Chapter II

REVIEW OF RELATED LITERATURE

An essential aspect of a research is the review of the related literature. In the word of Good, “The key to the vast store house of published literature may open the doors to sources of significant problems and explanatory hypothesis, and provide helpful orientation for definition of the problem, background for selection of procedure, and comparative data for interpretation of results. In order to be truly creative and original, one must read extensively and critically as stimulus thinking”.

For any specific research project to occupy a place in the development of a discipline, the researcher must be thoroughly familiar with both previous theory and research. The literature related to any problem helps the scholar to discover what is already known, which would enable the investigator to have a deep insight, clear perspective and a better understanding of the chosen problem and various factors connected with the study. So a number of books, journals, and websites were referred. In the following pages, an attempt has been made to present briefly a few of the important researches and studies conducted abroad and in India, as they have significant bearing on the present study.
The literature in any field forms the foundation upon which all future work will be built. If we fail to build upon the foundation of knowledge provided by the review of literature, the researcher might miss some works already done on the same topic.

**Aly et al (2005)** compared the effectiveness of a learner-control (group A) vs. program-control (group B) multimedia learning environment courseware packages regarding knowledge, understanding and transfer of content when applied to teaching principles of orthodontic appliances to undergraduate students. Both groups were evaluated by means of multiple-choice questions covering knowledge, understanding and application. A one-way ANOVA was carried out in order to check for statistical difference between the two groups. The P-value was set at 0.05. In this study, the learner-control instructional multimedia program was found to be as effective as the program-control version when teaching principles of the orthodontic appliances to undergraduate students. The focus needs to be on improving the value of CAL. Comparative evaluations of how different CAL approaches compare with or complement one another are certainly needed.

**Azer et al (2005)** assessed student learning before and after use of the multimedia CD-ROM. A total of 106 first-year medical students (27 with and 79 without a prior university degree) at the
University of Melbourne participated in this study. After completing the multimedia CD-ROM, each student filled out a 5-point Likert scale questionnaire evaluating the features of the program and its usefulness to their learning. Students agreed that the assessment tools used in the program and the feedback provided were meaningful and helpful to their learning. The incorporation of a multimedia CD-ROM into the first-year medical course has the potential to improve student understanding of the main concepts in a variety of body systems.

**Basturk (2005)** demonstrated and discuss the educational advantages of Computer Assisted Instruction (CAI). A quasi-experimental design compared learning outcomes of participants in an introductory statistics course that integrated CAI to participants in a Lecture-only introductory statistics course. Reviews of participants’ identical midterm and final exams scores demonstrated that participants in Lecture-plus-CAI section obtained higher averages on midterm and final exams than participants in the Lecture-only sections and these higher averages likely were because of their better performance on concepts and practices that were taught in both regular lecture and CAI course. In addition, when the topics of the introductory statistics course moved from descriptive statistics to inferential statistics, the
learning gap between Lecture-only and Lecture-plus-CAI is increased. Findings suggest participants’ learning capacity of the introductory statistics could be improved successfully when CAI used as a supplement to regular lecture in teaching introductory statistics course.

**Bridgemohan et al (2005)** developed a standardised case-based educational exercise on the topic of childhood learning disorders, and a multimedia computerised adaptation of this exercise, as part of a national curriculum project based on the Bright Futures guidelines. A total of 46 paediatric residents years 1-3 assigned to either FCD (n=21) or CT (n=25) and Quasi-randomised comparison design was used. FCD and CT stimulate different types of learning among paediatric residents. Future studies are needed to determine how to integrate these two techniques to meet the learning needs of residents in diverse settings.

**Diomidous et al (2005)** developed a module to help both teachers to design courses with different levels of knowledge regarding epidemiology and students to get acquainted with the field of epidemiology. The software development product Director was used to develop the software application. The user interface of the system employs colour, text, complementary voices and
animation. Moreover, exercises have been designed to facilitate the learning process and to allow students and teachers to interchange information with it. The system has been evaluated by a number of 65 students both graduate and undergraduate. The scope of this research is to prove the efficiency of Multimedia in teaching the rather difficult subject of Epidemiology.

**Gerber et al (2005),** evaluated a clinic-based multimedia intervention for diabetes education targeting individuals with low health literacy levels in a diverse population. Five public clinics in Chicago, Illinois, participated in the study with computer kiosks installed in waiting room areas. Two hundred forty-four subjects with diabetes were randomized to receive either supplemental computer multimedia use (intervention) or standard of care only (control). Access to multimedia lessons resulted in an increase in perceived susceptibility to diabetes complications, particularly in subjects with lower health literacy.

**Goran (2005)** developed and examine the efficacy of a computer-based interactive multimedia curriculum for promoting physical activity in fourth grade children. The participants were 209 fourth grade children (mean age of 9.5 - 0.4 years) from four schools. Two schools received an 8-week multimedia intervention delivered by interactive CD-ROM, supplemented by four classroom
and four homework assignments. Two control schools received educational CD-ROMS not related to health outcomes. Measures conducted before and after intervention included height, weight, percentage body fat (bio-impedance analysis), physical activity (5-day accelerometry), and psychosocial aspects of physical activity by questionnaire. All outcomes were examined using general linear models. There was a significant treatment effect for obesity reduction in girls but not in boys. There were no significant treatment effects on total physical activity by accelerometry (total counts per minute), but there was an overall treatment effect on reducing percent of time in moderate-intensity activity (16.5% to 15% of the time) and significant sex-by treatment interactions for light-intensity activities (reduction in boys from 78% to 75% of the time and an increase in girls from 78% to 81% of the time). There were marginal/significant treatment effects for improvements in behavioral outcomes, including self-efficacy, social norms, and outcome expectancies.

**Inwood et al (2005)** designed and produced instructional anatomy dissection software for use by first and second year medical students. The software consists of full-motion, narrated, QuickTime MPG movies presented in a Macromedia environment. Forty-four movies, between 1-11 min in duration, were produced.
Results of a student evaluation indicated that the software was useful, easy to use, and improved the students' experience in the dissection classes. The successful design and implementation of this software demonstrates that CAL software can be employed to augment, enhance and improve anatomy instruction. In addition, effective, high quality, instructional multimedia software can be tailored to an educational institution's requirements and produced by novice programmers at minimal cost.

**Kim et al (2005)** tested the effectiveness of Web-based multimedia contents for Physical Examination and Health Assessment on learning achievement. 59 students in a BSN and RN-BSN program in a university located in Seoul in the experimental group received lectures using web-based multimedia contents and 75 students in the control group received regular lectures. Learning achievement was measured by the knowledge of Physical Examination and Health Assessment. These web-based multimedia contents were found to maximize the effectiveness of the teaching process when used as a teaching aid, and yet kept the strength of a face to face teaching learning method.

**Prinz et al (2005)** conducted a study to find out the effect of 3D animations on the understanding of cataract and glaucoma surgery among medical students. 172 students were randomised
into two groups: a 3D group (n=90), that saw the 3D animations and video sequences, and a control group (n=82), that saw only the surgical videos. The narrated text was identical for both groups. After the presentation, students were questioned and tested using multiple choice questions. Students in the 3D group found the interactive multimedia teaching methods to be a valuable supplement to the conventional surgical videos. The 3D group outperformed the control group not only in topographical understanding but also in theoretical understanding. The use of 3D animations leads to a better understanding of difficult surgical topics among medical students.

Sotonyi et al (2005) decided to picturise and make a summary in an edition for demonstrating different elements of certain species of animals. The multimedia CD-ROM was made based on clinical view providing the opportunity for the vet to analysing and studying the part that is the actually subject of his work. After 30 years long break, today there is no graduate or continuing education program without teaching anatomy, which means to give the knowledge to our colleagues applying to their needs also to their everyday work.

Yom et al (2005) evaluated a CD-ROM educational program in sexual violence prevention for middle school students. A
randomized control-group pretest-posttest design was used. Seventy-nine students were randomly assigned to either an experimental (n=39) or control (n=40) group. There was a significant increase in knowledge in the experimental group, while no differences on attitude were found between the experimental and control groups. A CD-ROM-based program can be effective for delivering instructions on sexual violence prevention in the classroom.

Aly et al (2004) compared the effectiveness of an interactive multimedia courseware package versus standard lectures regarding knowledge, understanding, and transfer of content, as well as problem-solving skills in orthodontics. Pre and post-test assessments of final-year dental students (n=26), who either used an interactive multimedia courseware package (n=15) or attended standard lectures (n=11). Both groups were tested by written and multiple-choice questions covering knowledge, understanding, and application areas in the curriculum. A one-way anova was carried out. In this study, the instructional interactive multimedia program was found to be at least as effective as the standard lecture of the orthodontic curriculum for undergraduate training in orthodontics (Neutral).
**Blasko et al (2004)** designed an interactive multimedia Courseware for Observational Research (COR) to teach the foundation of the scientific method: systematic observation. COR uses digital video with interactive coding to teach basic concepts, such as creating precise operational definitions; using frequency, interval, and duration coding; developing sampling strategies; and analyzing and interpreting data. Through lessons, a case study, and laboratory exercises, it gradually scaffolds students from teacher-directed learning into self-directed learning. Evaluations of the lessons showed that classes using COR received better grades on their field observations than did those using methods that are more traditional. Students' confidence and knowledge increased as they moved through each section of the program.

**Eisermann et al (2004)** compared a computer-aided training program with a conventional training program in orthopedic rehabilitation for a study population of 189 women and 85 men. Patients received either computer-aided training (case group) or conventional training (control group) within the framework of their inpatient rehabilitation program. Patients displayed their acceptance of the system by rating it with average values between "good" and "very good." For patients with total hip replacements or total knee replacements, computer-aided training can be regarded
as the equivalent to conventional training in relationship to the results of the rehabilitation program. The system is a new tool in orthopedic rehabilitation.

Furner and Ramirez (2004), the BITT Model addresses math anxiety. In this study, two teacher educators use a multimedia approach with a middle school to help their students who attend a math, science and technology magnet school come to terms with high levels of math anxiety. BITT uses researched based practices to create a program that addresses math anxiety by incorporating bibliotherapy and discussion time, inquiry and problem-solving, technology, and test-taking/study skills using multimedia. This program helps to address the NCTM’s Social Goals for learners: becoming confident in one's own ability, learning to value math, and becoming mathematical problem-solvers. The BITT Model was originally designed as a pullout program to address the needs of the math-anxious; however, it is recommended that teachers and parents incorporate the components of BITT into daily lessons and home study sessions to help in overcoming math anxiety. BITT may be implemented at all levels Pre-K through university level.

Hardwick and Bramble (2004) created interactive learning resources, "Shared Visions," that provide authentic, real-world classroom examples of technology integration for use in Pre-service
preparation. The multimedia curriculum materials include video vignettes that depict exemplary teaching practices in elementary through intermediate classrooms, a lesson plan generator, and lesson plan template for Pre-service students to practice creating a technology integrated lesson plan. It is suggested to explore and discover how the on-line curricular materials are used in Pre-service and In-service education.

**Hartman (2004)** in his Multimedia learning research explores how learning improves when learners process both verbal and visual information. This MUVE, Educational Psychology’s Online Home, begins with Vygotsky Village, which integrates text-based resources like those used in the MUVE Tapped In with a graphic interface, like that used in Dede’s MUVE, River City. Pre and In-Service teachers can learn about Vygotsky, see actual classroom lessons reflecting his concepts and consult with colleagues/experts as they learn to apply Vygotsky’s theory to there own classes.

**Herriot et al (2004)** developed Student Training, Education and Practice for Dietetics (STEP-DIET) CD-ROM at the University of Surrey to prepare dietetic students for the practical dietetic training component of their Nutrition/Dietetics degree. Quantitative and qualitative methodologies were employed, with 41 dietetic students, separated by year group, completing questionnaires and taking
part in six focus groups. It was perceived by students to be effective in preparing them for the practical component of their dietetic training. Students rated the programme highly in terms of design and content, however, there was a reluctance to accept computer-assisted instruction (CAI) as a sole teaching method.

**Hicks et al (2004)** in this paper design and elaborate the collaborative efforts to prepare a multimedia tutorial for social studies teachers to teach historical inquiry. The paper discusses (a) the current state of teaching historical inquiry (b) the rationale, design, structure and resources used in the development of the SCIM–C Multi Media tutorial and (c) key findings with regard to its utility to prepare social studies teachers to use technology in the classroom as a tool to facilitate the teaching of historical inquiry.

**Hillis (2004)**, in his keynote address to the 15th annual Ed-Media Conference, Larry Cuban criticised the policy on computers in schools. Cuban claimed that computers had made a minimal impact on teaching and learning and much of this impact reinforced existing pedagogical practices. The reasons for the gulf between ICT rhetoric and ICT reality ranged from lack of time for teachers to review and plan lessons using ICT through to the fundamental error of top down driven model of implementation. This paper answers some of the concerns raised by Larry Cuban by
analysing the evaluation of a series of multimedia CD ROMs produced on themes relating to Scottish History. The evaluation demonstrates that ICT can enhance teaching and learning by developing research skills and presenting pupils with a wide a range of historical sources. Teacher involvement is vital to the success of the final product. Although these examples of multimedia come from History, the general principles apply across the curriculum.

**Howertonet et al (2004)** compared computer-assisted instruction (CAI) - multimedia instruction focused on intra-oral radiography with lecture format using recent hardware and software advances. A Seventy-five first-year University of North Carolina (UNC) dental students were pre- and post-tested to determine student performance and instructional preference. Analysis of covariance and the sign test were used to determine significance (p<.05). There was no significant difference between pre- and post-test outcomes, indicating that similar learning took place using the interactive CD and/or lecture format. However, students preferred CAI to lecture format.

**Nageswari et al (2004)**, Modern teaching trends in medical education exhibit a paradigm shift from the conventional classroom teaching methods adopted in the past to non conventional teaching
aids so as to encourage interactive forms of learning in medical students through active participation and integrative reasoning where the relationship of the teacher and the taught has undergone tremendous transformation. Some of the non conventional teaching methods adopted at our department are learning through active participation by the students through computer-assisted learning (CD-ROMs), Web-based learning (undergraduate projects), virtual laboratories, seminars, audiovisual aids (video-based demonstrations) and "physioquiz."

Lim et al (2004) recent developments in handheld telephony have given rise to 'the mobile internet' - a range of technologies, from multimedia-messaging to access of the Internet through handheld devices. These trends have been accompanied by the increasing consumerization of the mobile phone. This paper describes a study which focuses on how the social software of the mobile internet, such as (but not confined to) text messaging and picture messaging, is used by teenagers in the process of constructing negotiated and shared understandings of unfamiliar environments in which they may find themselves. The study has been constructed such that students have opportunities to collaboratively explore and navigate unfamiliar environments using the technologies of the mobile internet, as well as to engage in
debate, and use multimedia evidence recorded in the field to defend their positions both to peers in the field and in the classroom home base.

Moeller et al (2004) demonstrate how the use of multimedia case studies help broaden the preparation of teachers to teach mathematics in K-6 inclusion classrooms. The investigators list out multimedia case studies and learning experiences incorporated into methods courses at Bank Street College. Participants are invited to discuss ways in which these resources might fit into their own course contexts.

Muda et al (2004), Multimedia Technology is successfully implemented in education by improving the way of teaching and learning in current education system. This paper will discuss about a research that being conducted to design and develop an education courseware to improve the process of teaching and learning in primary school. The courseware is developed for the purpose of providing educational knowledge with interesting and interactive learning environment. The architecture of the courseware is divided into three important components consisting of: Human Computer Interaction, Learning Module and Knowledge-based component. Learning module component is the most important part of education curriculum and knowledge transfers, is
designed to suit different profile of the user. Target groups of the courseware are specifically for primary school students. Hopefully the architecture of the courseware could benefit the smart school projects, which is one of the Multimedia Super Corridor Flagships.

*Nageswari et al (2004)* adopted Modern trends in medical education with a paradigm shift from the conventional classroom teaching methods to non conventional teaching aids so as to encourage interactive forms of learning in medical students through active participation and integrative reasoning. Some of the non conventional teaching methods adopted at the department are learning through active participation by the students through computer-assisted learning (CD-ROMs), Web-based learning (undergraduate projects), virtual laboratories, seminars, audiovisual aids (video-based demonstrations), and "physioquiz."

*Rankin and deFreitas (2004)* dwell upon the utility of a Multimedia Digital Library helping faculty prepare teachers to use technology effectively for demonstrations, discussion, and modeling. Videoclassroom.org, developed by Preparing Tomorrow’s Teachers to Use Technology grant (PT3), is a digital video library for faculty, administrators, K-12 teachers, and pre-service teachers. The library has over four hundred short videos that show teachers and faculty demonstrating a variety of technologies in a classroom.
Seabra et al (2004) developed and evaluated a computer aided learning program using a multimedia presentation about prostate cancer for undergraduate teaching in urology. A total of 60 medical students from years 2 and 3 were divided into group 1-31 who used the multimedia program and group 2-29 who attended a standard lecture on the same subject. At the end the level of knowledge acquisition for the 2 groups was evaluated by a multiple choice test. According to this study computers and multimedia programs can be used for undergraduate education in urology, providing that direct contact with an instructor is concomitantly offered to students.

Sorkin et al (2004), In September 2002, the National Science Foundation (NSF) funded the Advanced Technological Education project, Instructional Multimedia: Curriculum, Professional, and Educational Materials Development for Science, Mathematics, and Technology. Among its activities, this project provides funds for stipends and instruction for three intensive 2-week summer institutes for 40 secondary teachers and college faculty in mathematics, science, and technology. In the 2003 institute, 14 participants returned from a previous summer 2002 Eisenhower-funded instructional multimedia workshop, and 25 were newly selected. Each participant will attend two consecutive summer
institutes, and create a Multimedia Learning Activity for classroom use. Participants received stipends, and individual copies of software for screen capture, web development, animation, and digital imaging.

**Tsai et al (2004)** developed a computer-assisted multimedia training course for intravenous injection and evaluate its effect on the knowledge and self-perceived performance of intravenous injection for novice nurses. Eighty-one novice nurses randomly assigned to the experimental group and control group undertook a designed training procedure and took pretest and posttests. It is concluded that the training course had a significant effect on the intravenous injection's knowledge. Besides, a high rate of satisfaction for the multimedia program showed the self-developed program was successful.

**Vivekananda-Schmidt et al (2004)** discussed the methodological issues relating to the evaluation of such multimedia based learning tools, using the example of a specific package, Virtual Rheumatology. They discussed the reasons for the increasing interest in the area of computer-based learning, the available evidence supporting the use of such tools in education, and issues about the design and production of this CD. They also discussed the evaluation of the package to illustrate the
considerable methodological difficulties in the research and evaluation of Computer Assisted Learning (CAL) packages generally.

**Almassy (2003)** in this paper, explores the utilization of multimedia computer-assisted technology in teaching Art History. Two layered lesson plans for both elementary/HS and college level for teaching the Sistine Chapel of the Vatican in Rome are devised. It is geared for private as well as classroom teaching and can be utilized before or after visiting the Sistine chapel for a thorough and sustainable appreciation of Michelangelo's works. It is superior to viewing slides or reading the text.

**Banister (2003)** documents a 35-minute video on the day-to-day uses of computer technology in a fifth grade classroom in the Midwest. A story of this teacher’s vision of “transparent technology” and how she integrates technology into daily curricular goals is told. Student and teacher interviews are woven throughout the video, as members of the classroom community share their interpretations of how the use of technology impacts their teaching and learning.

**Blank et al (2003).** The pipeline for women and minorities entering CS/IT is shrinking. Using a combination of multimedia e-learning and mentoring, we seek to widen the pipeline in both
first year college courses and grades 7-12. For CS0/CS1, we are developing multimedia that complements a new textbook. For grades 7-12, we plan to establish outreach teams consisting of undergraduate and graduate student Teaching Fellows, teachers and administrators, faculty members, and industry professionals. Two outreach teams will adapt multimedia designed for CS0/CS1 for use in grades 7-12. Preliminary results show that the multimedia promotes learning of Java programming for both undergraduates and high school students. One outreach team will adapt these Java materials for use in a high school. Another team will adapt multimedia introducing the field of CS for use in a middle school, seeking to clear up common misconceptions and start learning about universal, virtual and actual machines.

Bosseler et al (2003) developed and evaluated a computer-animated tutor, Baldi, to teach vocabulary and grammar for children with autism. Baldi was implemented in a Language Wizard/Player, which allows easy creation and presentation of a language lesson involving the association of pictures and spoken words. The research indicates that children with autism are capable of learning new language within an automated program centered around a computer-animated agent, multimedia, and
active participation and can transfer and use the language in a natural, untrained environment.

**Bouniaev (2003)** Analysis of the use of modern technologies in teaching mathematics reveals that in many cases the core of every methodology is developing a didactic model. There exist a number of requirements for the process of modeling that should be met for the model to succeed. We give a definition of the process of didactic modeling based on the analysis of modern learning theories, application of these theories to developing computer-oriented methods of teaching, and on the practices of mathematical modeling. We also discuss how multimedia help to resolve the conflict between theoretical recommendations regarding actions on objects and difficulties that occur since in many cases these objects are mental constructions that do not exist in the students mind.

**Greene et al (2003)** investigated student receptiveness to a multimedia-based, case-method alternative for developing teachers' abilities to connect theoretical knowledge learned in classrooms with likely real-life teaching and learning scenarios. Student evaluations suggest that the cases helped them tie theoretical knowledge to practical situations and provided a realistic foundation from which to begin exploration of deeper issues and possible actions as emerging educators.
Hardwick and Bramble (2003) developed the multimedia that depicts exemplary teaching practices in early childhood through intermediate classrooms. The curricular resource is available on CD-ROM and via the worldwide web. During the interactive session participants explored and discovered how the materials were used in Pre-service education and additional applications for the exemplary teaching practices.

Hewitt et al (2003) describe an innovative study in which teacher candidates’ immediate reactions to videotaped teaching scenarios were recorded and made the subject of personal and group analyses. Results from the research suggest that this approach has the potential to help candidates develop deeper insights into their own classroom practice.

Hillis (2003), Multimedia provides historians with a powerful tool to combine in one platform a wide range of primary and secondary sources. Evaluation of two CD ROMs used in Scottish Schools demonstrates that careful selection of these sources enhances both knowledge and skills. This evaluation also illuminates the more general debate concerning the role of multimedia and ICT in teaching and learning.

Issenberg et al (2003) described the adoption and integration within the curriculum in one United Kingdom (UK)
medical school of 'Harvey', the Cardiology Patient Simulator, and the UMedic multimedia computer-based cardiology curriculum-resources developed in a medical school in the USA which is described by 3 teachers actively involved in the cardiology curriculum of the UK Learning resources, in the form of simulators and computer-based learning modules, developed in one country can be successfully adopted and implemented in another. The successful use of simulators such as Harvey requires the presence of a 'champion', a clinician educator and a supporting administrative staff who ensure the simulator's appropriate use.

Jeffries et al (2003) compared the effectiveness of an interactive, multimedia CD-ROM with traditional methods of teaching the skill of performing a 12-lead ECG. A randomized pre/posttest experimental design was used. Seventy-seven baccalaureate-nursing students in a required, senior-level critical-care course at a large Midwestern University were recruited for the study. This evaluation study is a beginning step to assess new and potentially more cost-effective teaching methods and their effects on student learning outcomes and behaviors, including the transfer of skill acquisition via a computer simulation to a real patient.
Kim et al (2003) compared self-learning outcomes using the software and the printed materials. Eighty third-year student nurses were randomly allocated to either the CD-ROM group or printed material group. A test was administered after 1 week of study time. Results showed no significant differences between the two groups in self-learning measures. Text-based learning seems to be a convenient educational method because it can be used at any time in any place. However, with more time and facilities available, CD-ROMs may be as effective as traditional learning methods and can be an alternative tool.

Komenaka et al (2003) developed Internet-based distributed learning system in a course that introduces future teachers to the genres of children’s literature. While the course is being taught to a classroom of onsite students, the system integrates the visual and auditory images of the professor and students through streaming video technology with PowerPoint, the whiteboard, video clips, and web access, capturing the multimedia features of children’s literature and conveying the classroom experience asynchronously.

Lane (2003), this free online resource for teaching statistics contains material for an introductory-level statistics course. Sections can be viewed in three modes: standard, condensed, and multimedia. In the standard mode, the material is presented as
written text with many examples using real data. The standard mode also includes numerous hyperlinks. The condensed mode contains the essential material without examples or links. The multimedia mode consists of spoken lectures synchronized with visual presentation of the material. Many interactive Java simulations and demonstrations are integrated with the other content.

Lewis (2003) investigated the utility of Computer-assisted learning (CAL) for teaching anatomy and physiology. CAL provides an effective supplement to conventional methods of teaching, particularly in subjects such as anatomy and physiology. CAL also provides the student with an important additional resource and facilitates alternative modes of learning that are well suited to the requirements of students in subjects allied to medicine.

Llama et al (2003) in this paper, provide a general overview of the case instruction approach, how this methodology has been evolving from a print form to a multimedia format, in particular the case of video. The integration of video and instruction is evident in the use of video cases, which have served as a tool to improve the pre-service teachers’ preparation to use technology within the classroom context.
Mantovani et al (2003) discussed the rationale and main benefits for the use of virtual reality in health-care education and training. Virtual Reality Training can provide a rich, interactive, engaging educational context, thus supporting experiential learning-by-doing; it can contribute to raise interest and motivation in trainees and to effectively support skills acquisition and transfer, since the learning process can be settled within an experiential framework. Significant research and projects carried out in this field is presented, followed by discussion on key issues concerning current limitations and future development directions.

Butler (2003) designed a technology-based science lesson and then teach the lesson to secondary students. The student teachers combine curriculum knowledge and pedagogical skills to incorporate computer graphics animation technology within a science lesson. A large majority of students showed improved achievement in science after the graphics-enhanced lessons. One important implication drawn from the project was the ability of the Preservice teachers to positively influence the use of technology by the cooperating teachers.

Messecar et al (2003) developed a statistics CD-ROM tutorial program to replace a classroom course with several self-study modules. Ratings for the CD-ROM were compared with
those of a Web-based course taught the prior year. Mean satisfaction ratings of Web-based delivery of content were low due to technical problems with the Internet courseware used. Overall satisfaction with the CD-ROM for students who used all the components was improved substantially, compared to the Web-based delivery method.

**Michea et al (2003)** presented a design strategy based in user-centered design and the result of such process: an interactive program to support learning of respiratory physiology. This is an ongoing project, and future efforts measure the effectiveness of this design tool in medical education.

**Murchú (2003)** in this study, shows the path taken by children in a minority language, Gaelic school in Ireland and presents their journey into integrating internet-based multimedia materials into their daily learning of language and that of their peers. The multimedia materials generate fun and excitement besides enhancing the learning the language.

**Novak (2003)** developed concept map tool to be highly effective both in promoting meaningful learning and in assessing learning outcomes. Concept mapping strategies are also proving powerful for eliciting, capturing, and archiving knowledge of experts and organizations. New technology for creating concept maps
developed at the University of West Florida permits easier and better concept map construction, and suggest that we may be moving from the lag phase of educational innovation to a phase of exponential growth.

Redsell et al (2003) evaluated the impact of child-focused information provision using a multimedia software package 'All About Nocturnal Enuresis' and written leaflets containing the same information for bedwetting children. A stratified cluster randomized controlled trial with data on 270 children collected longitudinally. Multimedia educational programs and written leaflets are widely used to enable children to learn more about their health-related conditions. However, our result suggests that multimedia is no more effective than traditional materials at effecting health-related behavioural change.

Roesch et al (2003) developed an interactive multimedia programme for dermatological education and completely integrated into the regular dermatological curriculum of five German medical schools. The formative evaluation of an implemented relational database revealed a high learner acceptance regarding the programme's instructional design, ergonomics, and didactical presentation and, after completion of Dermatology 2000, an increased interest in medical education software. It is concluded
that the implementation of CAL in present medical curricula can contribute to reformations of medical education. The instructional design of Dermatology 2000 is well accepted and suitable to provide both theoretic biomedical knowledge and clinical skills.

Ward et al (2003), in this paper describe the lesson for middle school students developed as collaboration between university professors, classroom teachers, and forestry officials from Project Learning Tree. Beginning with the idea that the forest serves as an excellent math and science classroom, the lesson incorporates handholds, laptops, multimedia software, Internet resources, online learning activities, and field experiences.

Zibit, M. (2003), How can we help teachers, who grew up learning mathematics through memorization and rules, teach by knowing mathematical ideas and procedures so well that they can explain them skillfully in more than one way and at a level students can understand. Mathemagica, a Department of Education project, has an innovative model for online math professional development for K-8 teachers which includes 1) rich, multimedia interactive tools that empower both teachers and students to investigate mathematical topics and 2) a course sequence of investigations combined with readings and reflective tasks that teachers work on in teams facilitated by a moderator.
Teachers discover mathematics can be challenging but fun. Online, teachers learn as they put their abstract mathematical thinking into words and images. This presentation will give you a taste of a Mathemagica investigation and a sense of the structure and design of Mathemagica’s online learning experience.

Ahmad (2002) analyzed to enhance delivery on interactive television (I-TV) by adopting and adapting radio and television broadcast communication skills and voice management towards effective learning in the virtual surrounding. The study assumed that I-TV teaching does not require modifications in teaching style and a teacher can continue to teach as he or she has in the traditional classroom.

Ali et al (2002) demonstrated and trained Virtual Reality (VR)-an extremely useful and easy to use tool for classroom settings. This characteristic of VR enables a large variety of topics to be taught to students. QTVR, an example of VR was demonstrated in a workshop by brainstorming the ideas about the applications of QTVR in their field. After finishing this workshop the attendees were given a survey about their perceptions of how they incorporated QTVR movies in the teaching and learning process. Several choices exist currently in this tool and most QTVR creation software is fairly easy to use.
Bukowski (2002) studied new and traditional educational media as alternative methods of instruction in a human gross anatomy course. Three consecutive entry-level physical therapy (PT) classes (55 students total) participated in this study. The lecture and self-study group attended an introductory session to review course objectives and receive instruction in using the computer package. The results of this study suggest that computerized self-study techniques may be a viable alternative to traditional cadaver laboratory and instruction in human gross anatomy courses.

Buzzell et al (2002) examined the effectiveness of a series of Web-based, multimedia tutorials on methods of human body composition analysis. Tutorials were developed around four body composition topics: hydro densitometry (underwater weighing), dual-energy X-ray absorptiometry, bioelectrical impedance analysis, and total body electrical conductivity for a sample of thirty-two students. The results indicate that Web-based tutorials are as effective as the traditional lecture format for teaching these topics.

Carroll et al (2002) developed a computer program to teach the Draw-a-Person developmental test using the multimedia-authoring tool Director and tested whether a thoughtfully designed
computer program can replace a standard lecture in a pediatrics curriculum while teaching the subject matter equally well. Students using the computer program were more accurate than students attending the lecture when scoring drawings and estimating a developmental age from them. These results support the conclusion that a thoughtfully designed computer program can replace a standard lecture in a pediatrics curriculum.

Clare, K. (2002) reports on a study exploring teachers’ attitudes toward and their beliefs about the relationship between instructional technology and learning. Twenty-six Pre-service teachers participating in a semester-long technology infusion project were asked to share their personal relationship with technology and their belief about the relationship of technology and learning using the poetic conventions of either similes or metaphors. Data was analyzed using a variation of the constant comparative method. In addition, this study reveals specific attitudes and beliefs Pre-service teachers possess in relations to educational technology.

Foti (2002), this paper introduces and reports upon lessons learned during the development phase of the Lord Kelvin Middle School Science Program. For the past two years, we have been developing a set of tools to help middle school students learn
science in a way that uses the full power of today’s technology. Lord Kelvin is a robust collection of science activities, organized in modules that incorporates probe ware, sophisticated simulations, multimedia support for instruction, multiple assessment components, and comprehensive reporting tools. The activities bridge the gap between traditional and high tech science. The project, funded by the National Institute of Health joins the talents of a high tech engineering firm with experienced instructional designers to produce a unique learning experience for middle school students.

**Gannon-Cook and Bell (2002)** in this paper suggests that developmental early childhood programs should view the use of technologies as an on-going process of learning and interactivity considering the diverse needs and programme differences. Field-based early childhood programs should model, promote and facilitate the integration of technologies into training sites within their surrounding communities.

**Goodson-Espy et al (2002)** influenced the students’ fascination with 3D digital entertainment and medieval fantasy stories to teach mathematics to middle school students with an appealing computer environment- an Internet-based massively multi-player role-playing game (MMPRPG) called Warrick’s Secrets.
The subjects included two sixth graders, two seventh graders, two eighth graders, and one ninth grader. The students explained that the game made learning math easier for them because it placed the mathematics into a meaningful context for them.

**Hough et al (2002)** attempted to present and discuss interactive, web-based learning tools that are the end-product of CASELINK. The CASELINK team designed, developed and field-tested four interactive multimedia web modules for use in existing courses for the development of prospective teachers’ understanding of special education. CASELINK attempts not to bring the aspects of knowledge to the traditional learning environment, but to use technology to recreate the learning space to more closely resemble an authentic school decision-making environment.

**Hough et al (2002)** developed a series of on-line activities which present, on a course’s website, exemplary video cases of technology use in classrooms. Students are first encouraged to view the cases, repeatedly if necessary, until they feel that they "fully understand" what is occurring in the video. After this examination, students are asked to respond to a series of questions that elicit their analytical thoughts about the segments viewed. The responses of all students in the class are submitted to a database that is used by the course instructor to identify topics that will be used in the
following class to challenge students’ thinking. To give prospective teachers experience with a non-traditional testing environment, the examinations are created to offer "feedback" to the user as well as guided opportunities to correct their answers.

Lewis (2002) presented the findings of a class that became a case study in interdisciplinary academics. The course incorporated traditional collegiate education themes with technology through a collaborative, co-instruction effort between a university music professor and multimedia technologist. The course became an intuitive utilization of resources, and the student reaction made it an exceptional experience for all persons involved.

Liaskos et al (2002) presented different software tools for creating multimedia applications. Two examples of multimedia educational training programs "stand alone" applications CD-ROMs are discussed. The first, examined several aspects of the electronic patient record by using videos, audio descriptions, lectures and glossary, while the second one presented several topics regarding epidemiology and epidemiological research by using graphics, sound and animation.

Lieberman et al (2002) compared the educational effectiveness of an interactive tutorial with that of interactive computer-assisted instruction (CAI) and determined the effects of
personal preference, learning style and level of training. Fifty-four medical students and four radiology residents were prospectively, randomly assigned to receive instruction from different sections of an interactive tutorial and an interactive CAI module. The tutorial was marginally but significantly more effective at teaching factual knowledge, an effect unrelated to students' year of training, learning style, or stated enjoyment of CAI.

Liu and Edwards (2002) designed Web Quest to offer interdisciplinary opportunities that enhance student skills of learning by performing tasks, and encourage ability of information processing in the K-12 classroom. The systems and implementation of Web Quest were shown through a multimedia presentation, and the Pros and cons of Web Quest on both the learners and teachers were discussed. Participants were facilitated with sites for the research supporting Web Quest in addition to sites on how to create Web Quest.

Mahoney et al (2002) developed and evaluated the effectiveness of a CD-ROM-based multimedia program as a tool to increase user's knowledge about the differences between "normal" forgetfulness and more serious memory loss associated with Alzheimer's disease of 113 adults who were recruited from the community. Viewers were very satisfied with the program and felt
that it was easy to use and understand. They particularly valued having personal access to a confidential source that permitted them to become informed about memory loss without public disclosure.

Martine (2002) developed a tool for comparing various online courses. This is based on the theoretical principals of multimedia communication, online collaborative learning and online instructor/student roles. The tool is applied in the learning impact assessment of a virtual program in the natural sciences. It represents a unique contribution to the practice of online teaching, in its design and delivery aspects.

McCormack (2002) designed an interactive multimedia application, Interactive English on the basis of the functional approach to reading and includes functions, vocabulary and grammar contextualized in the scientific and technical field. The development of this educational tool has led to a redefinition of the roles of the teacher and student, has intensified teacher training in the area of computer assisted education and has also promoted the analysis of the advantages and limitations of the use of new technologies as an instruction medium. While students become responsible of their own learning process, educators play the role of a guide in the learning process by helping students potentate the use of technology in the process of knowledge construction.
Oliveira (2002) created a website prototype (dynamic, interactive and multimedia data base) with the purpose of providing support to any subject matter in teaching and learning at university. The aim is to make classes more flexible in the terms of space and time, providing a classroom virtual environment, based on “good pedagogical practices” of sharing and cooperative construction of knowledge. The model is briefly presented and the interface to be used by students is discussed.

Padberg and Schiller (2002), Multimedia elements addressing mathematical problems serve as an alternative or addition to classical forms of learning and teaching. Within the project math-kit we are developing a web-based toolbox to provide teachers and students with multimedia support to existing topics in maths. In this context, the integration of a computer algebra system (CAS) as a 'mathematical expert' offers many promising opportunities for the creation of internet-based learning units for undergraduate students. In this paper we show two examples of how the CAS MuPAD is used to create web-based mathematical drills with instant feedback.

Ransdell (2002) discussed characteristics of new Net-based experiment generators and compared with traditional stand-alone generators. Specifically, software should be evaluated in terms of
known learning outcomes, using appropriate control groups. Finally, the often complex interaction between the teacher’s instructional method and the pedagogical details of the software must be considered.

**Ray and Hocutt (2002)** demonstrate and discuss the steps involved in researching, storyboarding, and constructing a presentation that presents an historic event in the Real Slideshow multimedia format. Social studies teachers and secondary students can use the software to create powerful multimedia presentations that illustrate key instructional concepts and themes. Real Media Slideshow software can be used to promote hands-on, peer-to-peer learning and collaboration in a variety of secondary social studies classroom settings.

**Scott et al (2002)** designed and implemented a web-based performance assessment system for validation of technology outcomes. The purpose of this presentation is to provide participants with a working model of educational best practices and instructional strategies to support technology integration in classrooms we use in our PT3 project and in the College of Education at Pittsburg (KS) State University. Identify and elaborate technology integration best practices, Exhibit a dynamic database of adaptable, selectable best teaching practices and Demonstrate
an on-line validation process and assessment/portfolio system for teachers are the objectives of the study. This model uses performance assessment to allow teacher candidates, university faculty and co-operating teachers to demonstrate their proficiency in technology use and integration.

Sherwood (2002) reported on some of the design issues and a field test in a research and development project. The instructional software used in the study was developed using video materials from a previous anchored instruction project that were then integrated into a Star. Legacy software shell. Fifth grade students used the materials in small groups with each group working independently. The study provides evidence of successful use of the STAR. Legacy software with younger children and provides directions for future study.

Treadwell et al (2002) developed and implemented of an interactive multimedia program (CD-ROM) to deliver information about skills and to demonstrate them. Students had to study a specific skill using the CD-ROM and then practise in the Skills Laboratory, supported by lecturers who provided formative evaluation. The evaluation of the CD-ROM program was very favourable. The majority of students still preferred live demonstrations but found the CD-ROM useful for revision
purposes. The new curriculum students were found to be as competent as the students following the traditional curriculum.

**Van and Sherin (2002),** Mathematics and science education reforms encourage teachers to base their instruction in part on the lesson as it unfolds in the classroom, paying particular attention to the ideas that students raise. This ability to adapt instruction in the moment requires that teachers be able to notice and interpret aspects of classroom interactions that are key to reform teaching. This paper defines what it means to “notice” in the context of reform and describes a multimedia tool designed to help teachers learn to do so. The authors then report on a study in which six mathematics and science teachers seeking secondary teaching certification used the software to examine teaching. The results suggest that use of the software helped the teachers to develop new ways to analyze instruction. Specifically, the teachers began to identify particular events in their classroom interactions as noteworthy, to more frequently use specific evidence to discuss these events, and to provide their own interpretations of these events. This research adds to our understanding of teacher cognition and also has implications for those who are designing and implementing teacher education in the context of reform.
**Wiksten et al (2002)** examined the effectiveness of using a CD-ROM on Sports Injuries 3-D, by Cramer Products (Gardner, KS) in an introductory athletic training laboratory class of Undergraduate kinesiology major as a supplement to traditional lecture instruction. Student attitudes toward the CD-ROM program were favorable, and the qualitative data suggest that students would use this type of educational resource provided it was targeted toward the specific course and offered a time-efficient method for access.

**Yu and Duhamel (2002)** explored a future to educational multimedia. This paper discussed the Luc Duhamel’s e-Textbook and multimedia application in the teaching of University de Montreal. Yu Sisters Multimedia Studio assisted Prof. Luc Duhamel co-researching and developing the interactive multimedia courseware and the online course website in the 2002 winter term.

**Christopher Williams et al (2001)** investigated the effectiveness and acceptability of computer-based teaching. Method a single-blind, randomized, controlled study of 166 undergraduate medical students at the University of Leeds, involving an educational intervention of either a structured lecture or a computer-based teaching package (both of equal duration). Results There was no difference in knowledge between the groups at
baseline or immediately after teaching. Both groups made
significant gains in knowledge after teaching. Students who
attended the lecture rated their subjective knowledge and skills at a
statistically significantly higher level than students who had used
the computers. Students who had used the computer package
scored higher on an objective measure of assessment kills.
Students did not perceive the computer package to be as useful as
the traditional lecture format, despite finding it easy to use and
recommending its use to other students. Conclusions Medical
students rate themselves subjectively as learning less from
computer-based as compared with lecture-based teaching.
Objective measures suggest equivalence in knowledge acquisition
and significantly greater skills acquisition for computer-based
teaching.

Di (2001) developed hypermedia pharmacology CD ROM
program. Such a program includes hypertext format set up as a
network of nodes and arcs, multimedia technology, highly
interactive and customized navigation. The divided three modules
contain a text, hypertext, images, 3D animation and experimental
videos. This program promotes knowledge integration and building
through association of contents. To access to the program's demo,
consult the following page.
Jeffries (2001) compared the effectiveness of both an interactive, multimedia CD-ROM and a traditional lecture for teaching oral medication administration to nursing students. A randomized pretest/posttest experimental design was used. Forty-two junior baccalaureate-nursing students beginning their fundamentals nursing course were recruited for this study at a large university in the mid-western United States. Two methods were compared for teaching oral medication administration a scripted lecture with black and white overhead transparencies, in addition to an 18-minute videotape on medication administration, and an interactive, multimedia CD-ROM program, covering the same content. Results showed significant differences between the two groups in cognitive gains and student satisfaction.

Keppell (2001) addressed the implementation of a professional development program in the Faculty of Medicine, Dentistry and Health Sciences at the University of Melbourne. It examines the rationale, approach, evaluation and implications of this training and its effect in transforming traditional academic ideas about teaching and learning. A systems-based approach enhances teaching and learning by utilising the most appropriate and relevant methods as opposed to advocating multimedia and online learning as a panacea for higher education.
Lynch (2001), Learning preference refers to how individuals choose to approach learning situations. Computer-aided instruction (CAI) permits the adaptation of educational content to individual student learning strategies. To determine if learning preference and computer attitude influence the acquisition of knowledge using CAI materials, a prototype CAI program was developed that incorporated differing learning exercises. Students (n = 180) completed Rezler’s Learning Preference Inventory (LPI) and a computer attitude survey (CAS). The LPI uses three sets of paired scales to characterize learning preference and choice of learning situation. The CAS assesses student attitudes toward computers in general (CAS-G), as well as the educational use of computers (CAS-E). After finishing the program students completed a program attitude survey (CAS-P). Immediate comprehension was assessed by pretests and posttests incorporated into the program. Retention was assessed by a repeat of the posttest 4 to 6 weeks after initial program review. Scores (mean ± SEM) on the pretest, posttest, and late posttest were 38.1% ± 1.35%, 70.9% ± 1.24%, and 62.5% ± 1.44%, respectively. There was no correlation between students’ learning preferences or computer attitude and test performance. The data indicate that CAI provides a means of delivering educational content that results in an increase in
knowledge that is not correlated with computer attitudes or learning preferences.

**Riera et al (2001)** presented an environment that aims to facilitate the presentation of multimedia content in the classroom. The system comprises a PC connected to the network, a video projector connected to the PC with VGA and RS-232 cables, and a wireless-network access point. The system is found useful in controlling the PC and dissemination of the subjects.

**Stern et al (2001)** studied the effectiveness of an auscultation curriculum centered on a portable multimedia CD-ROM in producing and maintaining significant gains in cardiac auscultatory skills. 168 third-year medical students at 1 medical school in an academic medical center were used as the subjects. Students were tested before and after exposure to 1 or more elements of the auscultation curriculum: teaching on ward/clinic rotations, CD-ROM comprehensive cases with follow-up seminars, and a CD-ROM 20-case miniseries. In addition to the standard curriculum of ward and conference teaching, portable multimedia tools may help improve quality of physical examination skills.

**Sultana et al (2001)** compared the effectiveness and student acceptance of video and CD-ROM review of pelvic anatomy in third-year obstetrics and gynecology students. One hundred
seventy-six students were randomized, 88 to CD and 88 to video. A 34-item pretest was administered on the first day of the clerkship. Students were then randomized to watch a 45-minute video or use an interactive CD-ROM at home. All students took a posttest identical to the pretest. Examination scores were compared by paired and unpaired t test. Use of video review resulted in short-term significantly higher test scores, but students preferred an interactive CD-ROM. This method should be made available to all students during the rotation.

**Vichitvejpaisal (2001)** developed both a computer-assisted instruction (CAI) multimedia program and a textbook on arterial blood gas interpretation with the same content as formal didactic instruction. A prospective, randomized study was designed to compare the outcomes of self-learning using the software and using the textbook. METHODS: 80 third-year medical students were randomly allocated to two groups: the CAI (n=40) and text group (n=40). A 30-item, type-K examination was administered as the pre-test. After the pre-test, the volunteers in the CAI group studied the software program, whereas those in the text group spent their time reading the textbook covering the same material. The post-test was held immediately at the end of a full day of study, and 3 weeks later, the final test was performed without prior notice. A P value of
<0.05 was considered to be a statistically significant difference.

RESULTS: Students in the text group seemed to fulfill their assignments and improved their scores post-test better than those in the CAI group. After 3 weeks, the final test scores of both groups demonstrated a significant decrease, but showed an insignificant difference between the two groups. CONCLUSION: Text-based learning seems to be a convenient method of education where time is limited. However, with more time available, use of software may be as good as the conventional learning method and can be an alternative tool. The computer-assisted instruction program seems to enhance the learning process.

**Vogel et al (2001)** highlighted that the multimedia capabilities of modern computers promised a rich contribution to medical education, integrating video, animation and graphics as a single courseware package. Using the new generation of design tools, computer-assisted learning material can be successfully created in-house.

**Bennett and Pye (2000)**, the virtual learning community can be the key to opening the door to the world for the learner. Instructional technology is a powerful tool for students to communicate within a global community and develop knowledge, skills and attitudes about the world. Students can electronic
communication tools, Internet resources, and multimedia
documents to research information, develop inquiry skills, or
discuss diverse viewpoints. Communication tools can link
professionals, educators, and students interested in social studies,
art or music. Projects can be developed for students in different
settings to work collaboratively and internationalize the
curriculum. Designing global multimedia projects can enrich the
art, music and social studies knowledge base and broaden their
global perspective. Through global methods such as these and
regular integration of technology a community of learners can be
developed (White, 1996).

Carlton et al (2000) designed, developed, and formatively
evaluated a computer-based multi-media nutrition education
program for adults based on the Dick and Carey model of
instructional design. The 4 phases of the study included analysis,
design, development, and evaluation. Seventy-two volunteers from
the US Air Force, aged 18 to 50 years, participated in focus groups.
All subjects completed a pretest, 2 posttests, 3 embedded tests,
and an attitude questionnaire to ascertain program weaknesses. It
is concluded that dietetics professionals should use systematic
models of instructional design, such as the Dick and Carey model,
to design effective nutrition education programs for the public.
Cavanaugh and Cavanaugh (2000), Digital cameras have many advantages over film cameras for math and science education, and add a multimedia dimension to learning. Today's digital cameras offer a variety of features, and are as easy to use as film cameras without the expense of film processing. Digital images are available more rapidly than film images, allow unlimited low-cost duplication, and can be controlled and manipulated easily. Using a digital camera, students make personal meaning of documents, presentations, and electronic communications such as email and web pages. Math and science teaching and assessment are enhanced through electronic field trips, demonstrations and portfolios. Digital cameras enable students to visualize the mathematical and natural worlds in unique ways. Many cameras have panorama and limited audio/video capabilities. Most offer live or recorded video output, and can be used with special lenses, including microscopes and telescopes.

Eshet et al (2000) examined the incorporation of interactive multimedia science software into a grade two classroom over a six-week period. There was growth in various social and thinking skills that were developed and reinforced within the computer-supported learning environment. The results indicated increased
positive attitudes to-wards science by the girls after using the software.

Keppell et al (2000), examined a project which aims to improve dental clinical management through case management of medically compromised dental patients. During the past few years, it has become increasingly difficult to access suitable patients, especially child patients, for dental students and consequently for them to become sufficiently experienced in treating patients with medical conditions. Multimedia simulation provides a means to fill this gap and allows interactive learning in a non-threatening environment. This paper examines the design, development, project management and evaluation of the first module – congenital heart disease.

Nicol and Anderson (2000), Whilst a good deal of research literature has been published on using Computer-Assisted Instruction (CAI) to help teach children with learning disabilities, there are fewer published studies examining the use of CAI with adults with a mild learning disability. We undertook an experiment comparing computer-assisted and teacher-implemented instruction in numeracy with this population, with a third group acting as a control group. All groups were pre-tested on two psychometric tests of numeracy, after which the experimental groups received one
half-day per week training in numeracy, with all groups being reassessed after three months and after six months. It was found that overall the three groups improved in their numeracy scores, and that teacher-led and computer groups improved more as a function of time on the intervention than did the control group. The issue of how much teacher support is required when this population uses CAI is discussed, as are some of the strengths and weaknesses of the software used in the study.

**Matthies (2000)** developed multimedia information and communication systems that demands cooperative working teams of authors, who are able to master several areas of medical knowledge as well as the presentation of these using different multimedia facilities. The growth and the complexity of medical knowledge as well as the need for continuous, fast, and economically feasible maintenance impose requirements on the media used for medical education and training. Web-based courseware in the Virtual Learning Center at the Hanover Medical School is an innovative education resource for medical students and professionals.

**Nkambou et al. (2000)** presented a system called Cyberscience 1 dedicated to distance education. The learning interface of Cyber science includes a component consisting in
activating an interactive multimedia simulation in which the student can carry out direct manipulation tasks making the simulation a virtual laboratory (virtual lab in short). A virtual lab for genetic study is currently realized (see [10]). As an intelligent distance learning system, Cyber science includes a number of intelligent learning agents that operates in the space of the virtual lab in order to help students to achieve their goals. This paper presents an overview of those agents and how they act in the virtual lab.

Rooyen and Tolmie (2000), Changes in the educational methods of nursing students created great possibilities for the use of computer technologies. With the help of computer-based multimedia technologies we can build libraries of simulated clinical problems (patients encounters) that can serve to fill some of the gaps in the current educational systems. This paper covers the structure of a patient simulation system in the early stages of development, called CompuPatient. Feedback from a questionnaire sent out to collaborators on the project is being used as a foundation for the design of a system customized to fit the requirements of the collaborators. The outcome of the questionnaire will be discussed. This will be followed by a discussion on the users involved in a patient simulation system.
The final section and also the focus of the paper is the basic structure of CompuPatient covering the primary modules involved and communication between them.

**Rosser et al (2000)** compared knowledge gains for laparoscopic skill acquisition following a standardized tutorial delivered via CD-ROM versus live instructor. A standardized tutorial was written and subsequently converted to multimedia CD-ROM format. During a laparoscopic development course, experienced US-trained surgeons (n=52) participated in the tutorial delivered live by the author. The CD-ROM tutorial effectively transfers cognitive information necessary for skill development. Distance learning modes of this tutorial program may be feasible.

**Struck (2000)** described a work in progress in which multimedia is integrated into classroom instruction with the goal of enhancing clinical reasoning skills among third year occupational therapy students. The integration of multimedia and problem-based learning is designed to create a clinical climate in the classroom. The goal is to provide additional opportunities to use learning materials, and to apply the skills and knowledge students need in evaluation, intervention planning, formulating treatment goals and objectives, and documentation.
Wang and Swanson (2000), The Island of Guam is a U.S. unincorporated territory in the Western Pacific Rim. Guam is the largest and most heavily inhabited of the Marianas Islands with a population of 146,000. With 85% to 90% of college students forced to take remedial math, clearly, students in this region are mathematically challenged. To counter this problem, the Guam Community College introduced interactive multimedia computer based learning system into their math courses. This study presents a survey result regarding students' attitudes towards interactive computer based math course. The sample for the study was the students enrolled in computer-based math courses at the level of ranging from Basic Math to Precalculus. Data collection spanned two semesters in 1999. Sixty-nine students participated in the study. Data analysis shows that students were overwhelmingly positive towards computer-based interactive math courses and interactive multimedia learning system.

Weinstein (2000), through the device of examining the journal entry of a college freshman from 10 years in the future, this article illustrates one possible future in which powerfully networked multimedia-capable laptop computers have radically transformed the delivery of introductory level college mathematics courses. The student’s journal entries about his experiences in a
Finite Mathematics course are taken as a parable to be examined through the lenses of modern mathematics education theories, which suggest that learning mathematics is a process of construction of meaning by the learner in both internal-cognitive and external-social ways. In addition, some objections to the story brought up during the author's informal conversations with mathematics teachers and students are addressed.

Adler et al (1999), in recent years medical education tends to a more problem- and case-based approach (Barrows & Tamblyn 1980, Thomas 1997). These alterations particularly emphasize the need for authentic, multimedia and interactive designed virtual patients (cases) as the objective in problem-based learning. By these cases future physicians should be enabled to apply their knowledge and skills more effectively to real clinical problems and acquire the necessary problem-solving competence (Chen et al 1998, Mooney & Bligh 1997). For some years the World Wide Web provides a suitable platform for distribution and easy handling of medical teaching software (Walker et al 1998). Therefore it is a main strategy to offer realistically designed medical learning cases in a net-based interactive way by using multimedia and Web technologies (Carlile et al 1998). These cases should be generated by clinical experts using an easy-going authoring system.
Arroyo et al (1999). Mathematics training is essential for participation in science and engineering careers, yet many students, especially girls, dislike and avoid math, and are therefore unprepared for university science majors and graduate programs. The goal of this project is to increase students’ interest in math and their confidence in their ability to learn math through an intelligent, model-based multimedia tutor, WhaleWatch. Based on a dynamically updated student model, WhaleWatch selects problems of appropriate difficulty and provides help and instruction as needed. The results of several evaluation studies indicate that WhaleWatch had a positive impact on students’ math self concept and beliefs in the value of learning mathematics. These results also suggest beneficial tutor modifications that will be incorporated WhaleWatch’s successor, AnimalWatch.

Artus et al (1999) adopted a Computer-Assisted Personalized Approach (CAPA), a networked teaching and learning tool that generates computer individualized homework problem sets, in our large-enrollment introductory plant physiology course. Using CAPA, each student received a printed set of similar but individualized problems of a conceptual (qualitative) and/or quantitative nature with quality graphics. Because each set of problems is unique, students were encouraged to work together to clarify concepts but
were required to do their own work for credit. Students could enter answers multiple times without penalty, and they were able to obtain immediate feedback and hints until the due date. These features increased student time on task, allowing higher course standards and student achievement in a diverse student population. We saw significant improvement in student examination performance with regular homework assignments, with CAPA being an effective and efficient substitute for hand-graded homework.

Buller et al (1999) developed an educational multimedia computer program on sun safety was produced on CD-ROM for children in grades 4 and 5, which was based on the "Sunny Days, Healthy Ways" sun safety curriculum (SDHW). Its effects on children's sun safety knowledge, attitudes and behaviour were evaluated with 162 students in 8 fourth and fifth grade classes in a randomized pretest-posttest 2 x 2 factorial design. The CD-ROM program may be a cost-effective and administratively acceptable sun safety instructional strategy, however, like many short prevention strategies, it will be most successful at conveying information on sun safety to children.

Buss et al (1999) examined the effects on science and mathematics instruction of professional development in
multimedia-based technology for 26 In-service and 14 Pre-service teachers. Participants learned to use multimedia-based technology, collaborated in developing integrative instructional units, and implemented the units. Data from a variety of measures show that teachers demonstrated increased levels of competence and confidence in using technology for science and mathematics instruction.

**Cleland et al (1999)** examined the effects on science and mathematics instruction of professional development in multimedia-based technology for 26 In-service and 14 Pre-service teachers. The discussion focuses on three components critical to the success of this professional development model: linkage of pedagogy to technology; collaborative teacher planning of instructional units; and support during implementation to promote systemic change.

**Coscia (1999),** Suffolk County Community College (SCCC) has embarked on a three-year pilot project using multimedia learner-centered environments to deliver developmental mathematics. The project’s outcome assessment model will measure the effectiveness of this delivery system, as well as student achievement in mathematics courses. New initiative funding was invested in college-wide faculty development producing over 70
staff members as participants in this project. Moreover, this venture capital supported the design, acquisition, and construction of three multimedia mediated-learning classrooms that can accommodate over 1200 mathematics students in a semester. This paper and M/SET 99 presentation explores the development and design of this project.

**Doan and Baillon (1999),** with the incoming of new information technologies, including the WWW environment, more and more information resources as well as learning tools are available. The problem we address in this article is to provide content, easy access to heterogeneous resources (multimedia, multiple functions...) and customized teaching aids. We propose the design of a global framework which enables the integration of various components with training worth that can be selected through structured metadata. We focused more precisely on the description of teaching aids in the environmental domain and the experience we had with a simulation program in teaching courses.

**Mead et al (1999),** In the process of learning how to create effective computer-based training modules for accelerator physics, we have come to believe that simple two- and three-dimensional animations are often the most valuable multimedia tool for presenting techno-cal material. This talk demonstrates a number of
the animations we have developed for our tutorial series Accelerators and Beams and discusses why we think they are successful. Examples range from illustration of the right-hand rule for vector cross products to demonstration of the so-called “vertical betatron oscillation” that is used for ensuring stable beams in accelerators.

Werner et al (1999), it is often criticized that university education is too inflexible and does not go enough into the needs of individual students. As part of the restructuring process of university education which includes using the new forms of media, a new education concept for the vocational teaching profession "Computer Science" is presently being developed at the Gerhard-Mercator University of Duisburg. The aim of the MODULO Project is to create new possibilities of differentiated and decentralized learning. The new didactical concept of this course should take the different learning needs of the students into account. Therefore a teaching concept has to be developed which considers the heterogeneous educational background of the students and also offers students different degrees of preparation, accompaniment and practice. Finally the new didactical concept should promote a media competence for the to-be teachers, which is based on multimedia related learning and teaching methods, so that these
contribute in their later practice to new teaching and learning forms.

**Kallinowski et al (1998)** developed the computer-based training laboratory in the Department of Surgery, University of Heidelberg. This CD-ROM series contains 5000 multimedia units with information of a uniform structure that comprises 26 CD-ROMs. These modules contributed significantly to the training and education of medical students and doctors. Furthermore, this multimedia library is intended to aid in the development of a database-supported online information system.

**Kinney et al (1997)** assessed the efficacy and efficiency of CAI for students learning evaluation and treatment skills for carpal tunnel syndrome (CTS). Ten volunteer physical therapy students were randomly assigned into either CAI or interactive lecture instructional groups. Each student completed a 36-item pretest on CTS. The CAI group used the Physical Therapy Patient Simulator CAI and the instructional group participated in lecture/discussion to complete the case studies. A 2 x 2 ANOVA revealed no significant difference in pretest/posttest scores between CAI and interactive lecture. The findings suggest that using a CAI simulation program may be as effective as and more efficient than traditional methods of instruction.
Plasschaert et al (1997) developed and compared the effects of the multimedia program with a more traditional approach consisting of written information, without interaction. They were given a written pre-test using 2 cases of dental pain and were instructed to study independently using either the multimedia program (group A) or the written information (group B). Statistical analysis of the average scores using paired t-tests revealed no significant difference between the performance of the students in either group, indicating that the multimedia approach to learning endodontic problem solving may successfully replace traditional learning strategies.

Richardson (1997) compared student perceptions and learning outcomes of computer-assisted instruction against those of traditional didactic lectures. Components of Quantitative Circulatory Physiology (Biological Simulators) and Mechanical Properties of Active Muscle (Trinity Software) were used to teach regulation of tissue blood flow and muscle mechanics, respectively, in the course Medical Physiology. These topics were each taught, in part, by 1) standard didactic lectures, 2) computer-assisted lectures, and 3) computer laboratory assignment. Subjective evaluation was derived from a questionnaire assessing student opinions of the effectiveness of each method. Objective evaluation
consisted of comparing scores on examination questions generated from each method. On a 1-10 scale, effectiveness ratings were higher (P<0.0001) for the didactic lectures (7.7) compared with either computer-assisted lecture (3.8) or computer laboratory (4.2) methods. A follow-up discussion with representatives from the class indicated that students did not perceive computer instruction as being time effective. However, examination scores from computer laboratory questions (94.3%) were significantly higher compared with ones from either computer-assisted (89.9%; P<0.025) or didactic (86.6%; P<0.001) lectures. Thus computer laboratory instruction enhanced learning outcomes in medical physiology despite student perceptions to the contrary.

Mars et al (1996) developed an interactive multimedia-based computer-aided instruction (CAI) programme, to determine its educational worth and efficacy in a multicultural academic environment and to evaluate its usage by students with differing levels of computer literacy. Thirty-four volunteers from the class of 125 second-year M.B. Ch.B. students who participated in the CAI study; 13 of these were not computer-literate. The CAI programme reduced the time spent by students in the histology microscopy laboratory and did not negatively affect their marks in post-course
evaluation. The concept of multimedia-based CAI in medical education was positively received by the students who participated.

Halloran (1995), Computers increasingly are being integrated into nursing education. One method of integration is through computer managed instruction (CMI). Recently, technology has become available that allows the integration of keypad questions into CMI. This brings a new type of interactivity between students and teachers into the classroom. The purpose of this study was to evaluate differences in achievement between a control group taught by traditional classroom lecture (TCL) and an experimental group taught using CMI and keypad questions. Both control and experimental groups consisted of convenience samples of junior nursing students in a baccalaureate program taking a medical/surgical nursing course. Achievement was measured by three instructor-developed multiple choice examinations. Findings demonstrated that although the experimental group demonstrated increasingly higher test scores as the semester progressed, no statistical difference was found in achievement between the two groups. One reason for this may be phenomenon of vampire video. Initially, the method of presentation overshadowed the content. As students became desensitized to the method, they were able to focus and absorb more content. This study suggests that CMI and
keypads are a viable teaching option for nursing education. It is equal to TCL in student achievement and provides a new level of interaction in the classroom setting.

**Halloran et al (1995)** evaluated differences in achievement between a control group taught by traditional classroom lecture (TCL) and an experimental group taught using CMI and keypad questions. This study suggests that CMI and keypads are a viable teaching option for nursing education. It is equal to TCL in student achievement and provides a new level of interaction in the classroom setting.

**Santer et al (1995)** compared the instructional effectiveness and efficiency of a pediatric multimedia textbook (MMTB) with that of a standard lecture and of a printed textbook in a prospective. Third- and fourth-year medical students were selected. Students were randomized to one of four treatment groups: (1) computer-aided instruction with MMTBs (n=39), (2) traditional lecture (n=39), (3) printed textbook (n=39), or (4) a control group (n=62). Statistical analysis was accomplished by analysis of variance. The Multimedia textbook constitute an educationally sound alternative instructional method and have a promising future in medical education.
Toth-Cohen (1995) examined the learning outcomes of a computer-assisted instruction (CAI) tutorial in applied anatomy and kinesiology for occupational therapy students and to determine its applicability for use in two university settings. The learning outcomes of an experimental group of occupational therapy students using a CAI program and a control group using books to study the same material were compared. A CAI program in applied anatomy and kinesiology can be an effective supplemental resource for occupational therapy students and can offer a learning experience that student value and perceive as helpful. Establishment of clear learning objectives, use of a theoretical base to design instruction, and development and testing in different educational settings can help improve the quality of CAI programs and ensure their relevance to other curricula.

Waddell (1985) determined whether computer-assisted instruction (CAI) is as effective as the lecture method of instruction (LMI) for teaching sanitation to hospital foodservice employees. Two dependent variables--gain in sanitation knowledge and amount of time required to complete the training experience--and three independent variables--treatment, age and level of education--were examined for each treatment group. Attitude toward sanitation training and CAI was appraised for the groups prior to training and
for the CAI group after training. A sanitation knowledge instrument was administered as a pre- and post-test, and a Likert-type attitude assessment questionnaire was utilized to provide an indication of participants' attitude toward sanitation training and CAI. Findings indicated that significantly more training time (97 vs. 32 minutes) was required by the CAI group than by the LMI group. Participants younger than 25 attained significantly higher gain scores (X=11 vs. X=10) with CAI than with LMI. Gain scores for other age categories tended to be higher for individuals taught by CAI; however, they were not significantly different from the scores of those taught by LMI. CAI group members demonstrated an improved attitude toward CAI and sanitation training. It was concluded that the CAI and LMI methods were equally effective for teaching sanitation for most of the employees who participated in the study.

Jacoby (1984) investigated the effectiveness of computer-assisted instruction in two radio logic topics was. A group of fourth-year medical students received computer-assisted instruction while a control group received the same material by way of a conventional lecture. Each group was tested before and after instruction, and the groups mean scores were compared. Student attitudes were elicited by questionnaire. Computer-assisted instruction was as effective as the lecture in improving the students' test performance.
Subjectively, computer-assisted instruction was rated superior by the students because of its interactive nature. Applications of computer-assisted instruction in radiology education are discussed.

**Summary of the Literature**

The reviews were presented in different sections such as computer-assisted instruction, development of courseware, multimedia courseware, physical education and evaluation of courseware with chronological and alphabetical order. All the research studies were presented in the section prove that multimedia based coursewares contribute significantly for better instructional process. The research studies reviewed are from many journals available in the websites such as www.pubmed.gov, www.aace.org, www.icass.org, ERIC websites etcetera employ Computer Assisted Instruction, Development of Courseware and Multimedia Courseware in the disciplines of Medical, Dental, Physics, Mathematics, Education, Language, Economics, Statistics, Plant Physiology etc., that too at school and college level.

It is also observed from the review of literature that there is no research studies related to multimedia courseware in kinesiology for physical education major especially in India. This
inference has motivated the researcher to develop a multimedia courseware in teaching kinesiology for physical education major.

The review of literature helped the researcher from the methodological point of view too. It was learnt that most of the research studies cited in this chapter on content analysis and experimental design as the appropriate methods for finding out the lapses and remediation.

On the basis of the review of related research studies and from the above discussion, bringing in newer teaching methods such as multimedia based teaching in kinesiology for physical education students become a significant need. The significant need felt through the review of related literature, qualification, in-depth knowledge in relevant subject areas and functional knowledge in computer promoted the researcher to turn his attention towards computer assisted education in general and multimedia based courseware in particular. It is hoped that the present study may serve as a base for future research in Sports science in multimedia based learning.