### Chapter 2: Literature Survey

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2.1 INTRODUCTION

The present research work amalgamates following fields of study:

(a) Teaching / learning theories and processes.
(b) Creation of Electronic Learning Modules (ELMs) using modern technology.
(c) Generic Software and Authoring System of ELMs.
(d) e-learning application for HI person.
(e) Special consideration in Teaching HI person via ELMs and modern approaches in teaching HI persons. As such, wider survey of both hard and soft versions of literature in above domains was undertaken by the author. After reviewing the literature summarized discussions were held with experts in the field in order to derive specific properties / characteristics useful for current research. Both these facets helped the author in comparing existing Instructional Computer Systems with ICSH proposed through this research. Such comparison depicted in the Table towards the end of this Chapter, deals with Theories of Learning, Instructional Computer Model as well as Multimedia Techniques considered for the present research.

The comparison helps in bringing out the originality of our research work and confirming the new development (theory and model) through it, besides describing its benefits to HI persons.

Thirty four important literature references underlying present research are summarized in the next section. This is followed by its classification and aforesaid comparison.
2.2 LITERATURE SURVEY OF MODERN LEARNING THEORIES AND MODERN APPROACH IN TEACHING

a- BANNAN-RITLAND, BRENSDA & DABBAGH, NADA & MURPHY, KATE [6, Bannan-Ritland http]

Learning Object Systems as Constructivist Learning Environments: Related Assumptions, Theories and Applications

This paper starts in reviewing the core assumptions regarding alternative perspectives on cognition, corresponding theoretical perspectives and technology-based constructivist applications. Authors feel better prepared to further project potential features and attributes that should be considered by developers for implementation into learning object systems.

At the very least, these systems as flexible, generative, constructivist learning environments rather than merely efficient instructional or development systems. While, all the above instructional approaches are useful in taming a new technology for instruction, authors advocate exploring alternative pedagogical assumptions and instructional theories for application into these new systems.

This exploration may yield rich learning environments that can present support for powerful, goal-directed, generative experiences for the learner.

Placing the power of this technology in the learner’s hands may indeed reveal the true potential of this technology for learning. Authors stated, “...it is not the computer that should be doing the diagnosing, the goal-setting and the planning, it is the student. The computer environment should not be providing the knowledge and intelligence to guide learning, it should be providing the facilitating structure and tools that enable students to make maximum use of their own intelligence and knowledge”.

16
b- ATHANI, VITHAL [3, Athani2005]

Impact of Modern Learning Theories on Engineering Education

This paper introduces certain active learning theories, because the author said that Engineering education in India is still based on the age-old model of teaching/learning process. The author draws attention of engineering educators to the need of reorienting engineering education according to the modern theories of learning conclusion.

The paper confirms the activity of modern theories of learning in the teaching / learning process, also it has pointed out that these theories emphasize that it is the student who is responsible for learning.

The main impact of these learning theories will be on the teacher who is now to act as a facilitator of students learning rather as imparter of knowledge. The teacher must interact with this change in the role of teaching process as well as the engineering institution must reorient itself to it's new role as learning center.

c- PATRA, S. AND DEB, S. AND BHATTABHRYA, B. [56, Patra2005]

Strategies And Technology for Effectual Engineering Education.

This paper focuses attention on technical skill and innovative teaching in engineering education. It advocates the possibilities of integrating strategies and technology for effectual engineering education. Also the researchers suggest some thoughts to create positive attitudes toward technology and constructive teaching / learning philosophy in engineering education by integrating strategies and technology through experience.

Teachers acquire and practice the additional skills needed to quality as a problem – based learning trainer that in turn will help to develop specialized and skilled technical personalities in multiple domain areas of engineering education.
This paper aims at teaching the concept “how to learn” to engineers after graduation, particularly technical subjects. Learning is a science comprising a five level active process of which the student is the manager. The teacher is a facilitator rather than an imparter of knowledge.

This calls for a change in the mindset of not only teachers but also institutions and even university to transform themselves into “Student-friendly” learning centers rather than were teaching centers as at present.

The importance of learning is being realized not only on individual level but also on organizational level. Time has come for engineering schools to realize that teaching “how to learn” has become important as ….. the latest technical knowledge. In fact engineering schools and even universities need to transform themselves from teaching centers to “learning centers”

When Teaching Meets Learning: Design Principles and Strategies for Web-Based Learning Environments that Support Knowledge Construction

While many writers have produced comprehensive guidelines to assist Developers of conventional print-based learning materials, few have produced similar sets for designers of technology-based resources supporting flexible delivery.

This paper explores some of the issues surrounding the design and development of Web-based materials and provides some firm guidelines which have been used successfully in the past to help designers adopt design strategies more appropriate to contemporary learning using new technologies.
People develop web environments for many purposes. Some teachers use web sites as a means of delivering learning resources. Other teachers use the web as a means of communication and organization for their learning settings. Some teachers use Web sites to manage their learning programs.

Much of what has been reported in this paper will be of little interest to many of these teachers. But for those teachers who want to use the Web to enhance students' learning, the guidelines presented in this paper provide some practical strategies that can be used to guide the design process of engaging and stimulating Web-courses across many fields of study.

**f- GOODHEW , P.J & BULLOUGH, T.J :** [81, Goodhew http]

Active Learning in Materials Science and Engineering.

Active learning is expected to increase student motivation, commitment and retention. The incorporation of active learning elements into a materials engineering program is considered by means of three example modules. The implications of introducing these modules into a materials program is discussed in terms of five Ts – their titles, testing, teamwork, timetabling and the totality of the student experience.

This paper was presented at the CDIO Annual Conference, 06-09 June 2005, Kingston, Ontario.

**g- BORDEUR, D** [81, Bordeur http]

Problem-Based Learning in Professional Education

Interest in problem-based learning arose in higher education in response to criticism that programs in professional areas, e.g., medicine, engineering, failed to equip graduates with the problem-solving skills required for a lifetime of
learning. Problem-based learning derives from the theory that learning is a process in which the learner actively constructs knowledge.

This presentation uses examples from undergraduate aerospace engineering at MIT to present learning theories that underlie successful PBL, identify critical features in the design of problems, and suggest effective methods for assessing PBL experiences Presented to the American Association of Higher Education, San Diego, CA, USA, 2 April 2004.

Using Concept Maps and Concept Questions to Enhance Conceptual Understanding.

Conceptual understanding is the ability to apply knowledge across a variety of instances or circumstances. Several strategies can be used to teach and assess concepts, e.g., inquiry, exposition, analogies, mnemonics, imagery, concept maps, and concept questions.

This paper focuses on the last two -- concept maps and concept questions. Concept maps are two-dimensional, hierarchical diagrams that show the structure of knowledge within a discipline. Concept questions are questions posed to students to encourage higher order thinking and help them understand the basic principles of a discipline.

This paper describes progress at MIT in the development and use of concept maps and concept questions in aerospace engineering. Presented at the ASEE/IEEE Frontiers in Education Conference, Boston, MA, USA, 06-09 November 2002. Available here through the courtesy of the American Society of Engineering Education.
This paper discusses active learning games as a potentially important pedagogical technique in support of formal classroom education. A brief review of the active learning literature is given, followed by a list of known active learning games relevant to the CDIO engineering education context.

As a specific example of an active learning game they present the learning objectives, rules, and implementation of a “Genetic Algorithm Game” that is used to introduce this class of evolutionary optimization algorithms to graduate students.

Genetic algorithms do not require mathematically advanced formulations. Nevertheless, many students are experiencing conceptual difficulties in understanding the abstract nature of genetic operators and how the algorithm is able to successfully search complex design spaces for good solutions.

Authors have found that playing the “Genetic Algorithm Game” during class is an effective tool that helps students experience and reinforce the inner workings of genetic algorithms. This activity enhances conceptual learning and initial student feedback has been very positive.

This paper was presented at the CDIO Annual Conference, 06-09 June 2005, Kingston, Ontario

The Department of Aeronautics and Astronautics at MIT expanded its repertoire of active learning strategies and assessment tools with the introduction of muddiest-point-in-the-lecture cards, electronic response systems, concept tests, peer coaching, course Web pages, and Web-based course evaluations.
This paper focuses on the change process of integrating these active learning strategies into a traditional lecture-based multidisciplinary course, called Unified Engineering.

The description of the evolution of active learning in Unified Engineering is intended to underscore the motivation and incentives required for bringing about the change, and the support needed for sustaining and disseminating active learning approaches among the instructors.


2.3 LITERATURE SURVEY OF INSTRUCTIONAL COMPUTER SYSTEMS AND E-LEARNING

a- Hussein, Karim .Q[29,Hussein1986]

Computer Aided Learning of Theory of Structures, “Experimental Study”.

This MSc thesis aims at developing a CAL (Computer Aided Learning) package for the material of Theory of Structures, subject of (Analysis of Indeterminate Structures, the Unit Load Method). This CAL package was developed in 1986, then it was tested in a real Civil Engineering class, 3rd year BSC, Engineering College (University of Technology-Baghdad). The objectives of thesis are:

To Study the effects of CAL package of Theory of Structures on motivation of students towards learning, to Study the effects of CAL package on students achievement in that material and to study the viewpoints and responses of the experimental students sample towards CAL package.

However this CAL package did not depend on certain instructional computer model but it covered all factors of developing instructional software.
The final results of the experiment are mostly positive (tools of research are, questionnaire, observation and tests). Conclusions of thesis are recommending strongly to apply CAL software and to use systematic/intergraded instructional computer model to develop CAL programs.

Curran, Chris [16, Curran2004 http]

Strategies for e-Learning in Universities

This paper examines the e-learning strategies adopted by universities, from the perspective of three common objectives: widening access to educational opportunity; enhancing the quality of learning; and reducing the cost of higher education.

The discussion is illustrated by drawing on case studies of universities in Europe and the United States. It is concluded that the most striking characteristic of the e-learning strategies adopted by universities is their diversity, and inherent characteristic of adaptability in use and flexibility in application.

The implicit compatibility with institutional aims suggests that the e-learning strategies universities adopt reflect, rather than influence, institutional ethos and that by virtue of the capacity to adapt to different contexts, e-learning may be more adaptable - and ultimately less threatening - to academic mores than some observers fear. e-learning has grown significantly over the last decade to become a significant mode of instruction in higher education.

If as yet neither as ubiquitous or influential as some early proponents predicted, few doubt that it has the potential to become a substantive pedagogy – and one, perhaps, with a pervasive influence on tertiary teaching.

Just how substantial that pedagogy proves to be, and the extent of its longer-term influence, are still unclear – an uncertainty due in part to the scarcity of reliable data on a still nascent innovation, but still more to the difficulty of
assessing its future impact on an institution as ancient, diverse, phylogenetically complex and socially relevant as the modern university.

Hardly surprising then that the potential influence of e-learning on universities is the focus of much current interest and widely divergent views.

c- **JEONG, SANG-MOK; SONG, KI-SANG**[36,Jeong2005 http]

**The Community-Based Intelligent e-Learning System**

As the learning through computer is on the rise, the demand of e-learning, based on information technology (IT), is gradually increasing. If an e-learning system in which learning can be carried out in line with learners' own levels, the learning efficiency will be maximized, due to the effect of one to one tutoring for learners (students), as if a teacher provided one to one tutoring.

In this paper, a community-based intelligent e-learning system was developed, in which a teacher character equipped with face to face communication functions can interact with learners, so that learners can feel the teacher character is humane, while the teacher character can speak, understand learners' questions and move to express emotions, like a human teacher, based on an intelligent tutoring paradigm.

The community-based intelligent e-learning system, developed in this study, is expected to raise learners' learning performances, since precise diagnosis on the performance levels of students and adequate feedback can be provided through this system.

d- **TAKWALE, RAM**[72,Takwale2005]

**Virtual University for Agrarian Prosperity: An e-Learning Initiative.**

This paper proposes a model for virtual university aimed at bringing agrarian prosperity to India. The virtual university is expected to build self-sustainable e-learning model to achieve agriculture prosperity based on M. S.
Swaminathan's four pillars of agrarian prosperity, namely, productivity, quality, profitability and sustainability. The virtual university has been first proposed for Maharashtra based on the initiative taken by Government of Maharashtra.

**e- HIWARKAR, SHASHANAK [27,Hiwarkar2005]**

"Digital Campus : Integration of e-Learning with Traditional Education :

This paper presents an approach for integrating e-learning with the traditional education system. A conceptual map is then created for this integration leading to a functional model for open and flexible learning.

In the proposed integration, convergence of CD-based, class-based and web-based education is recommended on an architecture to achieve the convergence. In order to transform the existing schools, colleges and Universities into digital campuses, an inclusive system architecture is designed for digital campus.

A case study given is an actual implementation in a conventional school. Integration of e-learning with traditional education is not only possible but also highly effective with the proposed model.

**f- GRIMSHAW, SHIRLEY [23,Grimshaw http]**

*Computer – Supported Collaborative Learning.*

This project has produced a distributed collaborative micro world teach Newtonian mechanic. It uses a simulation of a rocket powered skater, with various tabular and graphical representations of different aspects of the skaters motion.

The project aims to support conceptual change in the area of Newtonian Mechanics, effective collaborative learning and the acquisition of scientific investigation skills.
The project was designed to support students in jointly exploring the properties of particular representations of thinking about and solving problems.

2.4 LITERATURE SURVEY OF AUTHORING COMPUTER SYSTEMS AND GENERIC SOFTWARE OF ELMs

a- HUSSEIN, KARIM & BAYATI, MAHA [32, Hussein2005]

e-Learning Modules of Genetic Algorithms.

This paper aims at developing four types of ELMs for several topics of Genetic Algorithms. These modules are to be developed by analysis, design and execution based on modern learning theories. An effective instructional computer model (model of perceptions theory and Ausable theory) has been used for the above purpose. The four types of ELMs are:

Text presentation, (tutorial method).
Drill and practice method, (exercises).
Testing method, (e-exam).
Problem solving method.

Several topics of Genetic Algorithms are covered by this paper like components of Genetic Algorithms, utilization of GA in search optimization. The idea of research is: How to develop a master software, this software could be capable of generating any ELMs for any topic: GA was selected as a case study to generate e-learning modules for some topics of GA.

Conclusions are mostly successful generation of ELMs of GA.

b- COOKE-PLAGWITZ, JESSAMINE[13, Cooke-Plagwitz http]

Generic Software for Foreign Language Instruction: A Snapshot of Teachers’ Approaches

Despite increased access to computer hardware and software in many schools, a significant number of foreign language teachers cite a lack of training and comfort in working with these tools in the classroom.
FL faculty who do use computers for instruction are often dissatisfied with pre-packaged language learning software and prefer to create their own materials using readily available generic software applications. This survey-based study explores some of the ways in which FL teachers use this software for instruction. Additionally, it discusses the ways in which these teachers have subtly altered their teaching strategies and classroom schedules to include these new tools. Finally, it examines the extent to which and the ways in which they are helping their colleagues and peers to do the same. This study provides us with a snapshot view of how FL teachers are employing generic software in pedagogically effective ways to enhance their classroom instruction. Furthermore, it illustrates how creative these teachers can be when developing their own instructional tools. The benefits derived from the inclusion of self-authored computer-based tools vary from teacher to teacher, but participants in this study report that their students exhibited more enthusiasm for language learning activities that involved the use of these “homemade” applications. Additionally, the inclusion of software-based activities allows teachers to target specific learning styles and to infuse their curricula with a more diverse range of learning activities, ranging from straightforward drill and practice activities to collaborative multimedia projects authored and presented by student groups. Lastly, the use of such software to create teaching materials for language instruction affords FL teachers the opportunity to network and to collaborate with their colleagues. FL instructors can work together to share ideas and tools that they have used successfully and those teachers more experienced with the software can act as peer mentors to assist their colleagues in becoming more comfortable with the use of generic applications in their own teaching.
c- **SANchez , guillerMO** [65,Sanchez http]

**Web-Based Software to Generate and Manage Online Tests and Exams**

An Italian SME has developed software that simplifies the entire exam cycle, including generation, execution, evaluation, presentation and archiving. This simplification allows saving time and money while improving exams reliability. The software introduces a large number of tools and features to improve the exams’ total quality. The SME is looking for a commercial agreement with technical assistance. Innovations and advantages of the offer are:

- Based on open-standard technologies.
- Supports various databases.
- Interfaces conform to Accessibility and Usability guidelines.
- Supports internationalization .

The use of this system, instead of traditional paper-based tests, allows simplifying the entire exam cycle, including generation, execution, evaluation, presentation and archiving.

d- **GRIMshaw, shIRLEY** [23,Girimshaw http]

**Authoring Environments for Intelligent Tutoring Systems (ITS).**

This project is a novel solution to the problem of creating cost–effective and efficient ITSs. Providing teachers and subject matter experts with REDEEM S/W tools, allows them to turn existing computer–based instruction into simple ITS that adapts to the different needs of their students.

The REDEEM tools allow teachers to describe student's characteristics. The information, in combination with theoretically motivated default behavior, is used by the REDEEM shell to deliver adaptive instruction.

This research explores REDEEM's use in classroom, the research has found that teachers can use in the REDEEM tools to create simple ITSs that matched the
perceived needs of their students in a time efficient manner (2 hours per hour of instruction)

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**e- SANCHEZ, GUILLERMO**[64, Sanchez http]

**An Application Development Platform Comprising Software Tools and Components to Facilitate the Creation of Games-Based Learning Content**

A Scottish-based market-driven R&D centre that has developed a unique content creation and authoring platform to facilitate the creation of games-based learning content. The platform consists of a framework on which to build and author games-based learning applications and content. Key differentiators include:

- Provision for a Learning Event Facilitator.
- A means of tracking an individual’s learning profile across one or more games-based learning applications.
- Tracking players’ actions alongside learner profiles and usage data to adapt the game to individual needs.
- Creation of templates for easy customization of learning events.

The platform integrates with the games design engine and comprises a suite of tools and plug-ins for the development and runtime management of games-based learning applications. It has a simple Windows-based user interface.

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**f- NEWTON, ERICKA**[50, Newton2007 http]

**Epic Launches New Tool for Accessible Rapid e-Learning**

Training Press Releases » Epic, the leading e-learning and communications company, has announced the launch of a new rapid e-learning tool for release at the end of May 2007. Rapid Create is intended to enable everyone with basic Microsoft Word skills and some basic knowledge in instructional design to
make effective, accessible, online courses. Rapid Create builds on Epic's own core technologies used to deliver high quality bespoke e-learning projects to its wide customer base.

Core to the tool's design is ease of use and the automatic creation of accessible content. Without the need to learn a programming language or master a complex authoring tool, Rapid Create produces simple but professional e-learning courses. Features include:

- A wizard that guides users through course creation
- An in-built art direction library, allowing users to choose from a range of predefined 'look-and-feel' templates
- The ability to insert media of the user's choice (graphics, video and audio)
- Automatic 'one-click' SCORM packaging

conclusion were: Feedback from pre-release demonstrations at the HRD 2007 exhibition were universally positive - a testament to the market research and focus groups that steered its design.

**g- ROTH, HORST & RAUSCH, RUDOLF** [62,Roth http]

Authoring System for Teaching Software.

This project deals with (CAL multimedia teacher ware) and Generating inflectional forms of Russian words, both as parts of the large project Russian für Deutsche – Elkhärt, geübt, beherrscht. This project also aims at Generation of German inflectional verb forms by computers.

**2.5 LITERATURE SURVEY OF ELMs FOR HI PERSONS**

a- **DRIGAS, A.S AND KOUREMENOS, D AND KOUREMENOS, S. AND VRETTAROS, J** [19,Drigas2005 http]

An e-Learning System for the Deaf People

This paper presents a learning system (LS) which offers Greek Sign Language videos in correspondence to every text in the learning environment. The system
is designed notably for deaf adults for the purpose of their lifelong vocational and educational training. In the LS, the special needs of Deaf learners are satisfied, e.g. bilingual information (text and sign language), high level of visualization, interactive and explorative leaning, and the potential of learning in peer groups via video conferencing.

In this environment, for the first time, Greek signers are able to learn in their own language, the sign language. In addressing the above context, the LS is adapted to the specific learning problems of the target group, i.e. deaf adolescents and young adults.

The provided content is bilingual. Bilingual experiments (spoken and signed language) in schools of the deaf and hearing impaired have shown that the use of sign language in the classroom enhance reading competence significantly.

The basic objective of the present e-learning environment is the support of the equal rights of deaf people for their access and real attendance in the vocational and educational training. The development of LS and this paper has been supported by Leonardo Da Vinci Framework Program, "DELFE" project, of European Union.

POOBRASTER, ONINTRA AND MAGUIRE, BRIAN [58, Poobraster http]

Knowledge Engineering in Multimedia and Computer – Assisted Learning for Special Needs Training : Effectiveness ?

Multimedia is an excellent technology for training students with disabilities. Multimedia supports new methods of communication in the learning environment. When multimedia used as supplement, it provides benefits for both teachers and students.

The purpose of this study is to exam the degree of effectiveness of multimedia technology in training in comparison to traditional print–based training methods. The researchers developed the multimedia training program from Macromedia Director ( an authoring tool for multimedia production ). The course content is
the same in the print–based training methods as in the multimedia program: two experiments have been done. The first experiment was a comparison between groups ( multimedia training group and print–based methods group ). The result from the experiment was no numerical difference between two groups of students, enjoy learning from the CD–Rom more than from the instructor. The second experiment discussed the measurement qualitative nature of learning using multimedia. The results have shown no real difference between group. 67% of students preferred to learn from CD–Rom and 80% from the groups interested in learning English Finger Spelling with computer.

**ELLIS, KISTEN AND BLASLAKI, KATHY CHILDREN** [20, Ellis http]

**Australian Sign Language and the Web; the Possibilities**

This paper examines the advantages of using the world Web (Web) as a resource to teach hearing primary aged children Australian sign language ( Auslan ). There is a trend towards educating signing deaf children in mainstream schools. Therefore it is important to teach the hearing children sign language to enable meaningful communication and the formation of social relationships between hearing and deaf students.

The authors compared various methods of teaching sign language with the web further describe a selection of available instructional material. Considerations for designing appropriate sign language teaching material for the Web are discussed particularly in the context of designing content that engages the primary school aged audience.

The main conclusions are: The World Wide Web provides great opportunities for creating engaging learning environment for primary aged children and could effectively be used to teach Australian Sign the language. The benefit of using
the Web to assist students in learning Auslan is that a more inclusive society is
created for deaf and other Auslan users.

**e- DRIGAS, ATHANASIOS & KLUKIANKIS, LAYTERIS & PAPAYERASIMAY, YUNNIS[18,Drigas2006 http]**

**An e-Learning Environment for Nontraditional Student with Sight Disabilities.**

ICTs and e-learning technologies have been exploited thoroughly, in an effort to
improve the education procedures and techniques and ensure that non-traditional
student (disabled students, distance students and sensitive social groups), gain
equal access to information, knowledge, education and employment.

This paper presented a multi-purpose e-environment for educative and
informative services in the domain of engineering education for students with
visual impairments. This e-environment can be used for actions that support on line e-classes as well
as e-activities that belong within the domains of life long training and distance
learning, it was built to support the visually impaired persons, enhancing their
skills and covering both their special personal and communication needs mainly
by redirecting the information through other sensory routes. Special “Assistive
Technology” was used and the principles of “Design for All” and “Universal
Accessibility” were followed, in order to produce a user friendly and easily
navigable environment for this nontraditional group of students in Engineering
Education, the final conclusion confirmed that:

There was the need to fully understand the handicaps and disabilities of special
needs people as well as the most appropriate and suitable technologies for them.

The integration of the visually impaired people into the society as full and equal
members through ICT requires time and efforts, which will in return will yield
the security and satisfaction that the disabled people are no longer considered
second class citizens of our world.
An e-Learning Environment for Deaf Adults

The objective of this paper is to present a learning management system (LMS) which offers German Sign Language videos in correspondence to every text in the learning environment.

The system is designed notably for deaf adults who want to maintain and improve their mathematical and reading/writing skills. The described LMS offers deaf students a new paradigm of learning: For the first time they will be enabled to learn self-determined in their own language, the sign language.

Conclusion are: Currently there are several projects aiming at creating bilingual learning materials for deaf people. Most of them rely on CD-Rom-delivery and do not provide a learning management system that allows easy authoring as well as easy learning. In this aspect, AILB offers a new approach. Furthermore, the results of Signing Books for the Deaf will be used for improving the user interface design of the AILB platform.

E-learning and Students with Disabilities: From Outer Edge to Leading Edge

The new millennium heralds exciting opportunities to diversify the ways in which we offer education. We can now provide greater flexibility through online access to learning -- when, where and how we do it. Breaking the shackles of tradition empowers all learners, including students with disabilities, as their diverse needs are increasingly accommodated in educational programs that are supported by information technology.
This paper shows that such programs can support what people with disabilities have known all along -- we all learn in different ways and the more that differences can be accommodated through universal design, the less remarkable and marginalizing those differences become. e-learning is one important avenue for promoting greater access for all learners.

To bring students with disabilities from the outer edge of educational considerations, teaching and information technology staff need to: apply principles of universal design, better understand the benefits of accessible technology for all learners, and ensure that electronic information environments are accessible to people with a range of disabilities.

Teaching staff and students need new skills to embrace e-learning. These include presenting information in new ways, navigating and utilizing the benefits the Web, and engaging in computer mediated conferencing. Leading edge advances, in both computer operating systems and assistive technology, provide students with disabilities new opportunities for fulfillment in educational programs. Educational administrators need to ensure that resources are available to progress the advantages of e-learning for all students, and that accessible electronic learning environments remain a central priority.

Final conclusion is : many people with disabilities have languished at the edge of mainstream post-secondary education for long time . e-learning has the potential to progress people with disability from outer edges of educational opportunity to the leading edge of educational innovation.
C-NOTE: A Computerized Notetaking System for Hearing-Impaired Students in Mainstream post-Secondary Education

Computerized notetaking is an effective tool being used by hearing-impaired learners at lectures and seminars in mainstream classes in colleges and universities.

This paper describes C-Note, a program that provides significant benefit over existing computerized note taking C-Note-developed by a computer programmer who is student with a hearing impairment and a learning specialist-allows communication between the student and the note taker, independent use of linked computers, and production of hard copy notes from each.

The C-Note system architecture is described in detail. Educational implications of using C-Note, and other computerized note taking systems for hearing-impaired students in the main stream classroom, are noted Potential modification to C-Note are suggested. The need to develop additional learning strategies to help students make effective use of the enhanced quantity and quality of lecture material is identified.

The final conclusion strongly encourages HI students to try computerized note-taking.

i- WATSON, LÉONIE [80, Watson http]

Multimedia: Enhance Ability

Whilst multimedia in many guises can appear to be an obstacle for people with disabilities, it should not be discounted as a means of enhancing the user experience for everybody, including those with disabilities. This study looks at two ways in which multimedia can be used to benefit people with different impairments.
The two cases (Cognitive Impairments and Hearing Impairments) are just a slight scratch on the surface of what can be accomplished with multimedia, both in the workplace and education.

As technology advances, so does the ability to ensure that multimedia can be used for the benefit of all people, be they blind or sighted, deaf or hearing, Dyslexic or otherwise.

2.6 LITERATURE SURVEYS OF MODERN APPROACHES AND USE OF TECHNOLOGY IN TEACHING HI PERSONS

a- Kaplan, Harriet & Mahshie, James & Moseley, Mary & Singer, Beth & Winston, Elizabeth [38,Kaplan http]

Design Effective Media, Materials and Technology for Deaf and Hard-of-Hearing Students.

The purpose of this research synthesis is to review and summarize research findings and descriptive articles pertaining to media, materials and technology (MMT) which provide access to education of deaf and hard-of-hearing from early childhood through eighth grades.

The goal of the research synthesis is to use research finding and expert opinion to present guidelines and criteria for what constitutes optimal tools for this purpose. The research synthesis deals with the following areas:

(a) Assistive technology for education, including listening, visually bases, and computer systems.
(b) English language development and enhancement.
(c) Development and educational use of American Sign language (ASL).
(d) Speech development.
(e) Respective skill development (audition and speech reading).
(f) Communion strategies.
Orientation and training to use hearing aids, assistive listening devices and cochlear implants. For each area, criteria and guidelines for optimal tools, critique of exiting materials, and developmental needs are discussed. Limitation and restrictions of the research are also discussed in each section.

The research syntheses were based on computer searches of data bases covering the period from January, 1981 to June, 1993.

Teachers report that successful S/W in characterized by many features like:

- A game-like format with high-resolution graphic displays to motivate students.
- Positive feedback to correct mistakes (e.g. “try again”).
- Minimum amounts of text.
- Extensive use of visual prompts.

About Auditory Technology. Oval window Audio has developed the 3-D Induction loop system to minimize of spillover problems.

b- **ANTHONY, ROBERT** [2,Anthony1999 http]

**Use of Metacognitive Teaching to Enhance English language literacy of Deaf and Hard of Hearing Adults learners.**

This paper discussed levels of literacy in English for deaf students. HI have low literacy level compared to their ability levels. This occurs in spite of their education beginning at 2 or 2/2 years of age. In fact the average literacy level of deaf adults in America is below a fourth grade level.

The population served in this study is HI adult learners in the center Deafness Adult Basic Education program. This is a mixed urbanrural population with same students coming from the city of Pittsburgh and others coming from meta-cognitive teaching-learning process pioneered by Dr. Donald Meacham.

The intervention on assisting students to use their knowledge and apply it to new learning or takes, e.g. reading and comprehending a story or article. The project
failed to increase student performance on the TABE by one grade level. Student interest in the lager culture improve students showed on interest and little understanding of newspapers at the beginning of instruction. At the end of instruction, students actively sought out the newspapers to read and demonstrated a better understanding of article content in class discussion and their writing. Students also used their knowledge of ASL to understand the conventions English.

c- FELZER, LAURA[21,Felzer http]

Research on How Signing Helps Hearing Children Learn to READ.

This study confirmed that sign were originally developed to help the HI communicate, signs also help HI children learn to read. This study discusses how students of all ages including those with disabilities can benefit from signing and finger spelling when learning to read signs can be used as a highly effective teaching tool for student who do not respond to traditional instructional methods as well as be part of a regular reading program for an entire class.

A reading program that includes the use of signs has the added advantage of bringing a kinesthetic dimension to learning as well as making learning fun. Students enjoy the physical involvement that signing brings.

2.7 DISCUSSION OF LITERATURE SURVEY

1. There are thirty four different papers (some of them are applied projects) in this chapter which have been reviewed. They are classified into five fields of area of study and research.

The next table gives brief notes about each field, first field: talks about modern approach and some modern theories in teaching as general.
The second field talks about ELMs developments and e-learning application. The third field talks about Generic S/W and authoring systems of instructional computer programs. The fourth field covers the area of e-learning applications and projects for the HI persons (some about sight disability). The fifth field talks about modern approach in teaching HI persons and use technology in teaching HI persons. The next table gives some comments about each field.
a) Ten papers in this field talk about the role of new theories in the instructional systems, modern. Theories of learning have the active role in developing the instructional systems (including instructional computer systems). Some of papers talk about how to learn, it is oriented to engineering students.

b) The field of e-learning and instructional computer as general aspect. These six papers give a general idea about instructional computer systems as a results of a research work, also some of them give a general aspect about e-learning applications like digital campus and strategies of e-learning in universities.

c) The field of Author system and Generic S/w. There are seven papers in this field, some about developed author system to generate e-learning modules, Genetic Algorithms as case study but it is yet without dissemination. Other papers talk about environment of authoring systems, others are author systems for e-exam and e-games, some about Generic S/W of languages.

d) Eight papers in this field are about using computer in teaching HI students. Some of them talk about how to use computer in learning sign language; some of them talk about use of web in teaching HI language. Other about blind student, each paper is oriented mostly for specific learning stage primary school, secondary etc.

e) Three papers in this field talk generally about using technology to support HI students like e-devices. Also talk about using new teaching approach to the HI learners particularly in communications with them.

Figure 2.1: Classifications of Literature Survey
2. The first group of papers confirm the importance of use modern theories, which allow student to improve their learning skills and realize effective achievement of instructional outcomes.

3. Conclusions of second group of papers indicate the benefit of e-learning to the teachers as well as student and institutions.

4. Papers of authoring systems and Generic software of ELMs present tools to the teachers in order to develop their required ELMs according to the farcicality of that system. Some of papers are applied projects.

5. Papers of e-learning to HI persons have direct relation with ICSH, it is clear that e-learning to HI students is a powerful technology, particularly the effective role of multimedia technique. Also e-learning realizes effective advantages to HI persons. As written in chapter 1, the modes of communication like finger spelling, sign language and lip movement, could be represented via effective multimedia of visual programming.

6. Papers in the fifth field talk about modern approach in teaching HI persons. Also they describe the usage of electronic devices to support hearing disability for HI student.

2.8 COMPARISON BETWEEN RESEARCH WORK AND LITERATURE SURVEY

The table of comparison shown in the next page describes the main differences between the applied computer systems in the literature survey and ICSH in the research work.
<table>
<thead>
<tr>
<th>Applied Computer Systems in the Literature Survey</th>
<th>ICSH In the Research Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instructional computer systems mostly depend on certain skills in programming and multimedia technique.</td>
<td>1. ICSH based on systematic integrated model, this model itself depends upon mostly specific learning theory besides other important factors.</td>
</tr>
<tr>
<td>2. There is no a real instructional computer model to be considered, also there is no specific learning theory matching with the teaching / learning process via e-learning.</td>
<td>2. This model has been developed so that to be a guide for developing ELMs of HI persons. These modules aim at realizing effective instructional outcomes.</td>
</tr>
<tr>
<td>3. Author systems in the considered papers deal with specific subjects like languages and S/W skills also these author systems are oriented to traditional students.</td>
<td>3. ICSH is the first author system (according to our survey) which allows teachers to develop any e-learning module of any topic for the HI persons, among others.</td>
</tr>
<tr>
<td>4. ELMs and instructional computer systems provide mostly limited activities or limited facilities for e-learning to the chosen topic.</td>
<td>4. ICSH offers three kinds of ELMs (tutorial, drill &amp; practice and testing). Each of these modules includes content and effective facilities to the required topic, which would be explained in chapter IV</td>
</tr>
<tr>
<td>5. Mostly deals with text content or teaching finger spelling / sign language itself.</td>
<td>5. ICSH provides not only text but pictures and marks for e-exam.</td>
</tr>
<tr>
<td>6. Mostly are oriented to certain stage of school standard level or for specific topic.</td>
<td>6. ICSH is oriented to the instructors in order to support them in developing ELMs for any level of HI students, for any given topic.</td>
</tr>
<tr>
<td>7. Mostly are limited in one mode of communication.</td>
<td>7. ICSH allows teachers to develop ELMs in four modes of communication (finger spelling, sign language, lip movement and normal text). It is possible to display the instructional material in the all modes of communication at the same time.</td>
</tr>
</tbody>
</table>

Figure 2.2: Table of Comparison Between the Applied Computer Systems in the Literature Survey and ICSH in the Research Work
2.9 SUMMARY

Five groups of literature have been reviewed and discussed. The ten papers in the first group confirm the impact of effective role of modern theories of learning and new approach of teaching Engineering to the teachers and students. Papers in second group represent general approach of instructional computer systems. Also some papers talk about e-learning application and strategies in universities. Papers confirm the benefits of ELMs for both the teacher as well as the student.

The third group of papers is about Author systems and Generic software for ELMs. One of these author systems is experimental project, Genetic Algorithm is the case study. Others are theoretical projects. Fourth group is about ELMs for HI students, eight papers are covered, most of them talk about the multimedia as an effective technology to support communication with HI students. The fifth group is about using technology and modern approach includes new methods of teaching HI students. These papers talk about using modern approach and technology for practicing sign language and finger spelling Alphabets.

After this survey, literature were discussed and then compared with ICSH. Seven main items of comparison were considered ICSH is different positively than literature reviewed by its theory, its systematic model, its ability in generating any ELMs for any given topic to the HI students and its flexibility in offering multiple-kinds of ELMs as well as multiple-modes of communications with HI persons.

*Theoretical Background of the above fields of literature survey would be presented in details in the next chapter*, *it is the chapter of theoretical background to develop ICSH.*