and manual muscle testing from a CAI program. The Motivated Strategies for
Learning Questionnaire was administered before and after students used the CAI
program. Results from the study showed a significant positive relation between self-
efficacy and achievement. The hypothesis that academic achievement could be
predicted from self-efficacy when controlling for prior knowledge was partially
supported. The significant interaction effect of prior knowledge indicated that
academic achievement can be predicted from self-efficacy only for low prior
knowledge students. However, no significant findings for the relation between control
of learning beliefs and achievement were found. For the secondary goal of
investigating the uses of the computer program, the findings indicated that there was
no significant positive relation between time spent using CAI and prior knowledge,
self-efficacy and control of learning beliefs.

Joy F. Xin (1999) investigated The effects of computer assisted cooperative
learning with and without disabilities. A total of 118, 3rd grade elementary students,
25 of whom had learning disabilities participated in the study. Three commercial
computer software packages were used for students to learn mathematics skills,
including concepts, computation, application and problem solving. The mathematics
achievement was examined by pre and posttests to the participating students. Results
showed that students in the cooperative learning group had statistically higher
achievement scores than those in the whole-class learning group.

Kaitsuk Chareekot (2000) conducted a study for the A development of
competency criteria for CAI specialists. The purpose of this study was to develop the
competency criteria for the computer assisted instruction specialists. The sample
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comprised (1) 6 computer experts, (2) 7 technology educators, and (3) 5 content and methodology experts, selected through a snowball technique. The steps of this research were proceeded by studying and analyze the competency of the computer-assisted instruction specialists, technology educators, teachers and the steps of CAI construction. The collected data were used to construct the questionnaires for Delphi technique. The median and interquartile ranges were used to analyze the data. Research findings showed that the competency for the computer-assisted instruction specialists consisted of:

- Knowledge competency; computer system, subject contents, CAI design, learning theory, and other relevance knowledges to CAI production.
- Skill competency; computer skills, curriculum skills, CAI design skills, and other necessary skills for CAI production.
- Intelligent competency; creative thinking and imagination, active learning, vision ability, observation and memory ability, information retrieval ability.
- Attitude competency; open minded and respect for the others opinions, awareness of CAI value, enthusiasm in the promotion of CAI production and development, teaching affection, be proud in the role of CAI specialist, responsibility in CAI production, acceptability on computer technology and innovation.
- Moral competency; devoted for success work, make an effort, morality, endure and restraint, and honesty.

Kowit Yodmongkol (2000) worked for The development CAI on learning achievement and attitude toward basic pneumatics and hydraulics of certificate of vocational students at Nong Khai Technical College. The purposes of this research were:

1. To compare achievement of basic pneumatics and hydraulics of certificate of vocational three students the experimental learning by using Computer Assisted Instruction and using traditional teaching
2. To compare attitudes towards basic pneumatics and hydraulics of certificate of vocational three students the experimental learning by using Computer Assisted Instruction and using traditional teaching
The sample consisted of two classrooms of certificate of vocational three students in Electrical Power Division Nong Khai Technical college, during the second semester at the academic year 1999. Each classroom consisted of 40 students. The research instruments were: basic pneumatics and hydraulics learning achievement and attitudes towards basic pneumatics and hydraulics Inventory. The data were analyzed by using mean, standard deviation and t-test. The research findings were as follows:

- The achievement of basic pneumatics and hydraulics learning of experimental group was higher than the controlled group at the .05 level of significance.
- The attitude towards basic pneumatics and hydraulics of experimental group were higher than the controlled group at the .05 level of significance.

Schipper, Rachel Ann (2000) studied The relationship between computer-assisted instruction and learning style on achievement in freshmen college students. Linear and hypertext environments were investigated to determine if presentation strategy had an effect on instruction for learners with a variety of learning styles and field orientations. One hundred and forty-two college freshmen were randomly assigned to one of two different groups based on scores from Kolb’s Learning Style Inventory: Converger/Assimilator, and Accommodator/Diverger. The two groups were randomly assisted to either orientation, using the Group Embedded Figures Test. Time taken to complete the tutorial and citizen status were additional variables considered.

As anticipated, Converger/Assimilator students taking the hypertext version of the tutorial and Accommodator/Diverger students taking the linear version of the tutorial averaged higher scores on a content-based multiple question exam than did Converger/Assimilator/linear students and Accommodator/Diverger/hypertext students. The interaction set was significant and Attribute Treatment Interaction was calculated. Two learning style contrasts, as well as the time variable, were significant.

Walsh, Roderick Keane (2000) studied The relationship between CAI, instructor-led instruction and learning achievement for teaching statistical process control. Conducted a research designed to study learning outcomes, duration of tutorial time, retention, relationship between duration of tutorial time and post-test and content retention test scores for the CAI group, and attitudes toward computers as
an effect of the treatment given to subjects. A repeated measures experimental design, whereby, observations were made prior to treatment, immediately after treatment and one week after treatment, was used for the research. Subjects included engineers and managers from Read-Rite Corporation who were randomly assigned to a CAI or Instructor-led (IL) treatment.

The CAI group had a shorter duration of tutorial time, completing their tutorials by 46 minutes faster on the average when compared against the IL group. There was no relationship between duration of tutorial time and performance on post-test and content retention scores for the CAI group.

Jan, Ai-Chen (2001) studied Multimedia CAI: Physical agent modalities Thermal agents. CAI has provided the opportunity for dynamic learning experiences for healthcare professionals. Since the multimedia materials for occupational therapy students and therapists are limited at this time, the purpose of this project was to create a valuable educational resource on physical agent modalities (thermal agent) for this field. A small group of students and clinicians was recruited to test out the usability of the CAI program. All subjects reported satisfaction with the program and recommended the usage of CAI programs as supplementary learning and teaching material.

Rick Mills (2001) conducted A comparison study of the learning effectiveness of CAI vs. Classroom lecture. He investigated the effectiveness of using CAI for skill training in the workplace. Manufacturing employees received electrical training using CAI or classroom lecture. Learning, satisfaction, and cost of each method were measured. CAI was found as effective as classroom for factual topic, but not as effective for theoretical topics. CAI learning required less time for factual topics, but more time overall and for theoretical topic.

Rungrote Pongkitwitoon (2001) studied The development of CAI based on constructivist theory in theoretical probability distribution on the business statistics of Rajabhat Institute Curriculum 2000. The purpose of this study was to develop the computer-assisted instruction (CAI) based on constructivist theory in theoretical probability distribution on the business statistics of Rajabhat Institute curriculum 2000. In addition, to compare students’ learning achievement and satisfaction between the students learning via CAI and students learning via CAI followed by constructivist process. The 76 subjects who participated in the study were freshmen of the Faculty of Management Science, Rajabhat Institute Nakhon Ratchasima, in 2001.
The subjects were divided into two groups. The first group was used for the efficiency testing (36 cases) and the second group was used as the experimental group (40 cases). The efficiency testing process consisted of one to one testing, small group testing, and field testing. The experimental groups consisted of 20 students who studied with CAI, and 20 students who studied with CAI followed by the constructivist process. The findings were as follows:

- The efficiency of the CAI in theoretical probability distribution was 78.2/72.5, which met prescribed criterion 75/75 level.
- Both groups of students who studied with CAI and who studied with CAI followed by the constructivist process had significantly higher posttest scores than pretest scores at the .05 level.
- The group of students who studied with CAI followed by the constructivist process had scores not significantly different from those who studied with CAI.
- The group of students who studied with CAI followed by the constructivist process had shown higher satisfaction than those who studied with CAI but not significantly different.

The constructivist process with printing or transparency film, retention of the study, and the students' attitude for constructivist process are needed for further study.

Panarat Sangvichit (2002) conducted a study entitled *The development of CAI in higher vocation certificate curriculum for business computer of computer network*, built and developed the computer-assisted instructions, took it for three processing experiments as follows:

1. the one to one testing,
2. the small group testing, and
3. Field-testing:

with the 35 students who have never learned computer network. The computer-assisted instructions for business computer of computer network in higher vocational certificate Curriculum concluded that researcher had built and developed take the effectiveness of standard 85.7/85.44. So, this CAI can be used in classes.

Anderson Mark Busey (2003) conducted a study entitled *Features of Programmed Logic for the Automatic Teaching Operations (PLATO), a CAI learning system, that promote students' mathematics achievement*. A literature review, studies and
analyses have sought evidence in support of computer assisted instruction (CAI) programs, in general. PLATO, specifically, has gathered much attention as an alternative educational solution to traditional instruction. This learning system provides student users with a self-directed medium for learning. The instructor-as-tutor feature is a resulting effect on the learning environment. In addition to quality of content, three program features are important: self-pacing, self-mastery and instructor-as-tutor are integral parts of the PLATO software. The instructor-as-tutor feature is a resulting effect on the learning environment. First developed over 40 years ago, PLATO has helped producing significant achievement scores and gains in a variety of learning contexts. Based on a review of 22 studies, the aforementioned features of PLATO seen to reorient instruction around the student user. Teachers become tutors, or guides, to students in a PLATO classroom. However, a limited population of students seemed to have benefited from the use of PLATO programs. Hence, questions of equity and access were addressed.

Baker Donld Richard (2003) in his research work entitled *Someone has to care: CAI and struggling readers*, conducted a study involving three volunteer, struggling readers and the computer assisted reading instruction software program, Academy of Reading 2000. CAI can be a useful tool for struggling readers but it can not replace one-on-one quality attention from a teacher. With adequate training and support, CAI can be considered an aid for teachers who have time to understand the complex literacy issues facing individual students with reading difficulties.

Christian Esther Renee (2003) investigated *The nursing students’ and nursing educators’ perceptions of their knowledge and use of CAI*. Thirty-five senior baccalaureate degree nursing students and 16 nursing faculty members from the mid-south completed a 26 items questionnaire that addressed the respondents’ perceptions of their use knowledge of computers and included activities. The instrument was a paper and pencil self-report that used a 5 point Likert scale ranging from 0 (none) to 4 (extensive) for past or present computer uses and from 0 (none) to 4 (considerable) for computer knowledge. A demographic section was included in the questionnaire to access descriptive data that included personal characteristics of subjects. The SPSS statistical computer application using the one-way analyses of variance (ANOVA) was used. There were no significance differences in the perceptions in the areas of general computer applications use and knowledge between nursing students and educators. With technology advancements, it is now possible for students to be in active learner roles.
**Hay, Kurt Mathew (2003)** studied CAI in mathematics: determining the volume of three dimensional figures. This study is a field-test of CAI in geometry. The subjects were eighth grade general math students from a heterogeneous group from Palos Verdes Intermediate School. The purpose of this CAI was to teach an in-depth, unique lesson of finding the volume of three dimensional figures. This paper discusses the results and significance of a field-tested CAI program as a means of delivery of instruction. Students responded to an interactive lesson, with remediation, that culminated in a real-world example of the benefits of understanding volume of three dimensional figures. The pre and post-test evaluation provided the assessment tool and the results indicate that this tutorial was valuable in helping students learn how to determine volume of three dimensional figures.

**Hsu Yung-chen (2003)** conducted a study to investigate the effectiveness of CAI in statistics education at the college level in the United States. This study employed meta-analysis to integrate the findings from 25 primary studies, which met a specific set of criteria. Results of the meta-analysis produced an overall effect size estimate of 0.43, indicating a small to medium positive effect of applying CAI in teaching college-level introductory statistics on students’ achievement. The results of the analysis of variance showed that different modes of CAI programs produced significantly different effects on students’ achievement in learning statistics. The teacher-made CAI programs were significantly more effective than the commercially developed CAI programs. The effectiveness of CAI program in teaching statistics did not differ significantly according to the study characteristics of the publication year, the publication source, the study educational role of CAI program, and the sample size.

**Crewa, Janna Margarette (2004)** studied Principles and methodology for CAI design. The primary goals of this research are two-fold.

- First, derive a theoretically and empirically-based set of CAI design principles directed at purposefully exploiting the unique capabilities of information technology to help learners develop their mental schemas.

- Second, codify a methodology for implementing these principles in the systems analysis and design process.

Both goals were accomplished as followed. First, a literature review was undertaken to uncover features important for designing CAI to improve learning. Concurrently, the design features and functionality of several existing CAI were
reviewed. A field study of one distinctive CAI was conducted to investigate and substantiate its effectiveness. Results indicated that learners using the CAI improved their achievement significantly more than learners who did not use the CAI. Moreover, learners attributed their improved performance to using the CAI. Based on the literature review, review of existing CAI and the results of the field study, a set of principles and a methodology for designing CAI were derived. The design principles and methodology focus the CAI design process on supporting learners’ development of their mental schemas.

Linda L. Wade (2004) studied *Teaching information literacy skills using CAI*. She evaluated the effectiveness of an interactive multimedia tutorial followed by a classroom teacher-led practice session on student skill and attitude towards one component of information literacy skills-locating and accessing information. The results of the study indicated that computer assisted instruction is an effective method of delivering information literacy skills instruction. Students were able to select an appropriate database for their topic and navigate through, select, and print information that supported their focus questions with minimal involvement on the part of the teacher.

Preciado, Christina (2005) conducted a study on *computer assisted instruction field test: system of equations*. An individualized Computer Assisted Instruction (CAI) called System of Equations (SOE) designed by the researcher was field tested in two of the researchers ninth grade Algebra 1 classes. The students interacted with a program over a 5 day-period during their 55-minute Algebra 1 class. The CAI activity contained three main sections: an introduction that describes the objectives of the activity; a section that allows investigation, in which students follow steps and answer questions and a section in which students are given the opportunity to explore more. The researcher’s pretest and posttest scores measured the effectiveness of this program. Based on the scores of the thirty-five students who participated, the field test found that there was a significant improvement in the comprehension of the concept system of equations. The results of the evaluation are encouraging and suggest that the proposed methodology can be effective in performing its task.

Pride, Linda Ewing (2005) conducted a study on *computer assisted instruction versus traditional lecture instruction in developmental studies in a rural mid-South community college*. This study used a matched-pairs design to examine the readiness of students in developmental studies at a rural mid-south community college.
taught mathematics using Computer Assisted Instruction (CAI) with that students taught mathematics using the Traditional Lecture Instruction (TLI).

In this study 64 students participated in an experiment in which half of the students took mathematics using computer assisted instruction while the other half learned the same material using the traditional lecture instruction. Statistical analysis of student achievement using test scores was the method of study. Students were administered an Elementary Algebra test to determine readiness for Intermediate Algebra. The same knowledge assessment post-test was given to all students and the scores were statistically tested for significance using an ANOVA. Although, the mean score for CAI was higher than the mean score for TLI, the results of the ANOVA did not support the research hypothesis.

➢ REVIEW OF LITERATURE RELATED WITH COOPERATIVE LEARNING:

Mathewson, Dianne Snyder (1985) studied Causal attributions and interpersonal attitudes in cooperative groups of females. Fifty-six females college students enrolled in six different psychology/human development courses worked in cooperative groups in completing a classroom assignment. Group members indicated attitude towards their group as a whole, as well as towards each groupmate. Results indicated that individuals who perceived their groups as successful expressed more favorable attitude towards their group as a whole. Each group member rated herself and each of her groupmates in terms of contributions to the group’s outcome. Results indicated that more favorable attitude of individuals were rated were by their groupmates as high contributors. Subjects also indicated the degree to which five attribution factors influenced their group’s success. Results indicated that high contributing members, as defined by self-contribution ratings, perceived the attributional factors of ability and positive attitude as more influential than did low contributing members. Additionally, members of more successful groups, regardless of contribution, perceived the attributional factors of ability as more influential to their group’s success than did members of unsuccessful groups.

Lauderbach, Keith Allyn (1986) conducted a study entitled Cooperative and individual learning activities: Their effects on performance in visualization of multiview orthographic projections. The purpose of this investigation was to

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determine effects of cooperative and individual learning activities on a student’s ability to visualize multiview orthographic projections as measured by an individual performance posttest. The subjects participating in the study were the 69 full and part-time undergraduate industrial arts education majors and non-majors enrolled in three sections of Engineering Graphics classes at Millersville University, Pennsylvania during the fall 1985 semester. The experimental design was a 2 x 2 factorial design. It was implemented in the fifth week of classes during the multiview projection unit and completed after 15 hours of instruction. The result’s indicated no significant difference in posttest scores of students in cooperative and individual learning groups, nor was there a difference between high and low visualizers in the cooperative group when compared to the high and low visualizers in the individual group. There was no significant interaction effect between treatment (cooperative or individual learning activity) and spatial ability (high and low).

Archer, Julie Ann (1988) conducted a study entitled Feedback effects on achievement, attitude and group dynamics of adolescents in interdependent cooperative groups for beginning second language and culture study. The purpose of this study was described as the effect of individual with group feedback, compared to group feedback alone on maximizing individual student achievement, positive attitude development and favorable group dynamics aspects for second language students using cooperative learning group structure according to the David and Roger Johnson Model. Individual feedback was the treatment administered in a field setting experiment with 56 subjects in German Language and Culture classes for middle school students in a public school in the upper mid-west. The treatment context was interdependent cooperative learning groups, where group feedback is a basic element. The dependent variables were achievement, attitude and group dynamic. The findings of this research strongly indicate that feedback about individuals and their groups is more effective than feedback about group performance alone in the areas of achievement, attitude and group dynamics. The first set of findings are based on testing hypotheses comparing the experimental group means on the achievement assessment instruments comparing individual scores with their own learning group mean as a measure of uniformity and correlating individual scores with uniformity scores. The second set of findings are based on hypotheses concerning attitudes about interindividual relationships, factors of classroom environment, perceptions about learning German in cooperative groups, course and field trip evaluations and parental
perceptions. A third set of finding about group dynamics also supported the effects of individual feedback concerning the observations of group monitors and subjects' introspections.

Carney, Cathleen Chmielowski (1988) studied *Using cooperative learning strategies to enhance computer-assisted keyboarding instruction*. The purpose of this study was to examine the impact of cooperative learning on the acquisition of keyboarding skills. The study also examined the effects of academic aptitude, gender, and software/hardware configuration on the development of keyboarding proficiency. One hundred nineteen 4th grade students participated in this quasi-experimental study, conducted simultaneously at two public elementary schools. At school A, three 4th grade classes participated: two experimental and one control. At school B, two 4th grade classes participated: one experimental and one control. The hardware/software configuration and instructional schedule used differed across schools. School A used a computer lab disk-based keyboarding software. Because school B had no computer lab, subjects in school B used inexpensive, battery-operated, portable keyboarding with nine lessons built the unit. The results showed no significant impact of cooperative learning on students’ acquisition of keyboarding skills. The results also showed no significant difference in students’ attitudes towards one another depending on whether or not they worked in a cooperative learning environment. A significant difference, however, did not occur between the two schools. Acquisition of keyboarding skills was significantly better in the school using portable keyboards.

Wilson, Michael Francis (1989) studied *The effects of cooperative learning on self-perceptions of teachers' careers and behaviors*. The purpose of this study included:

- an examination of the effects of a staff development program of cooperative learning on self-perceptions of teachers’ careers and behaviors.
- an explication and critique of Dewey’s theory of intelligence.
- An analysis of teacher interviews in the light of Dewey’s theory.
- A re-examination of the philosophical and pedagogical foundations of cooperative learning.

It was shown that the philosophical foundations of cooperative learning were diametrically opposed to Dewey’s theory and practice of intelligence. It was also
found that teachers exhibited few attributes of Deweyan intelligence. While Dewey’s theory remains a continued source of intellectual enchantment and inspiration, it was argued that social conditions had now reached the point where his democratic ideals would be problematic to realize.

**Edelbrock, Robert Charles (1990)** studied *Computer anxiety reduction: the effect of cooperative learning*. This study addressed the need for an efficient and economic method of reducing computer anxiety in teachers. This study used the quasi-experimental, Non-equivalent Control Group design, with a pre-posttest to measure the level of computer anxiety. The study used a control group and an experimental group in an attempt to test the assertion that dyad pairing of highly anxious with non-anxious students would significantly reduce the level of computer anxiety experiences. An analysis of variance of the mean gain scores was used to analyze the data by group and gender. Finding revealed that the experimental group reported a significant reduction in the level of computer anxiety at the conclusion of the course, which included the cooperative learning intervention. The control group also reported a significant reduction in the level of computer anxiety but without positive treatment.

**Olivas, Gerald Whilton (1990)** conducted a study entitled *The effect of cooperative learning on acquiring competencies for computer applications*. The purpose of this study was to determine the effect of using a cooperative learning method on student learning of computer application. An experimental group of 21 students and a control group of 24 students from the Word Processing Lab of the Regional Occupational Program were used in this study. This involved the use of seven cooperative teams, with three members on each team, who worked together to complete hands-on word processing lessons. At the conclusion of the study both groups were posttested using the Word Processing Operator Test of the Business Education Employment. The hypothesis of this study predicted that students who used a cooperative learning method to learn a computer application would show greater gains in competencies than students who used an individualized learning method. This hypothesis was supported. A t-test statistical formula was used to analyze the posttest mean score for the complete instrument, the objective section of the instrument and the performance section of the instrument. The results of all three analyses indicated that the experimental group did significantly better in terms of gained competencies than the control group at the .05 level of significance. In addition, the results of the
data that were kept on the amount of time students used their computers to complete their lessons showed that the students in the experimental group completed their lessons on an average in 12% less time than the control group.

Butler, Renee Hill (1991) conducted a study entitled *Cooperative learning and computer simulations: Examining effects on the problem-solving abilities of sixth grade students*. The goal of this study was to advance the exploration into the productive use of educational computer technology. Investigation into computer assisted cooperative learning was conducted by the use of a high-quality software simulation in a lab setting. Students worked either individually or in a cooperative group. Data collection included a problem-solving pretest/posttest instrument, student kept records, and video taped sessions of the cooperative groups and cooperating teacher log. Pretest/posttest data were then examined to determine if a difference existed in problem-solving skills between the two groups. Differences between the groups in using problem solving skills were explored, as were peer interaction variables in the cooperative groups by the analysis of video tapes. Findings indicate that while both individual and cooperative groups showed gains on four of five pretest/posttest measures, the computer assisted cooperative learning groups showed a significant gain on one measure, determining solutions and solved significantly more computer simulation tasks. Interaction analysis also suggests that there were eight categories of group interaction within computer assisted cooperative learning classes. The most successful computer assisted cooperative learning group made extended use of an information question pattern not used by the least successful group.

Bak, Byung-Gee (1992) studied *Meta-analytic integration of the relationship between cooperative learning and achievement*. The purpose of the current study were to re-evaluate the effect of cooperative learning (CL) on students’ achievement using Hedges’ meta-analytic approach, to extract the essential components of CL and to identify the moderators of CL. First, CL methods are effective for students’ achievement. Second, analysis of essential components of CL showed that it would be desirable to implement cooperative learning. Third, analyses of moderators of CL revealed the following findings. Analysis of study-wise moderators shows that publication bias exists, the Learning Together method is most effective, a large control group is more effective than a small control group and studies with high-quality designs report larger effect sizes. Analysis of experiment-wise moderators tells us that CL is more effective for science subjects, high-level tasks, 1-2 months’
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duration, 4-5 member group size, presentation situation, group leader situation and upper-middle heterogeneity level.

Frank, Kerry Dean (1992) studied *Teasing apart various aspects of cooperative learning: A theory generating meta-analysis*. The present study developed as a result of an interest in determining what specific strategies and techniques used in various cooperative learning conditions contributed to enhanced cross-racial relationships. The current investigation focused on ways of operationalizing aspects of cooperative learning techniques and settings that potentially could account for variability in the magnitudes of findings. The resulting coding system was in large part subjective; specifically, raters were instructed to “form a subjective estimate of whether the level in each study is high or low and come to some global estimate”. The overall patterns of the finding revealed that six variables were significantly related to the superiority of cooperative over other goal structures. They were: 1. Personalized interaction/task focus; 2. Class numerical distinctiveness; 3. School numerical distinctiveness; 4. Individual task focus; 5. democracticness of group and 6. Ability based versus opinion based.

Chang, Sheng-Chei (1993) studied *The effect of group reward on student motivation, interaction emotion and achievement in cooperative learning small groups*. The role that reward structure plays in the effectiveness of cooperative learning methods has been a controversial issue in cooperative learning research. To clear up this controversy, cooperative learning researchers need to examine the group processes in cooperative groups under different reward structures. This study was designed to explore this issue. Six classes of seventh grade junior high students were assigned to three treatment groups: cooperative learning classes with individual reward, cooperative learning classes with group reward and traditional classes. Results of this study support these hypotheses only partially in that students tended to feel more peer pressure, tended to give more explanations to peers, felt guilty and shameful more often and maybe achieved better than students in the cooperative learning with individual reward classes. However, the feeling of peer pressure, guilt and shame did not correlate with student achievement. Otherwise, whether student showed certain pattern of interaction might very well depend on the teachers’ classroom management style and the climate of the classroom. Many gender differences came up in this study and some are interesting and important. The differences between students in cooperative learning classrooms and those in
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traditional instruction classrooms on motivation and achievement are also presented and discussed.

Temiyakarn McDonald, Chanchai Singhanayok (1993) investigated the effects of studying alone or in cooperative learning groups on the performance of high and low achievers. They examined the effects of completing computer-based instruction using either learner or program control. Twenty-four students were assigned to work in heterogeneous pairs with the learner controlled/cooperative version of the computer based tutorial, twenty-two students were assigned to work in heterogeneous pairs with the program controlled/cooperative version of the computer based tutorial, forty-six students were assigned to work individually, half in the learner controlled and half in the program controlled version of the computer lesson. All subjects were told that they would take the immediate and delayed posttest individually. Both high and low achievers in the cooperative treatment increased achievement on program controlled and learner controlled computer lesson. The learner controlled cooperative learning group made more options while checking their concept learning and spent more time interacting with the learner controlled computer based tutorial than the learner controlled individual learning group. It appears that the cooperative learning group’s attitude toward grouping was better than the individual group. There was no significant difference in any treatment factor on attitude toward lesson.

Mkhabela, Octavia Khabelani (1994) conducted a study entitled effects of scripted cooperative learning on academic performance of Black South African college students. The study investigated the effects of study condition (cooperative and individual) and script type (high, low and no script) on academic performance of 195 Black South African male and female first year college students. The study also investigated the relationship among demographic factors, cultural variables and performance under the different experimental conditions. The relationship between task liking as measured by the evaluative questionnaire and post-test performance was also investigated in this study. This study was conducted in four phases. Session 1 of phase 4 involved learning a different passage using the same instructions provided during phase 3. During session 2 participants took a post-test and completed the evaluative questionnaire. The following hypothesis were tested:

- cooperative dyads would perform better than participants learning alone.
the three script types would differ such that participants using high scripts would perform better than those assigned to the low script and no script conditions.

- females learning as cooperative dyads would perform better than males assigned to the same condition.

- significant positive correlation would be found among post-test scores, demographic variables, cultural variables and the evaluative items for participants learning as cooperative dyads.

- participants learning as cooperative dyads would like studying the passages better than participants learning alone.

The results indicated that cooperative dyads performed better than participants learning alone. The second prediction was partially supported. Participants using low scripts performed better than participants using no script.

**Wolf, Beverly Ann (1994)** studied *Effects of cooperative learning and learner control in computer-based instruction*. This study examined the effects of two lesson structures (cooperative and individual) and two levels of learner control (full and lean) on the achievement, option usage, time in program and attitudes of 126 ninety grade students who used a computer-based instructional program. Students were assigned to work individually or in pairs on either a full version of the program with the option to bypass examples, practice-with-feedback and review or a lean version with the option to add these elements. Criterion measures consisted of a 25 item posttest and a 13 item attitude survey. All students were assessed individually. There were no significant achievement differences for either lesson structure or learner control. Students working cooperatively chose to view a significantly greater number of example and review screens and spent a greater amount of time on the program than students working individually. Students in the full treatment chose to view a significantly greater number of all option screens and spent more time using the program than students in the lean treatment. The findings suggest that cooperative use of computer-based lessons is not detrimental to student learning, which may be useful in academic settings with limited computer resources. Implications for providing learner control in computer-based instruction were included.

**Adams, Eleanor Taylor (1995)** studied *The effects of cooperative learning on the achievement and self-esteem levels of students in the inclusive classroom*. This
study investigated the effectiveness of a specific cooperative learning method, Student Teams Achievement Divisions (STAD), on achievement and self-esteem levels of mildly handicapped and normal progressing learners in an inclusive classroom. The participants in the study were 108 sixth grade students in five reading classes in an inner-city public school. Forty-four participants were mildly handicapped learners, slow learners and special education students and 64 were normal progressing learners. Of the 64 normal progressing learners, 40 were excellent learners and 14 were average learners. The findings showed that when the researcher examined normal progressing students and mildly handicapped together, those in the treatment group had significantly higher levels of academic achievement in reading comprehension. The findings also showed that the self-esteem of the students in the two groups did not differ significantly. When the researcher examined the mildly handicapped students separately, found that those in the treatment group had significantly higher achievement levels in vocabulary but not in reading comprehension. The mildly handicapped students in the treatment group had significantly higher levels of general self-esteem but did not differ in school and academic self-esteem. These findings suggested that students in STAD classes did better academically.

Nutteerat Wutthicharoen (1995) conducted a study entitled *Effects of Cooperative Learning with Computer-Based Instruction for secondary school (class III) students*. The purpose of this research was to study effects of three types of cooperative learning on computer-based instruction in secondary school class III students. The three types of individual accountability in cooperative learning are individual quiz, random quiz, and a pair quiz. Subjects were 98 students from Jakamhanatorn school province. The subjects were assigned to three experimental groups for pair learning. During study, subjects were observed on cooperative behavior. After they finished each part, each experimental group had to do different quiz. The first group was about individual group, the second group was about random quiz and the third group was about a pair quiz. Post-test was administered after all subjects finished the lesson. The achievement scores were analyzed by One-way ANOVA, and observation was computed in the percentages. The results of this research indicated that there was no significant difference between three groups of cooperative learning on computer-based instruction in secondary school class III. The percentages from observations indicated that the experimental groups with random
quiz and a pair group were more cooperative and interactive than experimental group with individual quiz.

Juntana Kaweenuttayanon (1996) studied *The Use of Cooperative Learning Model in First Aid Subject for the First Year Students in Certificate of Public Health Program (Pharmacy Technique)*. The purposes of the study were:

- to compare the learning achievement in First Aid subject using cooperative learning and the conventional approach.
- to compare the learning achievement between three groups of students which have different ability in the experimental group.
- to study the students opinions toward teaching of First Aid subject. The data were collected in the second semester of the academic year 1995.

The samples were The First Year Students in Certificate of Public Health Program (Pharmacy technique) of Sirindhon College of Public Health, Khon Kaen Province. Those samples were divided by matched - pair technique into two groups and were randomly assigned to be experimental group (27 students) and control groups (27 students). The experimental group was taught by cooperative learning and the control group was taught by the conventional approach. The pre test - post test control group design was utilized in this study. The research tools developed by the researcher were the learning achievement test and the lesson plans using the cooperative learning and conventional teaching methods, achievement test and a set of questionnaire. The paired t - test and Wilcoxon Matched Pairs Signed - Ranks Test were used for analyzing the data. The findings of the study were as follows;

- The learning achievement in the experimental group was better than the control group. There were statistically significant differences at the 0.05 level.
- The difference in learning achievements among three groups of students who had different ability (high, middle, and low), were statistically significant at the 0.05 level.
- The control group and experimental group had good opinions towards teaching of First Aid subject.

Mitsuru Ikeda, Shogo Go, Riichiro Mizoguchi (1997) studies *Opportunistic group formation: A theory for intelligent support in collaborative learning*. One of the major educational significance of the collaborative learning was to enhance the
participants' motivation to awaken mature reflection on their own understanding and externalize the result of it. That is, how to characterize the organization of learning group. The term opportunistic implies that the model can prescribe the right situation to form the learning group. At ordinary situation, each learner is a series of tasks in individual learning environment. Once the opportunistic group formation model finds that the situation of a learner is the right timing to shift the learning mode from individual learning to the collaborative learning, the system taking charge of the learner proposes other systems to begin the negotiation for the learning group formation.

Oranoot Sompakdee (1997) conducted a study entitled Learning Achievement and Self-Esteem of Rajamangala Institute of Technology Diploma Level Students Learning Through Cooperative Learning in Industrial Product Design. The purposes of the study were to compare learning achievement in Industrial Product Design of students between cooperative learning group and individual learning group and to study self-esteem of the students. The subjects were 50 second year students at diploma of Product Design Division. The subjects were divided in to control group and experimental group, which consisted of 5 sub-groups. Each group had 5 subjects that had different competencies and different self-esteem. The subjects were taught together by the same instructor. Then, on the workshop period the control group worked by the assignment sheets normally, while the experimental groups used cooperative learning on the assignment sheets. During the workshop period the experimental groups were observed for the cooperative behavior. At the end of the learning session the achievement test and the questionnaire of self-esteem were administered to the subjects. The data were analyzed using means, standard diviation, t-test and percentages. The result of the study indicated that:

- The learning achievement of cooperative groups and individual group were significantly difference at the .01 level.
- Achievement of students who had different self-esteem was different after learning through cooperative and individual learning.
- The percentages from observations indicated that students were more cooperative and interactive.

Pratana Gatenoi (1997) conducted a study entitled Effects of Cooperative learning in social studies on learning achievement and analysis ability of lower
secondary school students. The experimental design had two groups: experimental group and control group. Each group consisted of thirty students. There were two sets of lesson plans: eleven daily lesson plans for cooperative learning activities and eleven daily lesson plans for conventional activities. Duration of experiment was four weeks, consisting of four periods per week and fifty minutes per period. Assessment instruments were analysis ability test that had reliability of 0.83 and achievement learning test, which had reliability of 0.85. Then the data were compared by t-test. The findings were as follows;

- Students who learned social studies by cooperative learning activities had higher learning achievement scores than students who learned by conventional learning activities at .05 level of significance.
- Students who learned social studies by cooperative learning activities had higher analysis ability scores than students who learned by conventional learning activities at .05 level of significance.

Sunun Saengngammongkhol (1998) conducted a study entitled A study of the combined effects of cooperative learning and instructional package on the learning of logarithm of the first year students at the higher vocational level. The study attempted to propose a cooperative learning strategy combined with an instructional package as an alternative to the conventional method of teaching. The subjects in this study consisted of the first year students of the higher vocational level at a commercial school in Bangkok. They were randomly divided into two groups: the experimental group and the control group. Each group, consisting of forty-three students, equally spent fourteen periods of study, each lasting 45 minutes. The former studied the materials as explained in the cooperative learning and instructional package designed by the researcher. A teacher who used the same curriculum under the traditional method of teaching taught the latter. An achievement test in logarithm was administered to both groups at the end of the experiment. The results indicated that the students who learned via the cooperative learning and instructional package performed significantly better than students in the control group.

Montip Charoenrod (1999) conducted a study entitled Effects of use of Cooperative Learning on Science Learning achievement and group work behaviors of secondary school class II students at Wachirathamsatit School in Bangkok. The purposes of the study were to compare science learning achievement and group work
behaviors of secondary school class II students between those studied under cooperative learning method and the conventional method. The sample comprised sections (48 students each) of secondary school class II students in the first set of 1999 academic year at Wachirathamsatit School in Bangkok. The sample was purposively selected from the classes, which had similar average achievement scores, then randomly assigned to the experimental group and the control group. The experimental group studied the topic Food for 12 periods under cooperative learning method. The control group studied the same topic under conventional method. The instruments used in the study consisted of the lesson plan, the science learning achievement test, the observation form and the self evaluation form on group work behaviors. The t-test was used as the statistical procedure for data analysis. The study revealed that:

- the science learning achievement mean score of the experimental group was significantly higher than that of the control group at the .05 level.
- the group work behaviors mean scores of the experimental group were significantly higher than that of the control group at the .05 level.
- the experimental groups self evaluation mean score on their own work behaviors was significantly higher than that of the control group at the .05 level.

David W. Johnson, Roger T. Johnson and Mary Beth Stanne conducted a study entitled Cooperative learning methods: A meta-analysis. Cooperative learning is one of the most widespread and fruitful areas of research, and practice in education. Reviews of the research, however, have focused either on the entire literature which includes research conducted in noneducational settings or have included only a partial set of studies that may or may not represent the whole literature. There has never been a comprehensive review research on the effectiveness in increasing achievement of the methods of cooperative learning used in schools. An extensive search found 164 studies investigating cooperative learning methods. The studies yielded 194 independent effect sizes representing academic achievement. All eight cooperative learning methods had significant positive impact on student achievement. When the impact of cooperative learning was compared with competitive learning, Learning Together (LT) produced the greatest effect, followed by Academic Controversy (AC), Student-
Achievement-Divisions (STAD), Teams-Games-Tournaments (TGT), Group Investigation (GI), Jigsaw, Teams-Assisted-Individualization (TAI), and finally Cooperative Integrated Reading and Composition (CIRC). The consistency of the results and the diversity of the cooperative learning methods provided strong validation for its effectiveness.

Kosit Jatturatwatthanakul (2000) studied *Effects of cooperative learning using team assisted individualization technique on learning achievement and transfer of learning ability in mathematics*. The purpose of the research was to study effects of cooperative learning using team assisted individualization technique on learning achievement and transfer of learning ability in mathematics. The sample consisted of 78 Prathom Suksa Five students of Kasetsart University Laboratory school, Bangkok. They were divided to an experimental group and a control group, comprising of 39 students in each group. The experimental group participated in the cooperative learning using team assisted individualization technique for a session of 50 minutes in each period, 13 consecutive periods for a month. The control group participated in usual instruction. The instruments for data collection were pre-post test of the student’s mathematics achievement and posttest of the transfer of learning ability in mathematics test. They were calculated and analyzed by employing the t-test, ANOVA and ANCOVA. The results were as follows:

- The students at all levels of mathematics achievement, participated in the cooperative learning using team assisted individualization technique, had higher posttest achievement scores than the pretest at the .05 level of significance.
- The students at all levels of mathematics achievement, participated in the cooperative learning using team assisted individualization technique, had higher achievement than the control group at the .05 level of significance.
- The students who participated in the cooperative learning using team assisted individualization technique, had higher transferring of learning ability in mathematics than the control group at the .05 level of significance.

1) After the treatment, there were no significant difference between medium and low students who participated in the cooperative learning using team assisted individualization technique in mathematics achievement.
However, there were significant differences between high and medium students as well as between high and low students.

Sakhorn Saenkhamdee (2000) conducted a study to examine students learning achievement and to survey their opinion, using Cooperative Learning STAD Model in Basic Pneumatics and Hydraulics Subject of certificate level at Chiang Mai Technical College. The samples were 20 third-year certificate students majoring in electrical power of Chiang Mai Technical College. Instruments used in this study were 4 lesson plans using STAD learning model, and the questionnaire asking students opinion towards the model. The opinion items fell into 3 aspects, namely students’ knowledge and skills, working habits, and students’ happiness in learning. The results of the study indicated that:

- Student’s mean score, using STAD learning model, was higher but the standard deviation was lower than those of the traditional teaching method.
- As for students’ opinion towards the cooperative learning, using STAD model, students expressed that the model helped them gain knowledge and skills, have good working habits and be happy in learning.

Sasithrn Manthong (2001) made a comparison of mathematics achievement of mathayom suksa two students learning through CAI between groups learning by cooperative learning and individual learning. The purpose of this study was to compare mathematics achievement of mathayom suksa two students learning through computer assisted instruction between groups learned by cooperative learning and individual learning. The samples were two classes of mathayom suksa two students of Lahansairatchadapisek school at Buriram province in academic year 2001. There were 50 students in each class. They were divided into two experimental groups learning through computer assisted instruction, the first group learned by cooperative learning and the second group learned by individual learning. The research instrument was the mathematics achievement test with the reliability of 0.87. The experimental materials constructed by the researcher were 22 files of computer assisted instruction lessons in integer system, fraction and decimal. The data were analyzed by means of Analysis of Covariance (ANCOVA). The result of the study showed that there was no significant difference in mathematics achievement of students learning through computer assisted instruction between groups learned by cooperative learning and individual learning.
Gillian, Janice Hoots (2002) explored the impact of the cooperative learning instructional method on 12 course learning environment factors, learning outcomes, and overall excellence of instruction and courses in a small rural comprehensive community college. This study also investigated the relationship of the 12 course learning environment factors on learning outcomes and overall excellence of instruction and courses. Over 3000 student ratings were collected for analysis. A quasi experimental representative design proposed that an experimental group (students in courses taught through cooperative learning) and a comparison group (students in courses not taught cooperatively) be compared on course learning environment factors, learning outcomes and overall excellence of instruction and courses. Students in courses taught cooperatively rated the course and instruction significantly higher than in course not taught cooperatively on 10 of 12 course learning environment factors and learning outcomes. The impact of cooperative learning on the overall excellence of instruction and course was also statistically significant but marginal. The findings of the impact of course learning environment factors on learning outcomes and overall excellence of instruction and courses were very significant. This study was significant not only because of the depth and scope of the study on cooperative learning in a community college, but also because of the investigation of how course learning environment factors impacted student ratings of learning outcomes and the overall excellence of instruction and courses.

Beck-Jones, Juanda Joan (2003) studied The effect of cross-training and role assignment in cooperative learning group on task performance, knowledge of accounting concepts, teamwork behavior and acquisition of interpositional knowledge. She sought to address questions concerning under what conditions were cooperative learning groups effective. The data for this study were provided by full-time freshmen enrolled in several sections of an orientation to business course in which the instructional strategy was cooperative learning. The sample comprised of 174 participants who were randomly assigned to one of the three treatment groups; one in which no roles were assigned, a second in which roles were assigned and the group members were cross-trained on the interrelationships between those role in completing the task.

The overall result indicated that role assignment was more effective than cross training for task performance. The findings showed, however, that cross training had a greater effect than role assignment on acquisition of accounting knowledge and on
interposition knowledge. This study points to the value of applying interventions when cooperative learning is used in class.

**Massey, Scott Lee (2003)** studied *The effects of cooperative learning versus traditional classroom instruction on cognitive achievement, critical thinking and attitudes toward learning in teams in a physician assistant program*. The purpose of the research study was to determine whether a statistical difference exists between students educated in a cooperative learning environment versus a traditional lecture environment. The dependent variable utilized in this study includes critical thinking skills, cognitive achievement, and attitudes towards learning in teams. Using an experimental research design, students were educated in a cooperative learning format versus a traditional lecture format. The findings revealed no statistically significant difference in cognitive achievement and critical thinking scores between the cooperative learning section and the lecture section. The instrument utilized to measure attitudes toward learning in teams was divided into nine sub-hypotheses. In six of the nine sub-hypotheses, the null hypotheses were retained. Three of the sub-hypotheses revealed statistically significant differences between the two groups on the following items: all members of my group were integral to the group’s success, each member of investigator’s group contributed to the effectiveness of our presentation and success of the group, and investigator’s group knew the goal of the group and understood its importance.

**Taylor, Christopher Perry (2003)** conducted a study entitled *The effects of cooperative learning on student academic performance*. Historically school and employment have been separate and exclusive activities. While this remains true in most industrialized countries, many American teens have been begun to participate in the workforce. In existing studies several consequences of this decision have been observed. Unfortunately, there is an absence of research pertaining to business programs that incorporate part-time employment as part of their cooperative learning curriculum. The study was conducted in an effort to observe the effects of these programs on secondary students’ academic performance. Three areas of the students’ overall academic performance, course grades, classroom attendance, and pre-post test achievement, were carefully examined. The findings of this study point to a small negative effect of cooperative education on classroom attendance. Both course grades and posttest achievement were found to have received no statistical significant effects.
from participation in cooperative education. This study helps to identify important questions and has implications for parents, teachers, administrators and students.

Ahles, Paula M. (2004) studied *Attribution theory in a cooperative learning situation: can it explain helping behavior.* The purpose of this study was to determine if attribution theory can explain helping behavior in an interdependent classroom environment that utilized a cooperative model. The study focused on student participants enrolled in six community college communication classes taught by the same instructor. Three levels of cooperative learning were employed. Survey data for this study were collected from the students enrolled in the six communication classes. Participants were presented with situations describing a group member who was not participating in the cooperative learning process. The findings led to the following conclusions:

- First, attribution theory appeared to explain helping behavior in the simulated scenarios.
- Second, controllable causes for non-participating elicited negative feeling from participants, prompting a reluctance to help.
- Third, differences in the emotional and behavioral responses of participants who actually experienced a non-participating group member in their current class did not significantly vary as a function of causal controllability.
- Fourth, emotional and behavioral responses did not vary by age, gender, ethnicity or level of cooperative learning employed in the class.
- Fifth, participants with three or more prior cooperative learning classes were less willing to help a group member who failed to participate due to a controllable cause than participants with less than three similar classes.

Kessler, Julie Beth (2004) conducted *A survey of faculty experiences using cooperative learning in teacher education.* This study investigated the extent to which cooperative learning is used by a national sample of teacher education faculty, the practicality of its use and potential problems and solutions for implementation in teacher education. Findings indicated that the majority of participants use cooperative learning frequently and believe it is a highly-effective way to learn course material. Most lessons focus on the learning of content and practical classroom applications. Problems include students’ lack of commitment and incentive to complete group
work. Solutions center on effective evaluation and faculty roles. Participants currently involved in educational settings are most likely to use cooperative learning. Those who do not use cooperative learning are comfortable with their methods and may be resistant to change and faculties in general, do not have many opportunities to talk to each other about their teaching.

Paris S. Strom, Robert D. Strom (2004) conducted a study of student perceptions in assessment of cooperative learning. A perplexing question for teachers using cooperative learning is to identify teamwork skills demonstrated by students during teamwork. The purposes for this tool was to identify self-improvement opportunities with the observations of teammates, detect slackers, credit hard workers, and gain an easy-to-understand record of social skills. Outcomes can be kept in portfolios to establish school data banks of team skills. Field-testing with 303 high school students found acceptable indicators of reliability and validity.

Rondinaro, Peter Dominick (2004) conducted a study of The interpersonal multiple intelligence on the usage of cooperative learning methods. The purpose of this study was to determine the relationship between interpersonal multiple intelligence and the usage of cooperative learning methods. Participants were 103 teachers from two Pennsylvania school districts and one Pennsylvania private Catholic high school. Data were collected from Cooperative Learning Survey and the Multiple Intelligence Developmental Survey. Pearson Product Moment Correlation Coefficient revealed that there was a significant relationship between interpersonal multiple intelligence and the cooperative learning teaching methods. Relationships between demographic variables and the use of cooperative learning were also examined. This finding suggested that teachers employed cooperative learning as a multi-dimensional teaching strategy.

Cooperative learning techniques allowed teachers to address both academic and social skills. This study revealed that teachers should not be forced to use cooperative learning and that intra-personal traits could help to explain why this teaching method is not utilized as much as proponents recommend.

Williams-Jones, Tiffany (2004) conducted An investigation of the cooperative learning techniques with a sample of children (0-4) across three different daycare and playgroup learning communities. The purpose of this study was to investigate the possible differential impact of cooperative learning activity.
social emotional development of young children. A set of independent variables (social class, race/ethnicity, gender, parental education and marital status) was studied to determine if any significant social-emotional differences existed in the outcome measures among the participants related to these individual difference variables. Twenty traditional preschool parent participants completed a demographic questionnaire, participated in a set of observations and interviews and completed the HOME inventory. Ten of children playgroup parents completed the Vineland Interview and four teachers completed the Vineland classroom surveys. A mixed methodological design was used to address two research questions: 1. Are there differences in the social-emotional development outcome measures of children who participate in at-home playgroups, compared to children who attend traditional programs and 2. Are there significant differences in the socio-emotional development outcome measures when variables such as socio-economic status, gender, ethnicity, parental education and single or two parent families are compared across at-home playgroup and traditional daycare group conditions. The participants in this study were parents for activity in the creation of stimulating social environment that were cohesive, caring and focused on the enhancement of child development. The parents in both groups were also very active in the child’s educational, social-emotional and extra-curricular activities. The results indicated that the parents were a major influence with respect to the creation of these learning environments. They focused their attention on the enhancement of social-emotional development and cooperative learning. Regardless of the setting, positive social emotional development appeared to be taking place. In the traditional preschool/day care setting, the staff was concerned with creating a positive collaborative learning environment for the children. Even when individual difference variables (SES, ethnicity, gender, education and marital status) were introduced, there were no differences in the outcome measures across groups.

Cangro, Richard M. (2005) conducted a study of the effects of cooperative learning strategies on the music achievement of beginning instrumentalists. The purpose of this study was to determine the effects of cooperative learning strategies on the music achievement of beginning instrumental music students.

Forty-six fifth and sixth grade students from four schools participated. Four trained teachers used specific cooperative learning strategies for a 20 weeks treatment during instrumental lessons. The students were randomly assigned into one of two groupings. The experimental group received direct instruction paired with cooperative...
learning opportunities the control group received only direct instruction. All participants learned the same concepts and repertoire from an instrumental band method book and the same direct instruction for a portion of their weekly 30 minute lesson. Subtests of the musical aptitude profile were administered prior to the treatment. A posttest consisting of three performed individually was administered to measure achievement. Performances were audiotaped and measured with researcher-designed rating scales assessing melodic, rhythmic and expressive performance dimensions. The composite ratings for each were analyzed using a repeated-measures analysis of variance to determine main and interaction effects for treatment, condition, and level of aptitude. No significant interaction or main effects were found for treatment. As expected, high-aptitude students received higher rating than did their low-aptitude counterparts. A significant main effect was found for condition. Student performance rating of the teacher-prepared were significantly higher that rating for a sight-read.

Chien, Ya-Chen (2005) conducted a study of incorporating cooperative learning in Taiwan English as a Foreign Language (EFL) classrooms. The purpose of the study was to provide a measure of the effectiveness of cooperative learning in English as Foreign Language (EFL) technological university classes in Taiwan in terms of students’ achievement, oral production, and improvements in students’ attitude towards language learning. As students in Taiwan were brought up in an educational pedagogy that places strong emphasis on competitive and individualistic learning, this study sought to discover whether cooperative learning could better help technological university students in the process and outcomes of English learning. Results showed that all the classes improved over time as determined by the gain scores in pre and post test, which indicated that cooperative learning groups could perform and improve English skills as well as traditional learning groups in an EFL setting. Cooperative learning students at both levels advanced and intermediate, indicated a preference for this teaching approach both on questionnaires and during interviews with the researcher. Depending on the type of cooperative learning and interaction designed by the instructor, cooperative learning provided more English speaking opportunities. Although in an EFL setting, students shared a common mother language, a well designed activity that promotes English language interaction between student can be introduced.
❖ REVIEW OF LITERATURE RELATED WITH INDIVIDUALISTIC LEARNING:

Ohanenye, Nnamdi (1985) conducted a study entitled *Comparison of the effects of traditional and individualized instructional teaching techniques on the level of academic achievement in science of eleventh grade students in secondary schools in IMO state of Nigeria*. This study:

- Offered an opportunity for a more comprehensive way to improve students performance in science.
- Provided a chance to assess from the perceptions of the participating teachers and students whether in fact individualized instruction is a preferred (compared to the traditional method) teaching method for science.
- For those Nigerian teachers, who had a misconception of individualized instruction and the cost of establishing it in their facilities, this study may provide a better understanding of the individualized instructional process and its financial costs.

For each of the five schools sixty students were selected as the subjects for this writer’s research. A simple random table was used to assign the students to either the individualized or the traditional control group. In each school the experimental and control groups had thirty students each. Teaching time was the same for all classes, forty-five minutes per period, five periods of biology per week, for a total of 3.75 hours of biology per week. Finding, individualized instruction resulted in higher academic gains for Nigerian students. This resulted in the rejection of the first null hypothesis. There will be no statistically significant differences between the students in the individualized mode classes and the traditional mode classes as measured by students achievement based on the differences between the pretest and the posttest scores.

Fox, Janes Albert (1986) made *A comparison of lecture based instruction and computer based individualized instruction*. The purpose of this study was to compare a lecture based instructional delivery system and a computer based individualized instructional delivery system. A group of 188 students enrolled in a general education science course at the University of Northern Colorado were randomly divided into two groups. One group received instruction for the course from
lecture format and the other group received instruction from a computer based
individualized format. The individualized format followed the parameters suggested
by Fred Keller for his Personalized System of Instruction. A validated final exam to
measure course content achievement was administered at the end of the course. It was
concluded that a computer based individualized instructional delivery system was not
as effective as a lecture based instructional delivery system. Several reasons were
suggested to explain the results including the effects of the Personalized System of
Instruction individualized education format and the dynamic effect of having an
instructor in the classroom.

Rowland, Paul McDonald (1988) studied The effect of two modes of CAI and
individual learning differences on the understanding of science concept relationships.
The purpose of this research was to determine the effect of mode of CAI and
individual learning differences on the understanding of science concept relationships.
University elementary education majors (n=97) learned about home energy use from
either a computer simulation or a computer tutorial. They were administered three
measures of concept relationships: a concept web; a multiple choice achievement test
and a multiple choice applications test. Instruments were administered to measure
four individual learning differences: discrimination skill (Learning Styles Profile
Discrimination Skill subscale), field orientation (Group Embedded Figures Test),
locus of control (Rotter’s I/E Scale) and holist/serialist learning strategy (Study
Preference Questionnaire). The tutorial treatment was superior to the simulation for
developing concept relationships on the achievement test and the concept web. No
significant difference between the two treatments was found for the applications test.
Simulation users scored higher on their applications test than on their achievement
test. Tutorial users scored higher on their achievement test than on their applications
test.

Levin, Mary Elizabeth (1989) conducted a study entitled Comparison of
individual and cooperative mnemonic vocabulary instruction. Eight classrooms of
sixth and seventh graders were selected from a middle school in a midwestern
university community. Students were separated by gender and then by achievement
level (higher vs. lower) within classrooms for their teachers to create same sex,
mixed-achievement-level pairs. Student pairs were then randomly assigned to one of
four strategy/format conditions:

1. Individual mnemonic
2. Individual free study
3. Paired mnemonic
4. Paired free study

With all four conditions represented in each classroom. Three major findings emerged from this study:

- First, whereas among higher-achieving students no strategy/format difference were found, among lower-achieving students difference favored mnemonic-strategy users. On delayed tests of definition recall and story recall/comprehension, differences between individual mnemonic and individual free study students were statistically significant.

- Second, when free study students were re-classified as: (a) spontaneous mnemonic-strategy users and (b) nonmnemonic-strategy users, a strong pattern of differences favoring the “mnemonic” strategists was found. Moreover, students in the paired free study condition were statistically more likely to use effective strategies than were students in the individual free study condition.

- Third, when the scores of students in the paired free study and paired mnemonic conditions were re-analyzed, taking into account achievement level differences between pair members, the magnitude of the difference interacted with strategy. In pairs, students were at an advantage when within-pair difference were low, whereas free study pairs were at an advantage when within-pair difference were high.

Leali, Shirley Ann (1992) conducted a study entitled Cooperative and individualized learning with CAI in mathematics for at-risk high school students. The purpose of the study was to explore the outcomes of cooperative and individualized learning with CAI in mathematics for at-risk high school students. The cooperative learning model used for his study was the Learning Together Model developed by David and Roger Johnson of the University of Minnesota. The software programs used were real-life simulations of practical value to the student. This study was conducted in an integrated public high school in the American Southwest. The sample consisted of 74 students enrolled in grades 9 to 12. The findings were that students in the cooperative environment performed better on the mathematics post-test than those in the individualistic classes. The analyses suggested that males had a more favorable
attitude toward computers than females and those students in the individualistic classes showed a more positive attitude toward cooperative learning.

Pavese, Aida Genarita (1993) studied *The effect of cooperative and individual learning on the achievement of at-risk community college students*. Comparative studies in the use of various models of cooperative learning were reviewed in the literature. This review served as a basis for designing and evaluating a model collaborative learning treatment for educating “a risk” students in developmental courses. The subjects were 55 undergraduate students enrolled in a reading course at Suffolk Community College, Brentwood, New York. Random interviews of students involved in the collaborative learning process, provided further assessment of their academic achievement and self-esteem findings indicated that:

- The modified cooperative learning method proved to be a useful process in developing the reading performance of underprepared college students.

- Students, when taught in a collaborative environment, with group goals that are meaningful, can effectively achieve academic success and therefore, persist in their education.

- The combined cooperative learning experience/journal writing appeared to be an effective means of educating students in specific reading and writing strategies.

- In comparing both the written journal and the group assignments, it appeared easier for students to express emotions (frustration, praise, and disappointment) through the individual writing.

- Discussion of assignments and the setting of group goals enhanced preparation and developed responsibility.

Williams, Reginald Wade (1994) conducted a study entitled *African American males’ perception of unsolicited help: An attributional analysis of cooperative vs. individualistic learning*. The study was conducted:

- To determine if help condition (help vs. no help) influence perception of unsolicited help.

- To determine if the instructional techniques associated with cooperative learning or direct instruction influence perceptions of unsolicited help.

- To determine if individual differences (i.e., Task, Ego, Work Avoidance) have an influence on unsolicited help.
One hundred fifty upper elementary African American males completed the Motivation Orientation Scale and viewed two videotaped presentations depicting two instructional approaches (individualistic and cooperative instruction). The results provide support for unsolicited help as a low ability cue and for the use of cooperative learning as an attribution change program. Findings also give support for the Motivation Orientation scale as an individual difference measure.

Tannapat Pootanapan (1995) conducted a study entitled Interaction Between Computer Assisted Instruction of Exercises Two Types with Individualized and Group Learning Achievement. The subjects were eight students of primary school class IV at Demonstration school, Srinakarinwirot Phasanmit University academic year of 1995. The subjects were randomly assigned to 4 experimental group:

- A group learned from computer assisted instruction exercise of tutorial by individual study.
- B group learned from computer assisted instruction exercise of game by individual study.
- C group learned from computer assisted instruction exercise of tutorial by group study.
- D group learned from computer assisted instruction exercise of game by group study.

The tool used in this study was computer assisted instruction program in Mathematics. The subjects were tested by 25 items on the answer sheets provided. The data were analyzed by Two-Way Analysis of Variance. The results of the study were as follows;

- There was significant difference at the .01 level, in Mathematic learning achievement between students of two different computer assisted instructions of exercises of two types
- There was no statistically significant difference in Mathematics learning achievement between students of two types of learning.
- There was significantly difference in Mathematic learning achievement between pre-test with post-test at the .01 level.
- There was no statistically significant interaction between computer assisted instruction of exercises two types with type of learning on math learning achievement.
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Somkunn Sripusitto (1995) studied *A Remedial achievement of First Year Vocational Certificate Students in D.C. Circuits through Computer assisted Instruction Using the Individual Learning and The Co-Operative Learning*. The purpose of the study was to study a remedial achievement in D.C. circuits for Vocational Certificate level I students through both types of the Computer Assisted Instruction, the individual learning and the Co-operative learning. The experiment was carried out with 37 first-year Electronic students, of Samutsongkhram Technical College. Out of all student chosen as subjects on the scores of basics under 50% (nineteen students) learned the Computer Assisted Instruction Individually and the other eighteen students learned their computer program co-operatively. The findings of the study revealed that; the remedial achievement in D.C. circuits could help all 37 students improve their learning significantly. The data also showed no significant differences between these two groups of students.

Ruthakran Kuruthiti (1996) studied *Effects of Computer Assisted Instruction Courseware on the Achievement of Physics Remedial Learning between Individual and Paired Cooperation of Secondary School class IV Students*. The purposes of the study were to study the achievement of physics remedial learning by using computer assisted instruction courseware and to compare the effects of using computer assisted instruction courseware between individual and paired cooperation groups on physics achievement. The sample of this study consisted of 60 students of secondary school class IV Satriwittaya two schools, Bangkok, of the 1995 academic year. They were chosen by simple random sampling and stratified sampling. The students were randomly assigned into three groups of 20 each. The two experimental group’s individual and paired cooperative learning groups studied by using the Computer Assisted Instruction Courseware. The control group studied by using the conventional method. One-way analysis of covariance and the percentage were used to analyze the data.

- The results of this study showed that there were no significant differences at the .05 level of significance on the achievement of physics remedial learning between the experimental groups and the control group, and between the individual and paired cooperation groups.
- It could be concluded that computer assisted instruction courseware could be used for physics remedial learning as well as conventional method. The
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experimental groups preferred computer assisted instruction courseware at the percentage of 75.

Anchalee Kruecomekow (1997) conducted a Study of Secondary School class II Students Achievement, Moral Reasoning and Working Group Behavior in Ethics of Selected Individuals through the Case Study Techniques with Cooperative Learning. The purpose of the study was to compare secondary school class II students learning achievement, moral reasoning and working group behavior through the Case Study Techniques with Cooperative Learning Method and the Method in the Teachers Manual during the first semester of 1997 academic year. The sample group was 84 secondary school class II students in Jaehomvitthaya School, Jaehom District, Lampang Province, who were randomized into two groups; the experimental group was taught through the Case Study techniques with Cooperative Learning while the control group was taught through the Teachers Manual Method. Each group was taught with the same contents for sixteen 50 minutes periods. The randomized control group pretest-posttest design was used in the study. The learning achievement test reliability was .84, the moral reasoning test reliability was .92, and the working group behavior test had reliability of .84 were used in this study. The t-test difference score was used for data analysis. The results of the study indicated that;

- The learning achievement between the experimental and control groups were significantly different at .05 level.
- The moral reasoning between the experimental and control groups were significantly different at .05 level.
- The working group behaviors between the experimental and control groups were significantly different at .05 level.

Patchanee Thongkaew (1997) conducted a study of A Study of Secondary School class III Students Academic Achievement and Learning Retention Through the Team Assisted Individualization Instruction and the Teachers Manual. The purpose of study was to study secondary school class III students’ academic achievement and learning retention though the Team Assisted Individualization instruction and the teacher’s manual. The subjects were 80 secondary school class III students studying in the second semester of the 1996 academic year at Panapitthayakarn School, Chonburi Province. Randomized Control-Group Pretest - Posttest Design was used in this research. The major findings were as follows;
• The academic achievement in studying mathematics of those learned through the Team Assisted Individualization is significantly higher than teacher manual at .01 level.

• The retention in studying mathematics of the students who had the Team Assisted Individualization instruction was significantly higher than the teacher manual at .01 level.

Rattigan, Peter and John Charles (1997) studied the effect of cooperative, competitive and individualistic goal structures on students' affect and social integration in physical education classes. They conducted a study in which 42 fourth grade boys (21) and girls (21) took part in a skills/basketball unit. They were stratified for gender and ability and assigned to cooperative, competitive, or individualistic learning groups. These conditions were taught by trained physical education teachers. Data were collected on skill development, social support, group cohesion, and social development data included: free throw test score, and evaluation of stop, chest pass, and set shot. Social support and group comprehension of responses to items in the Classroom Life Questionnaire. The results indicated that interdependence and gender were the most salient factors: interdependence effective in improving skill and in enhancing social support; and boys felt more support and cohesion, and liked independence more than girls.

Jaruwan Youngraksa (1998) conducted a study on students' learning achievement and learning retention in mathematics through the Discovery method based on Constructivism Activities by Team learning, and Individual learning and methods in the teachers manual. The purpose of this study was to compare the secondary school class I students learning achievement and retention in Mathematics through the Discovery method based on Constructivism Activities by Team learning, and Individual learning and methods in the teachers manual. The samples in this study were 120 secondary school class I students from NongMuangwittaya School in Lopburi Province. They were divided into two groups; the experimental group I was taught by Discovery method based on Constructivism Activities by Team learning, and the experimental group II was taught by Discovery method based on Constructivism Activities by Individual learning.
control group was taught by the method in teacher’s manual. Each group was taught for fourteen 50-minute periods. The research design was Randomized Control - Group Pretest - Posttest Design. The data were statistically analyzed by the Analysis of Covariance (ANCOVA). The findings of this study were as follows:

- The Mathematical learning achievement of the experimental group I, the experimental group II and the control group was significantly different at the .01 level.
- The Mathematical learning retention of the experimental group I, the experimental group II and the control group was significantly different at the .01 level.

Naronsak Promwang (1998) studied A comparative learning achievement on sex education in health education course of mathayom suksa IV students by learning from CAI between individual learning and paired learning. The purpose of this study was to compare the learning achievement on Sex Education in Health Education Course of Mathayom Suksa IV Students between individual learning and paired learning using computer-assisted instruction. A sample of 48 Mathayom Suksa IV students enrolled at Mathayom Wanoniwat School, Wanoniwat district, Sakon Nakon province was randomly selected from Mathayom Suksa IV students in the Northeast during the second semester of the 1997 academic year, then was divided into two groups using simple random sampling technique. Each experimental group consisted of 24 students. The first experimental group learned from computer-assisted instruction individually, and the second experimental group learned in pair. The collected data were analyzed using the t-test. The result of this study showed that there was no significant difference on learning achievements between individual learning group and paired learning group.

Wichian Singchai (1999) studied Use of Team Assisted Individualization Method in Mathematics Learning of Primary School class V Students. The purposes of the study were to study the mathematics learning achievement of primary school class V students with high, medium and low achievement learning through Team Assisted Individualization method and to study the interaction of those students while learning mathematics. The samples were 20 primary school class V students of Ban Huay Tom (Chai Wong Sa Upphatham) School affiliated to the Office of Li District Primary Education, Lamphun Province during the second semester of 1998 academic
year. The 20 samples were 5 of high, 10 of medium and 5 of low achievement students. The research instruments were:

- Team Assisted Individualization mathematics instructional package on the topic Addition, Subtraction and Multiplication of Decimals which required 43 periods of instructional time.
- Mathematics achievement test with reliability of 0.97.
- The students’ interaction observation form.

Data were analyzed by mean, standard deviation t-test and descriptive analysis. The findings were as follows:

- The mathematics posttest scores of high, medium, low achievement groups learning through Team Assisted Individualization method were significantly higher than pretest scores at the level of 0.5.
- The interaction of students in three groups while learning mathematics were willing to help friends. They not only had good relationship and attitude towards each other but also had participation, cooperation in group working.

Kosit Jatturatwatthanakul (2000) conducted a study on Effects on Cooperative Learning using team assisted Individualization technique on Learning achievement and transfer of learning ability in mathematics of primary school class V students with different abilities. The sample consisted of 78 primary school class V students of Kasetsart University Laboratory school, Bangkok. They were divided to an experimental group and a control group, comprising of 39 students in each group. The experimental group participated in the cooperative learning using team assisted individualization technique for a session of 50 minutes in each period, 13 consecutive periods for a month. The control group participated in usual instruction. The instruments for data collection were pre-post test of the student’s mathematics achievement and posttest of the transfer of learning ability in mathematics test. They were calculated and analyzed by employing the T-test, ANOVA and ANCOVA. The results were as follows:

- The students at all levels of mathematics achievement, participated in the cooperative learning using team assisted individualization technique, had higher posttest achievement scores than the pretest at the .05 level of significance.
• The students at all levels of mathematics achievement, participated in the cooperative learning using team assisted individualization technique, had higher achievement than the control group at the .05 level of significance.

• The students who participated in the cooperative learning using team assisted individualization technique, had higher transferring of learning ability in mathematics than the control group at the .05 level of significance.

• After the treatment, there was no significant difference between medium and low students who participated in the cooperative learning using team assisted individualization technique in mathematics achievement.

• However there were significant differences between high and medium students as well as between high and low students.

Ratejanit Nissaichareon (2000) conducted a Comparative Study on Learning Achievement And Retention In Work-Oriented Experiences of Primary School class III Students Using Individualized Instructional Packages And Conventional Method. The purpose of the study was to compare learning achievement and retention in work-oriented experiences on the topic Eating with Table Manners in Unit One, The House Chores, of the Work-Oriented Experiences Group for Unit C (primary school class III) students between the groups taught by using individualized instructional packages and conventional teaching method. The sample consisted of Unit C (primary school class III) students in the Demonstration Primary School of the Faculty of Education, Khon Kaen University during the second semester of the 1999 academic year. Two classes of students were selected by cluster sampling. One class consisting of 39 students was assigned to be the experimental group while the other class of 41 students was assigned to be the control group by random assignment. The experimental group was arranged to learn from individualized instructional packages and the control group was taught by applying conventional teaching method. The instruments used in the study developed by the researcher, included Individualized instructional packages with the efficiency ratio of 90.16/92.52 and a 30-item test which contained a difficulty index between 0.33-0.86, discrimination power between 0.20-0.77 and the reliability of the test was at 0.72. A Pretest-Posttest Control-Group Design was employed for the experiment. The data obtained was analyzed through an SPSS for Windows Program to find the mean and standard deviation. Furthermore, a
t-test was used to compare the pretest scores, the learning achievements and the retention of the two groups. The results showed that the learning achievement of the experimental group was higher than that of the control group at .01 level of significance. The retention of the experimental group was higher than that of the control group at .05 level of significance. The comparison of the learning achievement from individualized instructional packages between boy and girl students; it was found that girl students gained higher achievement than boys at .01 level of significance.

Al-Halal, Ahmad J. (2001) studied *The effects of individualistic learning and cooperative learning strategies on elementary students' mathematics achievement and use of social skills*. He examined the effects of two methods of teaching elementary mathematics: individualistic and cooperative learning students’ mathematics achievement and use of social skills. The sample size was comprised of 56 boys and 46 girls, elementary fourth-graders. One boys’ and one girls’ class were instructed using individualistic learning strategies; in addition, one boys’ and one girls’ class were taught by utilizing cooperative learning strategies. The results were significant when utilizing cooperative learning strategies. Therefore, the null hypotheses of the study were rejected to support the use of cooperative learning strategies to improve fourth-grade students’ mathematics achievement and use of social skills. Also, most of the interviewees preferred the use of cooperative learning strategies that support the statistical results in the study.

Panee Sadjaphan (2001) studied *Learning achievement from individualized and group cooperative learning by CAI on natural resources of forest for manthayomsuksa III students*. The purpose of this research was to compare the learning achievement between individualized and group cooperative learning by using computer-assisted instruction on Natural Resources of Forest. The sample was selected by stratified random sampling from sixty manthayomsuksa three students, Wat Kheankhet School Amphoe Thanayaburi Changwat Pathumthani in second semester of academic year 2001. They were divided into two groups, thirty each. The first group learned by individualized learning method and the second group learned by cooperative learning group method through computer assisted instruction on Natural Resources of Forest. The achievement tests were developed as the research instrument. The data were analyzed by computer using SPSS/PC(+) program. Statistical analysis used were percentage, mean, standard deviation and hypothesis.
test by independent t-test. The result revealed that the students learning achievement of cooperative learning group was better than individualized group.

Kennedy, Ellengray Gutzman (2003) conducted a study of *Empowering lifelong learners through knowledge of individual learning processes: a case study at one community college*. The purpose of this study was to determine if students can learn strategies that enhance their ability to learn, reduce intimidation and thus, manage stress during the learning process in order to maximize learning potential. The case study method (Yin, 1994) was selected, with the research site being a small, rural Midwestern community college. Status sampling and snowball sampling techniques were utilized to identify research participants (primary data source) and other secondary data sources were used. The overarching questions were:

- What are the changes in learning when individual learners gain knowledge of their referred learning styles?
- What do students perceive as the outcome of the Learning Style Analysis (LSA) tool and training on their educational and personal lives?

The results of the study revealed six emergent themes:

- Theme ONE: Students Create Environment Conducive to Learning and Improve Study Skills.
- Theme TWO: Students Improve Grades and Reduce Stress Levels.
- Theme THREE: Students Gain Understanding and Appreciation of How They Best Learn; Improve Satisfaction and Confidence.
- Theme FOUR: Teachers Influence the Learning Experience.
- Theme FIVE: LSA tool and Training Accurately Reflect Students’ Learning Styles.
- Theme SIX: Communication Improved Between Students and Faculty.

This study revealed that changes took place in the learning of the students when the individual learners gained knowledge of their preferred learning styles. In addition, the majority of the students perceived the outcome of the LSA tools and training as having a positive impact on their educational experience.

Liu, Shih Chen (2003) studies *A study of factors that facilitate use of knowledge management systems and the impact of use on individual learning*. Conducted a study to assess the value that a knowledge system (KS) can contribute to individual learning in an organizational setting. A research model was proposed as an
extension of Jennex and Offmans' (2000) KS success model and a questionnaire was developed to collect data to assess the factors that facilitate KS and measure the impact of KS use individual learning. Structural Equation Modeling was used to analyze the data. Qualitative analysis of open-ended questions provided additional insights. The research finding suggested that KS benefited learning in a variety of ways. The research also suggested that individual’s perceived capabilities and usefulness of a KS, and management were the main factors that lead to KS use. Information quality was found to have a direct effect on KS use but its impact on KS use is dependent on individuals. A causal relationship from system quality to KS use was not significantly supported.

McFeters, Forrest Ethan (2003) studied The effects of individual collectivism on learner’s recall transfer and attitudes toward collaborative individualized learning. This study examined the differences in achievement between groups exhibiting different cultural dimensions in a particular online instructional environment. Variables were measured concerning the relationship between instructional environments, cultural dimensions and online learner preference. Subjects of this study were a representative sample of groups of graduate students from different cultures. The instrument was composed of a treatment that represented across two instructional environments. A web-based tool measured participant’s cultural dimension, recall, and transfer of knowledge and learner preference. ANOVA analysis method was used to examine the effects of individualism and collectivism on learner preference and achievement transfer. Significance in transfer measures was found. This indicated understanding of materials for collectivist participants. Correlational analysis revealed significance between cultural dimension and learner preference for instructional methods. Findings were consistent with the body of literature on cross-cultural psychology.

Wilkinson, John Donald (2003) studied Individual learning plan for 9th, 10th, and 11th grades: a formative evaluation. The purpose of the study was to determine what improvements the students and faculty recommended to the individual learning plans five step process. A process that identifies student academic strengths and needs according to the Pennsylvania Academic Standards in mathematics. In addition, the plan these academic addresses needs employing remedial work tutoring. The faculty and students in grades 9, 10 and 11 recommended improvements.
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to the individual learning plan employing a Likert-type scale, open-ended questions and a focus group activity. Students in grades 9, 10 and 11 reported that all students, in particular non-proficient students, were in need of meaningful interpersonal connections. The finding suggested that the individual learning plan process is a very viable means of aiding students in attaining proficiency; though the students reported that the lack of connections to the faculty members prohibited the individual learning plan process from having the greatest effect. The conclusion indicated that students who feel a sense of support, caring and encouragement from the faculty benefit the most from the individual learning plan process.

DiCanio-Whiton, Gabrielle (2004). conducted a study of individualistic and collectivistic perceptions of teacher communication styles. The purpose of the current study was to help clarify the rule of student perception based upon teacher interaction styles. Specifically, to examine the extent to which individualistic (self-oriented/competitive) and collectivistic (group oriented/passive) student perceive their teacher differently. There is also a sub-area of focus on Latino student who seem to have account related into American society, yet may still exhibit a collectivistic view point in terms of their perceptions of teacher interaction styles. A total of 110 seventh and eighth grade student form a Long Island school district participated in the study. Students who were in special education, and/or who were not fluent in English, and/or were receiving ELS service were not included in the study. A questionnaire to determine if a student met the criteria as either collectivistic of individualistic was administered to all participants. A questionnaire determining whether Latino students have acculturated was only administered to Latino. A third instrument measured the student’s perceptions of their teacher interaction styles and was administered to all of the participants. There were three research hypotheses that were examined in this study:

- Collectivistic students will perceive their teachers as more strict than individualistic students.
- Collectivistic students will perceive their teachers as more easily angered than individualistic students.
- Acculturated Latino students will perceive their teachers to be more dissatisfied than white American students.
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These hypotheses were mentioned by statistical interpretation of the questionnaire on teacher interaction. Results indicated that these hypotheses were not supposed. In fact, results from hypothesis I and II indicated robust inverse relationships. And area of interest in this study was how learning is affected by student perceptions and was investigated by examining the participant’s report card grades in math. The results of the area of interests were not supposed. This study fell under across sectional non-experimental correlation design.

Du, Helen S. and Christian Wagner (2005) conducted a study of the impact of weblog use on individual learning in a university environment. Weblogs are a relatively new knowledge sharing technology, which enables people to record their thoughts in diary form and publish those diaries as web pages, without programing or HTML coding. The research sought to empirically determine whether the keeping of on-going (web based) learning logs throughout a semester would result in better overall student performance. This was hypothesized, because web based learning logs appear to promote constructivist learning, provide reinforcement, and increase accountability (non-anonymous idea sharing). Results from an information systems undergraduate course with 31 students indicate that weblog performance is a significant predictor for learning outcome, while traditional coursework is not. Weblogs appear to have highest predictive power for high and low performing students, but much less predictive value for medium performers. Results also suggest that there is a learning effect for weblog authoring.

Molumby, Nicole L. (2005) conducted a study of the application of different teaching strategies reflective of individual students’ learning modalities in the university flute studio class. The purpose of this Doctor of Musical Arts document is to identify and explore different learning modality combinations expressed by university flute students in the studio class. In five lessons, this document investigated how activities based on the technical and musical aspects of selected standard flute repertoire could be used in the studio class with students expressing their personal learning modalities. In this qualitative study of metacognition, the students’ awareness of their learning modality was observed as they became more conscious of their own learning. The goal of this document was to encourage university flute students to incorporate a personal understanding of their individual learning process within the flute studio class. This research identified and used different teaching strategies that encouraged students to reach their potential of understanding of their learning.
modality within a group environment. The study participants ranged from freshman to senior level flute majors at the Ohio State University and included both performance and music education majors. Students took the VARK learning modality questionnaire, which determined if they were visual, aural, reading or kinesthetic learners. A combination of classroom observations and questionnaire results produced student learning profiles for each of the seven participants. The student reflection responses from each of the five lessons, as well as the final exit questionnaire, revealed that students found the studio class environment and the teaching strategies effective in meeting their personal learning styles. This brief study produced positive responses from all of the participants, particularly regarding group instruction and the students’ self awareness of their personal learning.

**REVIEW OF RELATED LITERATURE OF PERSISTENCE:**

**Dillon, David Eugene (1982)** studied missionary personality characteristics and perseverance as measured by the MMPI. This study investigated the effectiveness of the Minnesota Multiphasic Personality Inventory (MMPI) in discriminating among the personality characteristics of evangelical missionaries. The subjects in this ex-post facto study were 827 missionaries who were either in service or had resigned. The data were gathered over a 30 years period. The questions explored in this project were: Is there a difference between the means on the MMPI subscales of persevering and nonpersevering missionaries by gender, age, education and year test was taken. The finding indicated persevering missionaries were different from nonpersevering missionaries on MMPI scales L (Lie), F (Frequency or Confusion), Pt (Psychasthenia) and Cn (Control). Interactions were found on the means for persevering and nonpersevering missionaries by time span on scales D (Depression) and Sc (Schizophrenia). The statistical results suggested that the missionaries who presented themselves in the most favorable light, were emotionally stable.

**Steward, Robbie Jean (1984)** studied academic success and persistence on predominantly white university campuses. This study examined the differences between academically successful and unsuccessful Black college freshmen. It focused primarily upon attitudes and values interpersonal relationship variables and their interaction with demographic information and standardized test scores. Participants completed a Student Demographic Questionnaire (SDQ), Fundamental Interpersonal
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Relations Orientation-Behavior Scale (FIRO-B), a Personal Competency Rating Scale (PCI), a University Alienation Scale (UAS), a Just World Scale (JWS) and a Perceived Support Network Inventory (PSNI). In general the results neither SAT or ACT scores were significantly related to first year GPA. The discussion section explores possible explanations and implications that the results suggest.

Glasscock, Patricia Ann (1987) studied *Self-efficacy and goal setting mechanisms in the cognitive coping of persistent and nonpersistent children in an evaluative situation.* The purpose of this study was to investigate the mechanisms of self-efficacy percepts and goal standards in the coping cognitions of persistent and nonpersistent children in an evaluative situation. Three goal-setting conditions were employed: Do Your Best, Self-Set Goals and Experimenter-Set Goals. The setting of goals invoked self-evaluative reactions that served to lower goal attainment expectancies. Persistent subjects displayed more positive coping cognitions than the nonpersistent. Nonpersistent children reported more negative coping cognitions than the persistent children. Multiple regression analyses indicated that persistent children’s midtask performance contributed to off-task thoughts when the goal was externally set. Goal attainment expectancies contributed to the efficacious coping cognitions of the nonpersistent children in the Do Your Best condition.

Adams (1988) tried to find out the factors related to the persistence of men and women engineering freshmen. This study was conducted to enable the construction of quantitative model of likelihood of women, and men to persist in engineering major. A mailed survey of men and women engineering freshmen was conducted at two large Pennsylvania universities during the spring semester of 1986. The three hundred and ninety two students, who returned completed questionnaire, were followed with their sophomore year to know who continued in engineering. The results showed that 35.7% of women and 22.2% of men left engineering by their sophomore year. A logistic regression model was obtained for persistence in engineering, which estimated direct and indirect effects of several independent variables. He concluded that the student’s social and economic backgrounds and their past experiences with technology were not strongly related to persistence. For women, more than for men, past and present academic performance play important role in determining persistence while for men social support plays more important role.

Key, Roby Van (1988) studied *Characteristics that differ between persisting and non-persisting freshmen students in Bible college.* The purpose of this study was
to determine whether certain biographical factors in students’ present or precollege backgrounds would be useful in identifying students who have a high probability of not continuing in Bible colleges. Eight randomly selected Bible Colleges participated in the study. Seven hundred forty eight freshmen completed a 51 item questionnaire during the fall of 1987. Chi-square was used to compare the response distributions of freshmen who returned in the spring of 1988 with the response distributions of those who did not return. A summary of the finding was:

- Persisters and nonpersisters differed in their primary reason for attending college.
- Persisters and nonpersisters differed in how they ranked a Bible college with other schools, they considered.
- Persisters and nonpersisters differed in how many hours they were enrolled in college.
- Persisters and nonpersisters differed in how well they estimated their chance to finish college.
- Persisters and nonpersisters differed in the number of hours worked per week.
- Persisters and nonpersisters differed in the level of support they received from family and friends regarding attending a Bible college.
- Persisters and nonpersisters differed in the major motivating force of their lives.
- Persisters and nonpersisters differed in their feelings when something is left unfinished.
- Persisters and nonpersisters differed in religious attitudes, church attendance and Bible reading.
- Persisters and nonpersisters differed in marital status.
- Persisters and nonpersisters differed in their feeling about Bible college after a few weeks on campus.

Vann (1988) conducted a study on pre-college to determine how it related to student’s performance and persistence (as measured by following dependent variable: number of terms completed, number of hours completed, cumulative grade point average, number of changes of major and proportion earning a degree). Samples of 2151 students at Southern Illinois University were selected. Each subject was
assigned to one of the two cohort groups (early matriculant-students who entered college later than a year after graduating from high school). Ten hypotheses were tested to show the relationship between early and late matriculants and their persistence and performance. Two hypotheses were tested to assess the relationship between the gender of subject correlated with college student’s performance and persistence within matriculated groups. The results show that the student’s in early matriculant group had a higher rate of declaring a major at matriculation than did those of late matriculant group. For the test on the other variables, there was a significant difference between two matriculant groups. The students in early matriculant group showed a general trend of having better performance behaviour (in terms of completing more terms, completing more hours, and earning a degree). There was no significant relationship between males and females within the matriculant group on the way of the measures used in this study.

**Wullner, Kathryn S. (1988)** studied *Succeeding in college: The relationship of college orientation classes to persistence and college grade point average.* The purpose of this study was to examine the relationship of college orientation classes to persistence and cumulative college grade point average. The dependent variables were rate of college persistence and cumulative college grade point average. Three groups of first-time freshmen were studied: those who took the orientation class and received credit, those who took the class and received no credit and those who did not take the class. Independent variables included final course grade, gender, ethnicity, high school grade point average and Scholastic Aptitude Test (SAT) scores. It was found that students, who took the orientation class and received credit, had greater rates of persistence and cumulative college grade point average than either those students who took the class and received no credit or those students who did not take the class. Discussion on the importance of family involvement, particularly for first-generation college students, effective problem solving skills and understanding curricular history and the mission and goals of the university were included.

**Catarina, Mathilda Braceros (1990)** studied *relationship of individual and academic characteristics on dropout and persistence in adult degree-bound students.* This study was undertaken to increase the fund of knowledge and to determine whether a group of antecedent variables would predict dropout or persistence behavior. The first part of the study included tracking students for eight semesters to determine dropout or persistence status and collecting data from existing records. The
second part of the study was the analysis of a questionnaire sent to all of the students in the research project. The results indicated that an equation using the variables defined in this study could be utilized to improve the prediction of persistence of adult degree-bound students. The application of this equation for admissions decision raises both economic and ethical issues.

**Blong, John Thomas (1992)** conducted a study entitled *The relationship of selected variables to student attrition and persistence*. The study was conducted with a purpose to identify those variables identified by the Assessment of Skills for Successful Entry and Transfer (ASSET) Program including the Basic Skills Tests and the Educational Planning Form and other academic variables which might contribute to the prediction of withdrawal behavior in community college students. This research found that high school academic variables were very helpful in identifying first-term attrition. But the data suggested few independent variables that identify the potential drop-out during the second-term. However, first-term G.P.A. was revealed to be a strong predictor of second-term attrition. The level of employment, unemployment or success. The job market was a variable that affected the rate of returned to school. Unemployed, minimum wage workers and laborers return to school and increased their level of occupation most often. Students return to school for the opportunity to participate in advanced education as well. It was found that life circumstances, especially children, had a positive effect on the likelihood of a dropout returning to school. Another finding of the study was that dropouts tended to return to school more often when they received a letter from school. Distance was a problem for not returners and it affected females more often than males. Recommendations were made for practice with populations with similar characteristics.

**Brien, Susan Jeanne (1992)** conducted a study entitled *A case study in recruitment, persistence and perceived quality*. The cohort delivery structure at the doctoral level was innovative at Northern Illinois University. Northern Illinois University had 60 instructors who taught graduate classes designed by Performance Learning Systems, a private company. This cadre was first recruited for the doctoral program. The participants viewed the approach as being beneficial to both students and the school. Enrollment procedures were simplified and considered by some members to be positive factor in their initial decision to join the cohort. Students persisted for many traditional reasons such as never quitting what they begin. The most voiced reason to persist was because of the;
• support and encouragement shared by the members
• career aspirations of the group.

Other persistence issues centered on the belief in what the doctor; for one’s career aspirations. The only major difference between traditional this cohort delivery was the use of the weekend format. Some prof concerned that they did not get to know the student as well and wo academic or scholarly the student becomes in such a program.

**Hess (1993)** did the comparison of elementary age sibling c American high school dropouts and persisters on academic expectancy, t attitude and attendance. The five variables were examined i.e. he/she won high school, individual’s ratings of academic self competence, sch number of absentees or retention has occurred. A sample of eight s selected, consisting of forty dropouts and forty persisters. Males and fi equally distributed in the groups. The data was analyzed on subject’s 4 subject’s gender, and older siblings gender across the five dependen Significant main effects were found on the variables of high school expectancy and absentees between two groups. Siblings of dropouts rej expectation of completing high school and had more absentees than the persisters.

**Kala (1993)** conducted a study on persistence and academic e income minority students at the University of California, Berkeley, educational and economic disadvantages are academically successful. Th of the study were to describe common themes among their educational s to identify the kinds of experiences (past and present) that have help educational orientation of these students. For this a model was de researchers. The data was collected via questionnaire, student record structured interviews. The data explores topics such as; early educational experiences; student’s decisions concerning college; their lives as univer pressures and obstacles that they confront; way of coping; views ab persistence, themselves, education and the larger society; personal and persistence behaviour and strategies and their hopes and fears for future has two important aspects. This study was concerned with understand experiences of successful minority students by examining from their
those things that helped them to succeed. The study also attempted to locate academic persistence and success within a context of personal and cultural meaning. The study revealed three important findings. Firstly, persistent minority students share common beliefs, values and attitudes about themselves, about education and about the world that influences their goals and aspirations, and lead to strategies that enable them to persist in school. Secondly, significant relationships throughout student’s lives play a critical role in the shaping of their orientation towards education. And lastly, the ability of students to be academically persistent and successful relies heavily upon their social and academic support systems.

Sharrow, Margaret Ferguson (1993) studied precursors to persistence. This study explored the relations among some of the variables found to be important as persisting. These variables were: achievement in math and language arts, self concept and self efficacy in eighth which used test scores grade in both math and language arts and achievement in math and language arts in the ninth tests scores and ranked class grade, along with attendance and records of dropping out. Result indicated a strong relation between achievement in the eighth grade and achievement in the ninth grade. The sample size for these variables was comparatively small, so interpretation should be done cautiously. After the initial analysis, two pairs of subgroups were compared. These were male and female students and handicapped and nonhandicapped students achievement were similar for males and females. Correlation indicated relations among variables for those students with identified handicapping conditions were similar to those of the entire population. These relations did not appear as strong as those for the entire population, perhaps because of the small sample size.

A study of White, Thelma Jean (1993) focused on identifying significant institutional factors that contribute to student persistence in community colleges, also examined the relationship between the integrated model of Instructional and Student Services and student persistence. A conceptual model for this study, developed from the literature on persistence/retention theory, student development theory and organizational theory, framed the study and the in-depth interviews were conducted with 28 respondents in two community colleges. The model identified sets of variables that contribute to student persistence. An analysis of the data revealed some common factors and programs that have been supported in the literature as contributing to persistence. This study suggests that collaborative efforts between instructional and student services are necessary to meet the needs of a diverse student
population. More specifically, collaboration improves organizational relationships and enables colleges to improve the total educational process which leads to student persistence and success. The difference, which exist between persisting and non-persisting adult students. The results of this study showed no statistical differences between the two groups on quantitative measures. But some differences were identified in the areas of achievement need and perception of classroom environment.

Tuttle (1994) conducted a study, which sought to use achievement need, attribution and perception of classroom environment to identify those students who are more likely to persist in their programs. The study used to focus on group interviews supplemented by quantitative measures to build a profile of the differences, which exist between persisting and non-persisting adult students. The results of this study showed no statistical differences between the two groups on quantitative measures. But some differences were identified in the areas of achievement need and perception of classroom environment.

Franklin, Troy Lawin (1995) studied *Difference between White and Minority students on factors related to persistence: A pilot study*. The purpose of this study was to examine Difference between white and Minority students on factors related to persistence. The study examined students’ history traits (ACT, high school rank and college GPA) provided by the registrar’s office. Also, factor as stated by the literature that relate to student persistence were examined through the use of a questionnaire created by the researcher. The study skills hypothesis indicated that Minorities had a greater preference for studying in groups than Whites. The academic achievement as measured by ACT, high school rank and college GPA hypothesis indicated that a college GPA was higher than Minorities GPA. In summary, insights and recommendations generated from this pilot study will benefit future studies related to student persistence. The finding points towards some possible considerations for future studies. However, caution is advised in interpreting these finding, due to the low return rate, differences existing in students’ backgrounds and differences may be masked by combining groups.

Mickens, Caesar (1995) studied *Effects of learner characteristics and computer-based instruction on achievement and persistence of Adult Basic Education (ABE) and Adult Secondary Education (ASE) students*. The purpose of this study was to examine characteristics of this population in relationship to computer-based instruction and to determine the impacts this interaction had an achievement and
persistence. The study was conducted with 66 adult participants at two Job Training Partnership Act (JTPA) Programs. One location used a Computer-Managed Instructional (CMI) system and the other used an Integrated Learning System (ILS). The purpose of both programs was to prepare students for the Central Educational Development (CED) exam. The Test of Adult Basic Education (TABE) level D was administered to all of the students to measure their pre and post reading and math grade levels. Kolb Learning Style Inventory was also administered to examine the influence of learning styles on achievement and persistence. Predictors of persistence in this study were:

- age and
- instructional time.
- Learning style.

Older students obtained higher persistence levels than younger students. Students who had higher persistence rates had an opportunity to increase their instructional time. Learning style had no correlation to achievement; however a significant correlation was found between persistence and learning style. Accommodators obtained significantly higher persistence rates than assimilators in the CMI program.

Leslie Pendleton Graham (1997) designed a study to investigate a phenomenon, persistence of undergraduate women in their engineering majors, from a qualitative paradigm. A developmental life-span and social learning perspective called for an examination of factors relevant to engineering major choice and persistence from early childhood to the present time, including family background and individual factors, environmental factors and experiences with the engineering culture, and social factors relevant to major choice and persistence. Twenty-eight (28) persisters and 8 non-persisters participated in the study, which was conducted at a large land-grant university in the southeastern United States in the fall of 1996. The finding clearly demonstrated two major groups of persisters and non-persisters. One group of persisters made early decisions and stayed with the course through academic preparation and hands-on experiences. A second group of persisters made later decisions based on encouragement and the structure of opportunity for women and minorities in engineering. One group of non-persisters left engineering for majors that provided a better person-environment fit. A second group of non-persisters, many of
whom were pressured to major in engineering although they lacked hands-on experience, left their engineering major for a variety of different reasons including intimidation, isolation, lowered confidence in their abilities and personal problems. Perceptions and experiences with the institution itself and perceptions of the culture of engineering education varied depending on the career decision making process, group membership and individual factors such as personality. It is a complex interaction of individual, environmental, and social factors.

Roberta-Anne Kerlin (1997) conducted a study *Toward a theory of women's doctoral persistence*, to provide an in-depth qualitative examination of the challenges women encounter in pursuing the Ph.D., and the meanings they attribute to their experiences, with the purpose of identifying critical factors that influence women's doctoral persistence. The study breaks new methodological ground by demonstrating how the Internet, often thought to be a cold and impersonal medium, can be used to conduct in-depth personal interviews that are rich in meaning despite separation of interviewer and interviewees in both place and time. Findings, relating to women’s doctoral persistence emerge through an analysis of electronic mail transcripts and face-to-face interviews. Central to the findings is the illumination of a complex interaction of personal, social and institutional factors that both enhance and detract from women’s doctoral persistence. Eleven elements of women’s doctoral persistence were proposed viz:

- A unique combination of personal, social and institutional factors shape women’s perceptions of task.
- Department climate.
- Relationships with others in and out of academe were the conduit through which women negotiated the various demands associated with completing the task.
- Self-images as individuals and as emerging scholars.
- Women doctoral students who come from working class backgrounds may be more likely than those from middle or upper class backgrounds to experience difficulty negotiating their identities as scholars.
- Relationships that enhance or diminish one’s self-image as a person or as an emerging scholar.
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• The advisor/advisee relationship was a central influencing factor in women’s degree progress. A good match between advisory style and students' individual needs around advisement may be central to time to degree and completion rates.

• Women who experience negative issues around relationships, particularly advisor/advisee relationships, may progress more slowly and experience longer times to completion. In turn, longer times to completion may impact negatively on students' likelihood of completion.

• Critical events in women’s personal, professional and/or academic life shape their perceptions and experiences and may be the ultimate determinants of whether or not they finish.

• The accumulative effect of isolation and exhaustion significantly diminish the quality of women’s doctoral experiences.

• It may be that for women relationship issues are the primary determinant of progress both times to degree and completion rates.

The benefited and limitations of using electronic networks to conduct qualitative inquiry were examined.

**Boldt (2000)** studied factors to help students persist and succeed, and social outcomes of degree attainment. The analyses showed no statistically significant differences between two-year graduates with vocational degree and four-year graduates whose degrees had both vocational and liberal arts components. Positive economic and social outcomes were found for all graduates. Financial aid and self perseverance were the most important factors in helping single parents persist and succeed in degree attainment, was found to increase graduates’ learning capacity, strengthen their labor market attachments, cultivate life-long learning, and encourage academic aspirations for their children. Statistically significant differences were found between average annual wages of graduates and dropouts.

**Constance H. McLaren (2001)** made a comparison of student persistence and performance in online and classroom business statistics experiences. By comparing persistence and performance measures from the author's five semesters of online and traditional sections of a required undergraduate business statistics course, this paper provided evidence that while there are significant differences in persistence between the two cases, accomplishment of the learning objectives, as measured by the
final grade in the course for those students who persist, is independent of the mode of instruction.

Louise Bourdages (2001) conducted a study to synthesise an inventory of works written from 1990 to 1999 on persistence in distance university studies. It seeks to shed light on what has held researchers’ attention in the 1990 on persistence in distance education by examining more carefully the variables that directly concern students. A quick glance shows that the main interests of researchers are of a conceptual, functional, methodological or practical nature. Some authors work on defining the notions at issue: distance, dropout, persistence, study context, part-time studies and so forth; some look for the causes or concomitants of abandoning studies, whereas others try to renew the methodological approach or try out programs designed to provide solutions to the problem.

Rebecca Achee Thornton (2001) studied The persistence of learning: A second look at wartime shipbuilding, evidence of learning-by-doing has been well documented in a number of industries and firms. Rapping’s 1965 study in liberty ship production during World War II has often been cited as the classic case of organizational learning. Argote, Beckman and Epple (1990) revisit this case study and report evidence that knowledge acquired during this program suffered from a rapid rate of depreciation. The study suggests that lessons learned from experience decay over time; more recent experience is more valuable. This study investigates this finding using a more disaggregated data set. This result is robust to various changes in model specification. Furthermore, evidence suggests that knowledge in this case was embodied in management or improvements in yard layout and design rather than in the average (unskilled) worker.

Howell, Cynthia Lake (2003) conducted a study of Resilience in adult women students in higher education: implications for academic achievement and persistence. The purpose of this study was to identify, describe and analyze the factor or processes contributing to resilience in adult women students in higher education. The study utilized a multimethod design to determine the degree of conformity between qualitative findings obtained from interviews and two quantitative measures relating to adult women’s dispositions towards persisting in higher education: the Resilience Scale and the Adult Persistence in Learning Scale. Non-probabilistic, purposive sampling allowed for the selection of subjects who met key selection criteria. The two scales and a demographic questionnaire were completed by 54
Introduction

subjects, eleven of whom participated in interviews so that a dimension of depth, detail and meaning could complement the quantitative findings. The findings of this study identified the dispositional factors that enabled the participants to develop the resilience to achieve academically and persist in higher education. The findings included their perceptions of the processes for developing those protective factors. Perseverance and flexibility emerged as the primary components of their perceptions of resilience; risk-taking and a sense of self-efficacy emerged as the critical elements of the process of developing resilience.

Kim Rapp (2003) examined the factors associated with persistence decisions of doctoral students affiliated with two programs of interdisciplinary study at two major research universities. The purpose of this study, therefore, was to enhance understanding and knowledge of the persistence decisions of Ph.D. track students affiliated with interdisciplinary programs. Study participants were drawn from doctoral students who were affiliated with either of the two interdisciplinary area study programs between August 1993 and May 2003. The two programs were focused on a single world area, and will be located at two universities in the Midwest. The results of this study intended to provide a resource for faculty and administrators engaged in academic program planning and add to the literature on doctoral student persistence. The study is also poised to make a contribution to the field of higher education in that it examined one of the attributes of an ever-growing but woefully under-studied section of the university. The application of the persistence it is recommended that the models developed be employed to identify students who have a high likelihood of dropping out so that these students can be provided assistance to resolve identified problems. Faculty and student affairs staff should be advised that the male and female students leave college for different reasons (e.g., housing and major departments). Any program or policy designed to increase student persistence should take gender difference into account.

Motter, Kristi Lynn (2003) studied Student versus staff perceptions of selected university student services and relationships between student satisfaction and academic perseverance. Of all the mastery learning variables, perseverance is the one about which there are the least data. The research does identify an individual trait called persistence (i.e., the ability of keeping on at a task) which is distinct from either simple endurance or an involuntary inability to shift one’s train of thought. Students
do differ in their persistence for a particular kind of learning task probably because of their history of prior success or failure on similar or related tasks. This study focused on both issues of satisfaction with student services and the importance of that service pertaining to the decision to remain enrolled and the concept of those issues as related to the opinions of professional staff members from Financial Aid and Admissions. Satisfaction with services and importance of those services to the decision to remain enrolled in the departments of Admissions, Financial Aid, Residence Life and Food Service were evaluated to determine if a statistically significant difference existed. Areas of environment, service, staff, cost or assistance, office hours and an overall satisfaction and importance level were evaluated. Data were collected for this study through an instrument electronically submitted those full-time undergraduate students enrolled at the main campus with electronic addresses. A total of 569 responses were received into the database. Results from the analysis indicated a small, statistically significant relationship between satisfaction with service importance of those services in all departments evaluated. A statistically significant relationship was also found in the area of assistance between satisfaction and importance within the Department of Financial Aid. There is also a statistically significant relationship between ethnicity, classification and age when compared to the satisfaction level and the importance of Financial Aid. Each analysis was performed using regression analysis. A statistically significant difference was also found between satisfaction and importance in relation to student and professional staff opinions in the departments of Financial Aid and Admissions using paired-sample-tests. Although the relationships are weak, statistical significance was found. Satisfaction with services offered in the department of Admissions, Financial Aids, Food Services and Residence Life do have an impact on the decision of a student to remain enrolled. Student opinions of service within Financial Aid and Admissions also differ statistically from those professional staff members as staff members opinions produced higher means than those produced in the student results.

Cohen, Crecilla Vonetta (2004) studied The impact of personal resources on college persistence and educational attainment. This study examines the influence of personal resources on educational attainment. Using data from the National Education Longitudinal Study of 1988, this study analyzed the educational outcomes of 1992 graduates who enrolled in a college or university immediately after high school. Using logistic regression, this study attempts to answer the following question: 1. Do
personal resources influence educational outcomes, net of important background characteristics?. 2. Do these resources affect men and women differently? and 3. Do these resources affect minority students differently? Results indicated that, net of other important background characteristics, personal resources as measured by respondent’s aspirations, advanced math taking and SAT/ACT preparation efforts significantly influence educational outcomes. However, their educational attainment affected more by:

- Background characteristics.
- Personal resources.
- Aspiration rather than persistence.

The effects of advanced math courses on degree attainment are significantly stronger for women.

Chao, Maureen (2004) studied Academic performance and persistence among international students with and without participation in an intensive English as a second language program. The quantitative study compared international students who began their academic level studies at Green River Community College (GRCC) already proficient in English, with students who transitioned into academic studies after participating in the on campus Intensive English as a Second Language (IESL) program. The intent of the research was to identify differences between the two groups in terms of scholastic performance and persistence. The population for this study included all current and former academic level of international students at GRCC (N=623) who entered with English language proficiency or transitioned from the IESL program between summer, 2000 and summer, 2003 (12 quarters). To determine if there was a difference in academic performance between Non IESL and Former IESL students, transcripts of all students in the study were reviewed. Data was collected from the transcripts and the International Program’s database to identify:

- GPA in the student’s first full academic quarter (12 credits or more)
- Cumulative GPA
- Number of developmental classes taken
- Number of classes withdrawn
- Number of classes repeated.

Transcripts also were reviewed to determine if there was a difference in persistence between non IESL and former IESL students. Data were analyzed to
establish if students from one group completed more academic credits or quarters before leaving than students from the other group. No significance was found in academic success or duration of attendance at the college between with and without regular participation groups. Demographical information revealed differences in academic performance and persistence related to the independent variables of age group, country of citizenship/region, gender and for former IESL group, the number of quarters spent in the IESL program.

Hoef, Ted F. (2004) studied *Within-year persistence of four-year college students by gender*. Women represent 56% of the postsecondary students enrolled in the United States. This represents a major change since 1965, when women represented 39% of the postsecondary students (National Center for Educational Statistics, 2002). However, very few of the persistence studies between 1965 and 2000 specifically looked at difference based on gender. Considering the major shift in the number of women attending college, there is a need for further persistence research on four-year college students by gender using national data samples such as the National Postsecondary Student Aid Study (NPSAS). This study used NPSAS:96 data and a model developed and tested by previous NPASA researchers. To examine the factors that influence male and female student persistence at four-year colleges. The previous NPSAS research found that a persistence model should include the following variables: background, achievement and aspirations, institutional characteristics, college experience, prices, debt and financial aid.

This study found that the sample of male four-year college students had 24 variables that were significant and associated with persistence. Female college students had 20 variables that were significant and associated with persistence. The differences between males and females included:

- ethnicity
- high test scores
- dependent
- father with college experience and
- doctoral institution, were positively associated with persistence for males but not females; low test scores and living on campus were positively associated with persistence for females but not males; high debt and low debt were negatively
associated with persistence for males but not females and Hispanic ethnicity was negatively associated with persistence for females but not for males.

Ivankova, Nataliya V. (2004) conducted a study entitled *Students’ persistence in the University of Nebraska-Lincoln Distributed Doctoral Program in Educational Leadership in Higher Education: A mixed methods study.* The purpose of this mixed methods sequential explanatory study was to understand what impacted students’ persistence in the Distributed Doctoral Program in Education Leadership in Higher Education offered by the University of Nebraska-Lincoln. In the first, quantitative phase of the study, the research questions focused on identifying the predictive power of ten composite variables, representing selected internal and external factors to students’ persistence in the program. The data were collected via a web-based survey (N=278), using a self-developed instrument. The response rate was 74.5%. First, the participants’ answers to separate items on the survey scales were analyzed using descriptive statistics. A discriminant function analysis identified five variables best predicting the group membership: program, online learning environment, student support services, faculty and self-motivation. In the second, qualitative phase, four case studies, selected on typical response and maximal variation principle, one from each of the four participant groups (Beginning, Matriculated, Graduates and Withdrawn/Inactive), explored the results from the statistical tests in more depth. The data collection included multiple sources. Four themes related to the participants’ persistence in the program emerged in the thematic analysis of each case and across the cases: quality of academic experiences, online learning environment, support and assistance and self-motivation. In each case, the themes differed in the number and similarity of categories comprising them. There were more similarities between the participants still in the program, than with the graduated or withdrawn/inactive members.

- The quality of the program and
- students’ academic experiences, learning in the online environment were the most discussed themes. Quality and online learning environment were also the reasons for withdrawal from the program. The results of the quantitative and qualitative phases were integrated while interpreting the outcomes of the entire study. Based on the findings from the quantitative and qualitative phases of the study, a
preliminary model of students’ persistence in a distributed doc
developed.

Bagby, Janet Marie (2005). conducted a study on persistence a_student_of_alternative_high_school. The purpose of this study w relationship between alternative school factors obtained from stu students’ persistence to graduation. A secondary purpose of 1 determine which, if any, variables can be used to predict g completion (dropping out) for other students in the same school s were 200 students that graduated (98) or dropped out (102) during 2002-2003 school years. Data were obtained from student f maintained at the alternative high school. Data collected wei descriptive statistics, correlation, multicollinearity diagnostic regression, and logistical regression. A significant relationship w persistence to graduation and student, school, and demographic var

SIGNIFICANCE OF THE PROBLEM

A review of the research literature shows that the trends of t of CAI have undergone tremendous shift especially with th multimedia use. It has been observed lately that applications of CAI resulted into higher strides of achievement for the learners. How the investigator as a teacher in technical college, was that te especially in the area of electronics can be better imparted in small It may rather lead to better equipment of students with practi electronics. Electronics being her area, she had been working to dr introduction of multimedia.

The literature related with the use of multimedia CAI sugge
• Multimedia learning is a sense-making activity in which tl build a coherent mental representation from the presents information, which is an objective commodity that can b mind to another, knowledge is personally constructed b cannot be delivered in exact form from one mind to anothe learners can be presented with the same multimedia messa with different learning outcomes.
• From the knowledge construction view, the learner’s job is to make sense of the presented material, thus the learner is an active sense maker who experiences a multimedia presentation and tries to organize and integrate the presented material into a coherent mental representation.

• The teacher’s job is to assist the learner in this sense-making process, thus the teacher is a cognitive guide who provides needed guidance to support the learner’s cognitive processing. The responsibility for learning belongs to the learner, with the teacher acting as a facilitator.

• The goal of multimedia presentations is not only to present information but also to provide guidance for how to process the presented information, that is, for determining what to pay attention to, how to mentally organize it, and how to relate it to prior knowledge.

The guiding metaphor is that of multimedia as a helpful communicator. According to this metaphor, multimedia is a sense making guide that is, an aid to knowledge construction. This is more consistent with the research based on how students learn. Rather than seeing the goal of multimedia presentations as exposing learners to vast quantities of information, the goal of multimedia as helping develop an understanding of important aspects of the presented material.

However the use of multimedia CAI with teacher as a facilitator has been in great use for last one and a half decades. With the advancements in CAI supplemented with extensive use of multimedia, a process of increments of infrastructures also got triggered. It may sound quite normal for very rich countries, but perhaps those countries which cannot pour resources, too fast, into infrastructure upliftment, will have to seek some alternatives of such situations. So why not using multimedia CAI in small group situations? In fact it was this intention with which an humble attempt was made to study effect of multimedia CAI through cooperative and Individualistic learning conditions. Also if it is studied in relation to student persistence.
STATEMENT OF PROBLEM

EFFECT OF MULTIMEDIA CAI THROUGH COOPERATIVE AND INDIVIDUALISTIC LEARNING CONDITIONS OF VOCATIONAL STUDENTS OF THAILAND IN RELATION TO PERSISTENCE

DELIMITATIONS

The scope of the study had been delimited with respect to the details given below:

- The study was conducted in the Technical College of Department of Vocational Education in Thailand.
- Some basic concepts of Electronic Background from the contents of study as applied to the students of Diploma level, were selected for developing instruction packages.
- The sample of students was drawn mainly from the technical colleges of Uthaithani and Chainat provinces of Thailand viz: Uthaithani technical college, Uthaithani polytechnic, and Chainat technical college.
- The sample was limited to urban provinces of Thailand, Uthaithani and Chainat, where these colleges are situated.
- This study was limited only to first year diploma students of Technical colleges.
- Study was conducted on both male and female students, but female students were very less in number in this study.
- A wider coverage of technical colleges of the region should be made & study be replicated to arrive at wider generalisation.
- Based on the present research about multimedia CAI, it is clear that Cooperative Learning in multimedia CAI seemed to be better in achieving higher gain means as compared to these of Multimedia CAI in Individualistic Learning situation. For further study, well designed multimedia in CAI can be focused on promoting cognitive processing in learners even when learner seem to be behaviorally inactive, deficient in Entry Behaviour, low in computer background.
• For future study, it is recommended that this research be modified at other levels of education to determine if the results of the study were influenced by other environmental factors. Some environmental factors like socio-emotional environment, organisational climate etc. may be studied.

• Relative interaction effect of the objectives of this study may be studied at large scale, especially for learners of higher education, with different subject areas, having different persistence levels, and different socio-economic status etc.

• Some experimental studies can be planned and conducted to study the effect of multimedia in CAI in various other subject areas like physical science, mathematics and language, and also social sciences.

• Findings of the study support the need for further research to involve investigations that compare levels of persistence in achievement and different learning situations across different levels of Entry Behaviour, such research may serve to expand the utility of multimedia in CAI in various courses at various levels.

• Meta-analysis of the studies in respect of multimedia in CAI may be conducted.

OBJECTIVES OF THE STUDY

The study was designed to attain the following objectives:

• To develop and validate multimedia CAI units for vocational undergraduate students.

• To compare effectiveness of CAI as against Conventional Group Learning in respect of levels of persistence.

• To study the effectiveness of multimedia CAI through the following learning groups of vocational undergraduate students:
  • Individualistic Learning
  • Cooperative Learning
  • Conventional Group Learning

• To study the effect of persistence on achievement of vocational students.
To study effect of multimedia CAI and persistence on achievement of vocational undergraduate students through Individualistic and Cooperative Learning conditions.

To compare effectiveness of multimedia CAI in Individualistic and Cooperative Learning situations in respect of computer background of students.

HYPOTHESIS

The following hypotheses were formulated and tested:

Ho.1: There is no significant difference in the scores of Computer Knowledge of students in different learning groups (Multimedia CAI in Individualistic Learning, Multimedia CAI in Cooperative Learning and Conventional Group Learning).

Ho.2: There is no significant difference in the scores of Computer Knowledge of students at different the persistence levels (High, Average and Low).

Ho.3: There is no interaction effect between learning situations and levels of persistence to yield difference in score of Computer Knowledge.

Ho.4: There is no significant difference in the Electronic Background score of students learning through different situations (IL, CL and CGL).

Ho.5: There is no significant difference in the Electronic Background scores of High, Average and Low Persistence students.

Ho.6: The interaction effect of the learning situations and levels of persistence will not be significant on the scores of Electronic Background.

Ho.7: There is no significant difference in the Pre-Criterion scores of students learning in three different learning situations (IL, CL and CGL).

Ho.8: There is no significant differences in Pre-Criterion scores of students at the three levels of persistence (High, Average and Low).

Ho.9: The interaction effect of the learning situations and levels of persistence will not yield significant differences in the Pre-Criterion scores.

Ho.10: The students learning through Multimedia CAI and the students learning in conventional group learning situation do not achieve different gain means.
Ho.11: There is no significant differences in gain means of High, Average and low Persistence groups.

Ho.12: There is no interaction effect of instructional strategies (CAI and CGL) with persistence (High, Average and Low) of students to yield different gain means.

Ho.13: There is no significant differences in gain means of students learning through Multimedia CAI in Individualistic, Multimedia CAI in Cooperative, or Conventional Group Learning.

Ho.13.1 There is no significant difference in gain means of students through Multimedia CAI in Individualistic and Multimedia CAI in Cooperative.

Ho.13.2 There is no significant difference in gain means of students through Multimedia CAI in Individualistic and Conventional Group Learning.

Ho.13.3 There is no significant difference in gain means of students through Multimedia CAI in Cooperative and Conventional Group Learning.

Ho.14: The High, Average and Low Persistence students have equal gain means.

Ho.14.1 High Persistence students are not different in gain means as compared to Average Persistence students.

Ho.14.2 High Persistence students will not yield significantly different gain means than the Low Persistence students.

Ho.14.3 Average and Low persistence groups will yield equal levels of gain means.

Ho.15: The interaction effect of the instructional strategies (Individualistic Multimedia CAI, Cooperative multimedia CAI and Conventional group learning) and levels of persistence (high, average and low) will not yield significant difference in gain means of students.

Ho.16: Students learning through Individualistic multimedia CAI Learning and Cooperative multimedia CAI Learning situations will not differ in achievement scores of computer background test.
Ho.17: Students learning through Individualistic multimedia CAI Learning and Cooperative multimedia CAI Learning situations will have no significant difference in achievement scores of high, average and low levels of computer background.

Ho.18: There is no interaction effect of two CAI learning situation (IL and CL) with the high, average and low level of computer background of the students to yield difference in gain means.