CHAPTER-II
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A review of related literature is an important prerequisite to actual planning and execution of any research work. The term ‘review’ means to organize the knowledge of the specific area of research. To make our research effective, adequate familiarity with all the work done up to the time in the field is very essential.

Exploring the literature moves the educator to the frontiers of knowledge where he can examine new findings in his field, spot gaps in knowledge, note contradictory findings and identify needed research. It is indispensable and unavoidable need for the research worker to be thoroughly familiar with the writings and the research in his field.

In the words of Robinson & Reed (1998), “A review of literature is a systematic search of published work to find out what is already known about the intended research topic”. A literature review serves many significant purposes; which includes establishing the need for the research, widening the horizons of the investigator, and prohibiting the investigator from carrying out the research that already exists. Aitchson (1998) holds the idea that review of literature permits the investigator to discover what has been done with regard to the problem being researched to make sure that replication does not takes place. It also develops understanding and insight essential for the establishment of a logical framework (Gay, 1976). Bless (2000) gave more specific reasons, which include the following:

- To deepen the conceptual framework of the investigation.
- To make acquainted the investigator with the recent developments in the field of research.
- To discover gaps in knowledge, as well as weak points in earlier researches.
- To identify correlations, disagreements or other relationships among various research conclusions by comparing various researches.
- To find out variables that should be included in the research study.
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- To study the tools used in earlier studies as well as the characteristics of the sample used, with the objective of employing them for the new study.
- To examine the merits and limitations of the research methods employed by other researchers, so as to improve them in one's own study.

Leedy (1989) noted that the more informed you are, the better you will be able to understand your problem. The aim of review of literature is not only to determine and analyze all information available on a topic, but also to develop understanding into the problem at hand. A famous philosopher Confucius (1997) stated, “Study the past if you would divine the future”. Thus, the overview of the past researches discussed in this chapter aims to pinpoint some of the important studies that have had influential impact and still have contemporary relevance.

The literature review for this research was carried out from various sources like journals on education and technology; articles published online and international dissertation abstracts to get the information relating to the general background and context of the study. This chapter presents the review of related studies under the following categories:

2.1 Studies Related to Web Based Instruction.
2.2 Studies Related to Learning Styles.
2.3 Studies Related to Attitude Towards Physics.

The review of a reasonable number of studies related directly or indirectly to the problem undertaken by the investigator is given below.

2.1 STUDIES RELATED TO WEB BASED INSTRUCTION

Frank (2000) studied the effects of collaborative learning and web-based instruction on academic achievement, in a constructivist environment, in principles of financial accounting course. The instructional module used in the study was implemented in the form of a cognitive apprenticeship and incorporated situated learning tenets. A two-by-two factorial research design was employed. An evaluation of study results indicated that neither collaborative learning nor web-based instruction alone impacted students’ posttest performance. However, an evaluation of the interaction effect indicated that web-based instruction was more effective when students worked individually rather than in collaborative dyads.
Mehlenbacher et. al. (2000) analyzed how learners enrolled in two web based courses of a technical writing class achieved as compared to learners enrolled in a traditional mode of classroom. Although no significant differences in individuals’ performances was determined between the two learning environments, the data indicated significant relationship between learners’ previous knowledge, attitude, learning style, and web based learning environment. Other finding was that reflective/global learners achieved better through web based instruction than active/sequential learners, whereas no differences were found between them in the traditional classroom.

Buchanan et. al. (2000) compared conventional classroom instruction with web based instruction in a degree level programme in library and information sciences. Results revealed that there was no significant difference in individuals’ performances and that learners felt the web based learning was good in certain circumstances.

Alzafiri (2001) investigated the effect of web based instruction on cognitive and psychomotor learning. The subjects of the study were delivered two types of instruction, web based instruction to the experimental group and conventional instruction to the control group. Both the groups were given instruction for thirty minutes on “Soldering a Circuit Board.” It was found that web based instruction was a suitable method of instruction for both male and female students as it accommodated varied learning styles. Also, this method was appropriate for teaching in the cognitive domain as well as psychomotor domain. But using web based instruction for providing instruction in psychomotor domain required more training and knowledge of instruction design principles.

Sansanwal and Nawayot (2001) designed WBI for enhancing the reasoning abilities and thinking skill of individuals. The website was hosted for three weeks and 71 students belonging to nations like Australia, Africa, U.S.A. etc. studied through the website. The WBI came out to be more effective in enhancing reasoning abilities of individuals who belonged to various nations and age groups.

Blackwell et. al. (2002) studied the performance of degree level students in a web based classroom environment in speech-language pathology. In this study, sixty-
eight students in speech-language pathology studied in a web based environment and finished a 67-item questionnaire. Students were from two groups, one who studied through web based instruction and the other by conventional classroom instruction. Responses depicting different aspects of web-based experiences were correlated with each individual’s overall satisfaction. A Mann-Whitney test depicted larger satisfaction expressed by individuals seeking web based course rather than conventional course. Individuals differed in the phases of instruction they thought that were useful to their success.

Derouza & Fleming (2003) compared students who finished online quiz with students who took traditional paper-based quiz and it was determined that marks revealed, those individuals who took the online quiz performed significantly better than the individuals who took the paper-based quiz.

Liang & Creasy (2004) analyzed the dynamics of web based classroom evaluation by studying the perspectives and experiences of the teachers. Grounded theory method was used to develop a “process theory”. This investigation comprised of ten faculty members who taught web based classes, and 220 learners. Interviews and classroom observation were conducted. The results depicted that, performance-based evaluation, writing skill, interactive evaluation and learner self-sufficiency were major evaluation aspects to facilitate learning. If one of the important roles of web based instruction is to promote self-paced learning, as part of the educational system, web based classroom evaluation must be so developed and implemented to facilitate learner self-sufficiency.

Al-Jarf (2004), in his study, aimed at determining whether there was significant difference between EFL learners who studied through conventional classroom writing instruction while depending on the textbooks only (control group), and those provided a combination of conventional classroom writing instruction and web based instruction (experimental group), achievement in learning writing. Before giving instruction, both the groups were given a pre-tested. The investigator found that learners taught through web based instruction performed significantly better than those taught through conventional method. Use of web based instruction used in combination with conventional classroom writing instruction was significantly more beneficial than classroom instruction which depended on the textbook alone.
Kim (2005) examined in what way individuals' attributes affected their achievement and learning experiences in a web based course. Eighty two graduate students participated in a web based course. Web based questionnaire was employed for collecting the data. Results suggested that student interaction with classmates and the teacher may have an impact on their achievement in web based course.

David & Thomas (2005) compared the performances and satisfaction of students in the web based instruction class with the performances and satisfaction of students in corresponding conventional classroom version of the same class. The research was undertaken at an in-service programme for training the technical education teachers at both the secondary school level and the college level. The findings revealed that students in the web based instruction classroom version of the methods course performed significantly better on 3 of the 4 individual performance criteria than students in the corresponding conventional classroom version of the course. However, individuals in the web based instruction course did not performed as well on the presentation’s project as individuals in the conventional course.

Henss (2005) conducted a study to evaluate an online version of a floral design course in comparison to the traditional version of the class. There were 140 students in the sample. The experimental group was enrolled in the online version of the course, while the control group was enrolled in the traditional version of the course. Their floral designs were evaluated at the beginning and end of the class in order to measure design skill, and grades earned in the class at the end of the semester. Statistically significant differences were noted in class grades as well as design skills with traditional students outperforming the web-based students in lecture points, lab points, and overall course grades. No significant differences were in terms of student course satisfaction.

Nguyen & Kulm (2005) undertook an experimental study that compared the effect of practicing through web on individuals' learning outcomes with that of conventional paper-pencil method of practicing. It was revealed that web based group showed better results than the group which practiced through paper-pencil method on both fractional and decimal operations of mathematics. Individuals also exhibited
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their desire of practicing more through this dynamic web based method by the end of the present study.

Butler & Zerr (2005) explored the usability of a web based homework system that employed feedback approach in mathematics instruction at two medium-sized American Universities. The data was analyzed and it was revealed that students achieved high rate of satisfaction. Also, this technique helped the individuals in improving their learning outcome.

Alaj-Aaski (2006) in his research, took a group of fifty-three polytechnic students who took part in an experimental web based instruction in mathematics/statistics. Attitude questionnaire was administered to the learners at the commencement (pre-test) and conclusion (post-test) of the study course. Neither overall nor between group differences was found among the students’ attitude towards mathematics/statistics.

Bangurah (2006) conducted a research whose main objective was to examine whether there were variations in the rate of completion and passing among students taking the courses offered in conventional classroom and web based instruction format and who were given instruction by the same teacher. About 3,601 students enrolled in courses constituted the population of the present study. There were no significant differences found in the mean rates of course completion among students from two academic divisions, for the course offered in the conventional classroom. However, significant differences were found among students in mean completion rates for identical course offered in web based instruction classroom. The results also indicated that there were differences in the mean passing rates for courses offered in conventional format, when the scores were compared among the various academic divisions, for the course offered in the conventional classroom.

Potomkova et. al. (2006) undertook a research whose purpose was to synthesize the experiences of implementing the information technology for supporting the teaching/learning processes in health and medicine. Many of the studies chosen for the objective of reviewing included evaluation of the web based tutorial in the light of practical implications, merits, limitations, and major preferences when compared to conventional classroom based instruction. It was depicted that overall,
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individuals preferred web based instruction to conventional classroom based instruction for convenience, ease of use, liberty of learning and the merit of frequent practicing, that web based instruction has been constantly revolutionizing and that it is a very significant instrument of learning.

Liu et. al. (2007) compared the learning effectiveness between two instructional delivery methodologies, conventional classroom based learning and web based learning. In the present study, experimental method was employed. Data were gathered from two institutes and a total of 287 workable answers were analyzed. The findings revealed that students who received web based training performed better in terms of learning outcomes than those who received conventional classroom based training.

Buzzetto-More et. al. (2007) determined the applicability of a web based homework management system employed in an accounting course at college level on individual satisfaction and value perception, as well as the effect on the learning outcome of students. Results revealed greater satisfaction among individuals with students asserting that the web based homework greatly assisted them to: (a) perform better in classroom (b) correct discrepancies (c) better understand major concepts and (d) perform well on home assignment.

Artino & Stephens (2008) examined how motivation and negative achievement emotion are variably characterized among learners in a self-paced online instruction. Also, the research determined how the various emotion-motivation characteristics relate to different techniques of academic success. For the present study, undergraduate students participated in a survey. It was revealed that individuals varied greatly in their configuration of course-related motivation and emotion. Additionally, individuals with more adaptive profiles showed high mean score than those with less adaptive profiles. Overall, these results indicate that online instructors and instruction developers must take measures to account for emotional and motivational difference that individuals possess and try to develop such curriculum which promotes self-dependence and task-value belief.

Al-Senaidi (2008) investigated the effects of computer based instruction on learners’ achievement, computer literacy among students and their attitudes toward
both the content material and computer based instruction. The findings depicted that there was a significant effect of web based instruction on learners’ computer literacy, and also on their attitude towards computer based instruction. As a result, recommendation for efficient employment of web based learning environment was made.

Buzzetto-More & Ukoha (2008) examined the effects of web based remedial instruction in mathematics on students’ learning outcome. The main characteristics of the instruction consisted of interactive tutorial exercises, online assignment and quiz. The findings of this research were non uniform and higher level of neutrality was noticed. But, the results did reveal that many learners opined that the web based remedial instruction was simple to use, a good learning instrument, and a tool that aided them to do better in terms of learning mathematics.

Omari (2008) studied employment of online instruction by Physics students and their attitude towards it. In the present study, XI standard students were studied and analyzed. During this research students’ answers to questions about their learning of the subject were determined and their perception about the importance of online curriculum in helping them to deal with their education. The results of this research indicated that learners, as a whole, showed negative attitude towards online Physics curricula in their classroom. Learners agreed that online curricula did not encourage them and is uninteresting, ineffective and time consuming, did not enhance the teaching and learning process, and that they did not prefer to employ it.

Hsu & Chang (2009) studied the perception and attitude of teaching staff and students towards web based instruction so as to determine the practicability of developing a web based instruction for the department of designing. For the present investigation, the methods used were both qualitative and quantitative methods of research. 18 rounds of semi-structured interview were conducted with 18 staff members and 270 students studying in the department of designing were given a questionnaire to be filled by them. Findings depicted that teaching staff members and students thought that web based instruction was practicable depending on the type of designing curriculum and separated the mode of instruction into completely web based instruction and computer assisted instruction.
Baker (2009) compared the performance of students taking statistics course who were taught through web based instruction and those who were taught through conventional instruction. The study was conducted in two groups, one groups being provided web based environment and the other given conventional instruction at an American college. The findings from the pre-test scores, post-test scores, and annual final examinations marks suggested that students given web based instruction had high level of academic achievement in statistics course as compared to those taught through conventional instruction. It was also depicted that the asynchronous form of web based learning allowed learners to study at their own pace and would continue to generate students’ interest despite of any potential difficulties.

Liu & Wang (2010) studied the learning processes of forty Vth standard students while studying ‘stars and sun’ unit of school science, by employing the development of conceptual maps in addition to web based instruction. The below mentioned inferences were drawn: (a) the web based instruction had a favorable impact on students’ understanding of the science concept; (b) the web based instruction firstly provided a framework to the students from which the related concepts were developed. This method of instruction proved to be a more stable mode of learning; (c) the web based instruction was found to be appropriate for learners with varied capabilities.

Boyaci (2010) examined the viewpoints of pre-service teachers on web based classroom management system. In this research, qualitative method of research, specifically descriptive method was employed. About twenty pre-service teachers were examined for the present study. It was found that there was an agreement among views of pre-service teachers regarding the workload and accountability of the teachers in web based classroom management. It was also revealed that the web based classroom management was more efficient than conventional class. There was no indiscipline in a web based classroom as it is found in a conventional classroom.

Sitzmann et. al. (2011) determined the effectiveness of web based instruction as compared to classroom instruction. For this meta-analytic technique was used by the researchers. They also studied about the moderator of the comparative effectiveness of the two modes of instruction. As a whole, the findings showed that
web based instruction was six percent more efficient than classroom instruction for teaching declarative knowledge. Both the modes of instruction were equivalently effective for teaching procedural knowledge. The students were equally satisfied with web based as well as classroom instruction. Eventually, web based instruction was fourteen percent more effective than classroom instruction for teaching declarative knowledge when students were provided control during web based instruction.

From the review of studies related to WBI, it is found that WBI has proved beneficial for learners. It was found that in WBI students were themselves responsible for their learning. Both students and teachers have been recognizing the importance of internet for educational purposes. Some studies indicate that students were greatly benefitted from online instruction and showed more confidence after taking the instruction. It was also reported that the web-based classroom management was more effective than traditional classroom. Students can learn at their own pace through asynchronous mode of web based instruction. They enjoy watching video lectures delivered by experts. It was also found that students have better understanding of concepts, enjoy doing assignments and rectify their deficiencies.

2.2 STUDIES RELATED TO LEARNING STYLES

**Brudenell & Carpenter (1990)** examined the relationship between students’ learning styles and their attitude towards computer assisted instruction (CAI). The study was based on single group pre-test post-test design. The data collection was done from adult learners who were enrolled in a nursing course, which utilized computer assisted instruction as a teaching strategy. Analysis of the data suggested that significant negative attitude towards computer assisted instruction existed among the individuals having different learning styles.

**Orr & Davidson (1993)** analyzed the effect of computer-based instruction and learning styles on the achievements and attitudes of 189 elementary school students. Findings did not support the hypothesis of interactional effect of computer based instruction and learning styles on both achievements and attitudes of the students.
Marrison & Frick (1994) determined the effects of learning style on academic achievement and the perception of students of the two instructional methods. The data analysis revealed that learning styles in combination with instructional method had no significant effect on the students’ achievement on the agriculture demand knowledge test. Additionally, it was revealed that the learning styles had no significant effect on the overall perception of the students of the method of instruction.

Diaz & Cartnal (1999) conducted a study whose aim was to make comparison of the learning style of the students studying in online health education class with those studying in an on-campus class. In order to determine the social learning preference of students in various learning style categories, the Grasha-Riehmann Student Learning Style Scale was delivered to the students. It was depicted that the individuals who were enrolled in the distance education programme were significantly independent learners. On the other hand, the individuals enrolled in the on-campus class were significantly dependent learners.

Ballone & Czerniak (2001) carried out a study whose purpose was to determine the influence of teacher’s belief with regard to their intentions to execute varied strategies of instruction for meeting the requirements of students having diverse learning style in the science classroom. Variations among different teachers’ population for the three fundamental components and their intentions were also determined. Findings suggested that attitude towards subjective norms influenced the intentions of teachers to execute diverse strategies of instruction for meeting the requirements of students having varied learning style.

Byrne (2002) conducted an experimental research to find out the relationship between individual learning style and online learning resources. The particular situation of the experiment demanded that the instruction be carried out through an online learning environment called as web based classroom. The experimental group of the experiment utilized the online resources in a self-dependent and self-paced manner. Learning style of students was determined using a VARK scale and an index of learning styles (ILS) questionnaire. The results depicted that a significant relationship existed between learning styles and multimedia preference of students.
Shih & Gamon (2002) examined relationships between learning style and students’ achievement in a web based course. The results indicated that learners with various learning style and background achieved well, and did not vary in their usage of learning strategy and pattern of studying in a web based course.

Miller (2004) analyzed the use computer based education in relation to learning style. The findings depicted that learners having concrete sequential learning style learned not as well through computer based instruction as the learners having concrete random learning style.

McAndrews et. al. (2005) examined the relationship of learning style and students’ motivation with web based instruction in a course of agronomy. The findings showed that there existed no significant differences in web based instruction usage pattern among students having different learning styles as measured through Kolb’s learning style test. All the students preferred to use all the components of web based instruction for the similar number of time. However, individuals who exhibited converging learning style had highest marks while those having accommodator learning style achieved lowest marks.

Wishart (2005) made the comparison of the dominating learning style, approach and method of studying between students of Information Science and Computer Science studying in undergraduate classes. One hundred thirty four students of the first year class at universities of England participated in an online survey and findings revealed that students possessed a various types of individual learning style and methods of learning. More than double of the students of Information Science than the students of Computer Science preferred to use the method of discussion for learning. Computer Science students preferred to solve problems more likely than Information Science students. Both the groups did not enjoy reading from books or attending lectures.

Zualkernan et. al. (2005) conducted a cross-cultural research based on the students of Computer Engineering studying at a Sharjah university and an American university in relation to learning style, background characteristic and course outcome. In the present study, the learning styles of students of computer engineering studying
at both the universities were determined and analyzed. Findings indicated that there 
were greater similarities in learning style of these students studying at two different 
universities. But, it was tough to find out the relationship between students’ learning 
style and course outcome.

Mohamad & Nasir (2006) studied the learning style of multi-ethnic students 
studying at various institutions of Malaysia, in relation to gender, programme of 
studies and academic achievement. The descriptive analysis technique was employed. 
The results depicted that all students possessed different learning styles viz., Activists, 
Reflectors, Theorists and Pragmatists. Reflectors learning style was found to be the 
most dominating learning style among the students while the Activists learning style 
was the least dominated. It was also found no relationship existed between learning 
style and achievement and that, There were no significant differences between males 
and females, science and arts students with respect to their learning style.

Venugopal & Mridula (2007) examined the hemisphere preference for 
information processing and style of learning and thinking in students. A total of 250 
students of class eighth which comprised of both males and females from English 
medium schools were chosen. The tool Styles of Learning and Thinking was 
administered. The analysis of data revealed that, significant differences existed among 
students in their brain hemispheric preferences for information processing. It was also 
revealed that male students were more right hemisphere oriented and female students 
were more left hemisphere oriented.

Beck (2007) undertook a research whose aim was to determine the usage of 
the case study approach in relation to the learning styles of individuals enrolled in 
science methods course. 97 learners enrolled in an elementary science methods course 
at Midwest University took part in this investigation. This study depicted that teachers 
found the usage of case study method as practically helpful in assisting them learn and 
process course content no matter which preferences for learning styles the teacher 
possessed.

Ryu, Nam & Jackson (2007) conducted a research to determine both 
individual and cultural perspective of learning styles in relation to web based 
instruction among students studying at high schools. Two ethnic groups, Euro-
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Americans and Afro-Americans were chosen to participate in the research. The findings revealed that there were no significant differences among students on dimensions of learning styles. Additionally, students having active and visual learning styles were benefitted from web based instruction, which consisted of multimedia components like animations and audio effect which involved a better human interaction with computers.

Akkoyunlu & Soylu (2008) determined the learning style of students and their opinions on blended learning. The sample consisted of 34 students studying at various universities at Turkey. The tools which were employed consisted of a questionnaire developed to determine views of students on blended learning and Kolb’s Learning Style Inventory (LSI) for measuring learning style of students. For this study, students’ achievement scores were also collected for data analysis. The findings showed that students, in relation to their learning style, exhibited different views on blended learning process in terms of the easiness of the blended learning, criteria for evaluations, face to face environments etc. As a whole, results indicated there existed no significant difference between achievements of students in relation to the learning style.

Fazarro et. al. (2009) examined the learning styles of students of agriculture. Particularly, the objectives of the research were: (1) to identify the learning styles of agriculture undergraduate students studying in a soil science course and (2) to determine the differences in the course grade average scores of the students in the soil science course when the experimental group was given instruction in accordance to their preferred learning style in comparison to the control group. Findings depicted that when the modified approach of instruction was administered to the students, it resulted into a higher course grade average scores (CGA) for the experimental group as compared to control group scores.

Christou & Dinov (2010) examined the learning style, attitude and knowledge acquisition in computer-based probability and statistics course. For this study, data gathered were both qualitative and quantitative in nature. Data were collected by using various tools like Felder-Silverman-Solomon index of learning style, background assessment scale, and pre-test and post-test survey of students’
attitudes toward the course taught. The results revealed that, learning style of students and their attitude towards statistics and probability course were important determinants of their quantitative achievements in the course they studied.

Sullivan (2010) studied the students’ learning ability or style studying through traditional and accelerated programme of instruction, the differences in the emotional intelligence of students, and the relationships between learning style, emotional intelligence and academic success of the students. The sample consisted of ninety eight students out of which fifty students were enrolled in traditional instructional programme and forty eight in accelerated programme of instruction. Students from both groups were found to exhibit diverger learning style. The coefficient of correlation indicated that there existed no significant relationship between learning style, emotional intelligence and academic success of the students.

Engels & Gara (2010) investigated the learning style of students who were medical undergraduates, general surgery residents, and general surgeons. The learning style was determined using Kolb’s learning style inventory. For the present study, about two hundred forty members of faculty and students participated. It was revealed that the medical students exhibited assimilating style as their dominated style of learning. The dominant learning style of the residents and members of faculty was convergent and accommodative, with the residents and members of faculty showing no significant differences between them.

Rakap (2010) studied the influence of learning style, computer skills and online course experience on knowledge acquisitions of students when provided with web based education. About 46 adult students who were enrolled for web based course took part in this study. In order to evaluate learning styles of students, VARK learning preference questionnaire was employed by the investigator. The findings of the research depicted that (a) learning style had statistically significant effect on knowledge acquisitions of students, and (b) there existed a positive correlation between computer skill and success of students.

Alkhatnai (2011) compared the learning style of college students in an online and conventional instructional environment, so as to find out whether the students’ perception of their learning style is a determinant of their academic success
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and satisfaction in various instructional environments. For this, quantitative and qualitative methods of research were employed. Data were collected from a sample of one hundred students studying at a college. The analysis of the data depicted following conclusions. Firstly, the students were found to have preferences for various learning styles like tactile, auditory, visual, and kinesthetic learning style. Secondly, the research did not indicate correlation between the students' learning style and their preference for particular instructional mode. Lastly, the research depicted that students preferred online instruction for causes other than those linked with their learning style.

By studying the literature, it was determined that students vary in their learning styles. Some studies depicted that the students having concrete random learning style gained more through WBI. The difference was also noted in WBI use pattern among students of various learning styles. However, the overall perception of instruction method did not differ with styles of learning. Some studies indicated no relationship between learning styles and academic success. It was also found that instructional strategy should be adopted according to the preferred learning styles of the students. Also, active and visual learners were reported to benefit from the web based instruction, which employed multimedia elements such as animation and sound effects involving a greater human-computer interaction. On the other hand a few studies concluded that students with different learning styles and backgrounds learned equally well, and did not differ in their use of learning strategies and patterns of learning in Web-based courses. However, it was revealed that students having different learning styles can’t be taught through same method of instruction and requires newer ways of instruction based on computer and specifically on internet.

2.3 STUDIES RELATED TO ATTITUDE TOWARDS PHYSICS

Kalu (1994) conducted an investigation with the objective of observing and the interaction pattern of students during Physics class and to identify students’ attitudes toward Physics and their achievements in various academic tasks. The sample included 520 students and 16 Physics teachers taken from various secondary schools. Every teacher was observed for four periods for a period of eight weeks. The data analysis revealed that a significant positive relationship existed between
interaction patterns of students, their post-instructional attitudes toward Physics and achievements in the academic tasks.

**Weinburg (1995)** conducted a meta-analysis of the literature between 1971 and 1990. This analysis determined the gender differences in students’ attitude towards science, and correlation between attitude towards science and achievements in science. Seven correlations representing 6,753 subjects were calculated during the study. Findings revealed that male students have more positive attitude towards science than female students. The study also indicated that for the subjects of Biology and Physics, the correlation between attitudes and achievements for males and females was positive, but stronger for females than for males.

**Ogretme (2001)** determined the effects of ninth grade differentiated instruction in Physics on gifted students in relation to attitudes and achievements of students. The Physics instruction was delivered for eleven weeks and was given on the basis of learners’ readiness and their learning style. For the present study, twenty-eight IXth grade gifted students comprised the sample. The statistical data analysis indicated that there was a positive effect of differentiated instruction on students’ attitude towards Physics. The instruction transformed the students’ attitudes toward Physics, and achievement of the students was also improved.

**Stake and Mares (2001)** examined the effects of two science enrichment programme on the attitude of about 331 gifted high school students who attended a full-time summer programme for a four week time period. Significant difference was found in the effect of science enrichment programme between the students of the treatment and control group.

**Demireci (2004)** studied the attitude of students toward Physics course. For the research, 177 students were selected through convenient sampling. Out of these, 124 students were males and 53 students were females. The data collection tool used had eighteen statements which related to attitudes of students toward Physics. It was determined that significant differences existed between attitudes of male and female students toward Physics. Males showed more positive attitudes toward Physics than females. Additionally, the findings revealed that there were significant differences between the students’ academic achievement in Physics.
Eryilmaz (2004) studied the effectiveness of peer instruction on the achievement of students and their attitude towards Physics. For the study, two type of instructional methods were employed. Also, Physics Attitudes Test (PAT) and Achievement Test in Physics were employed for data collection. The research was carried out with three teachers and 190 Xth grade students of public school. The data were analyzed by using statistical techniques. The findings revealed that peer instruction was more effective than conventional instruction. However, the data analysis was unable to show significant differences between the attitude of the treatment and control group students towards Physics.

Santiboon & Fisher (2005) explored the relationships between student perceptions of their interaction with teachers in senior secondary schools and attitude towards Physics of the students. The teacher-student interaction was evaluated using a 47-item questionnaire. Attitude of students was determined with an attitude towards Physics scale. The questionnaire was administered to the students in Physics school classes at the twelfth grade level. Significant relationships were found between student perceptions of their interaction with teachers and the attitude towards Physics of students.

Prokop, Tuncer & Chuda (2007) determined that attitude towards science of the students differed from one student to other and transformed with age. Also, the attitude towards Physics of the students became more negative with age while the students' attitude towards Biology became more positive with age. Similarly, attitude towards science among male students changed with the age, and became more positive toward Physics than toward Biology, while female students' preferences for Biology remained invariable and at a high level.

Duda & Garrett (2007) examined effects of blogging in Physics classroom on the attitude towards Physics of the students. During the study, attitude of students toward Physics was determined by employing a likert scale survey during the four semesters in an introductory Physics course. It was revealed that, students who did not utilize blogging for studying Physics demonstrated decline in their attitudes toward Physics. However, individuals who studied and were involved with the blogging maintained a positive attitude towards Physics. Students’ responses to the blog was
awesomely positive, with students asserting that blogging made the Physics concepts, which they studied in their classes, more clear and learning became much more interesting.

**Broggy & McClelland (2008)** determined the attitudes of undergraduates toward Physics after an experience of constructing concept maps. These maps were created by students during the college course. They were eventually asked to fill a questionnaire. Qualitative as well as quantitative analysis of concept maps was done to determine variation in knowledge structures of the students and to find out the effect of their attitude on cognitive development. The conclusions drawn suggested that the attitude of students towards Physics enhanced after experiencing the concept maps. The other finding that emerged was that the improvements in cognitive development were not directly linked to the improvements in attitude.

**Alimen (2008),** in his research, studied the performances and attitudes toward Physics among the students for a period of 5 years. The data collected was, in turn, employed to determine learning theories in teaching of Physics. The data were collected on the basis GPA and scores on the scale of attitude towards Physics. Findings showed that attitudes and performances in Physics of engineering students turned down during the time period. The Investigator further asserted that, there was a need to encourage positive attitudes among the learners toward Physics. More positive is the attitude, more positive is the performance of the students in Physics.

**Ikitde (2008)** explored the effects of teaching aids on attitude of students towards Physics. About 184 senior secondary school students were included in the sample. The study was based on quasi-experimental design. A Physics attitude scale was employed for collection of data. The analysis was done through the technique ANCOVA. The findings depicted that use of models and charts were very much effective in enhancing the attitude of students towards Physics. No significant gender difference in the students’ attitudes towards Physics was found. It was also revealed that the effect of teaching aids on the attitude towards Physics among students was not constant at all the gender level.

**Erdemir (2009)** determined the impact of problem-solving strategy on the attitude of students towards Physics. Problem solving strategy was employed with the
treatment group, while the control group was taught through conventional teaching method. The research was undertaken with 271 students studying in high schools. The results pointed out learners in the treatment group made positive improvements in their attitudes toward Physics than the control group.

Kaya & Boyuk (2009) studied attitudes toward Physics and Physics experimentation of high school students. For this study, sample consisted of 290 students chosen from the population by random sampling. A scale consisting of twelve items with regard to attitude towards Physics and eight items with regard to Physics experimentation was employed for the present study. It was revealed that, students’ attitudes toward Physics and Physics experimentation varied with respect to grade level and age of the students. But, no significant differences were found with respect to gender.

Anastasiadou et. al., (2009) in their study, analyzed students’ attitudes toward Physics. One hundred and sixty seven 11th grade students took part in the research. A validated questionnaire measuring attitudes toward Physics was administered to 91 boys and 76 girl students. In addition the study explored the gender differences in relation to the attitudes toward the subject. The results of the study indicated that students’ attitude toward Physics is strongly affected by teacher identity (personality). Moreover, male students possessed more favorable attitude towards Physics than their female counterparts.

Akinbobola (2009) conducted a study to determine the change in students’ attitudes toward Physics with the application of cooperative, competitive and individualized learning techniques. Quasi-experimental design was chosen for this research. About one hundred forty individuals participated in this investigation and they were chosen by the technique of random sampling. For the present study, students’ attitude towards Physics Questionnaire (SATPQ) was employed for data collection. The findings revealed that cooperative learning was the most efficient in enhancing the attitudes of students toward Physics. It was also depicted that no significant gender differences in the students’ attitudes toward Physics were found when they were instructed through cooperative, competitive and individualized learning strategy.
Stefan & Ciomos (2009) investigated the attitude of 8<sup>th</sup> and 9<sup>th</sup> grade students towards learning Physics. The sample involved in the research was formed of two groups of students, one of 8<sup>th</sup> grade (ages 14-15 years) and another of 9<sup>th</sup> grade (ages 15-16 years). The sample with 14-year old students was comprised of 112 students and the one with 16-year old students was comprised of 101 students. The applied questionnaire consisted of 10 questions and the answers were distributed on a five point scale. The results showed half of the subjects (52% of the 8<sup>th</sup> graders and 56% of the 9<sup>th</sup> graders) considered Physics to be a difficult subject, but which they enjoy studying. For more than half of the subjects (63% of the 8<sup>th</sup> graders and 73% of the 9<sup>th</sup> graders), Physics has been an interesting subject.

Mason & Singh (2010) surveyed the attitude of students towards Physics and approach to solve problems in Physics. Researchers developed and validated an attitude and approach to solve problems in Physics survey and delivered it to the students. The responses of the graduate students to the survey questions were compared with the students of introductory Physics course, students of astronomy and faculty members of Physics department. Responses to various questions indicated that the students’ attitude and approach to solve introductory Physics problems were not as expert like as graduate students of Physics and members of faculty. Likewise, the responses to some questions indicate that the attitude and approach of graduate students for solving introductory-level questions were not as expert-like as Physics faculty members.

Karakuyu (2010) investigated the effect of concept maps on the achievement of students in Physics and their attitude towards Physics. Fifty eight students from two 1X<sup>th</sup> classes who were enrolled in a Physics course at a high school participated in the study. One class was randomly selected as treatment group which developed concept maps on the topic electricity and the other was control group which did not have any knowledge about concept maps. Findings depicted that the experimental and control groups did not differ significantly with respect to the students’ attitude towards Physics and achievement in Physics. But, the students of treatment group were found to have more positive attitudes toward Physics than the control group.
Review of Related Literature

**Azar & Sengulec (2010)** compared the effect of computer assisted instruction and laboratory teaching methods on achievement and attitude towards Physics. The experimental pretest-posttest-experimental-control group design was employed for the study. The achievement test in Physics and attitude towards Physics scale were administered twice as pre-test and post-test. According to the data analysis, there were significant differences on students’ Physics achievements in favor of the computer-assisted teaching method. Also, for two different teaching methods, there were significant differences in students’ attitude towards Physics.

**Eshach et. al. (2011)** measured medical students’ attitudes towards a) Physics as a subject, b) Physics as useful to medicine, c) the learning environment, d) Physics textbooks as an efficient teaching device, and e) the assessment process. Questionnaire was distributed to thirty-two medical students in their fourth year of a six-year undergraduate program. The results indicated that medical students view Physics as an important subject that helps them to understand both everyday phenomena and medical topics. They also were not scared by the Physics courses, as one might expect. However, they were not satisfied with the way Physics was taught, and felt that the lecturer did not related the Physics concepts to medicine.

**Eryilmaz et. al. (2011)** undertook a study whose aim was to examine the relationships between high school students’ attitudes towards Physics laboratories, and their motivation levels for the class engagement. The study was carried out on 114 male and 180 female (total 294) adolescents attending high schools. The data of the study was collected by means of the Attitudes towards Physics laboratories scale. In the analysis of the data, simple regression analysis was used. According to the results of the analysis, it was observed that the students who have negative attitude towards lab work showed lack of motivation for classroom teaching, and also the students who exhibited positive attitude towards lab work showed higher motivation for classroom teaching.

**Karaman (2011)** conducted a study to compare the effectiveness of text-oriented instruction and conventionally developed instruction on VIIIth class learners’ understanding of the concept of fluid pressure and the attitude of students towards Physics. In accordance, the fluid pressure concept test was framed. The data were collected from thirty students in the treatment group who were instructed through
text-oriented instruction, and thirty-two students in control group taught through conventional classroom instruction. The findings revealed that text-oriented instruction helped in better acquisition of concept of fluid pressure than the conventional instruction. Also, the research did not indicate a significant effect of treatment on the attitude of students towards Physics.

From the above studies, it is found that students differ in their attitude towards Physics. Attitude towards Physics was improved through new teaching techniques like problem solving, cooperative learning etc. However, impact of web based instruction is an area which needs due consideration. A few studies suggested that students who had negative attitude towards Physics showed lack of motivation for studying Physics whereas the students who had positive attitude took interest in learning Physics concepts. It was also revealed that computer based teaching methods improved the students' attitude towards Physics. The students who studied through computer assisted instruction scored good marks in their exam as compared to those who studied through traditional method of instruction.

2.4 SIGNIFICANCE OF THE STUDY

The day is not so far when all Indian classrooms would have a computer. Each day instructing through computer would then happen to be a reality. In developed nations, a lot of researches have been undertaken with regard to the impact of computer as an instruction tool on individual’s achievement, attitude, learning rates, retention etc. (Cotton, 2001). In our country, however, not many researches or meta-analysis have been undertaken in this field.

These days’ students are growing with the visual equipments like televisions, videos, computers and internet. It is impossible to capture the interest of these individuals by employing conventional techniques that were utilized in the past. As a consequence of technological advancements that occurred in the last section of the twentieth century, a great variation was found among the modes of introducing the knowledge to the students and the modes of attaining knowledge in the society. So, it has become tough for the teachers to teach with conventional methods.

Advancement in technology brings newer possibilities in the fields of education and instruction together. Presently, educators are not examining the
Review of Related Literature

problem of whether computer is useful in education and instruction but they are finding out how to utilize them more efficiently.

In the past some years, the internet has been becoming a main up-to-date mode of restructuring educational settings. The web facilitates teaching/learning by providing learners accessibility to a varied set of knowledge tools and supporting present needs. With the network technology providing infrastructures for newer formats of education, the possibility is grown to develop a virtual community of learners in the current society.

Web based education has the capability to manage with the needs of individualistic learning, cooperative learning and constructivist approach. Rapid pace of development in information &communication technology indicates that web based instruction will attain the capability to transform the status of conventional teaching learning process.

It would indeed be worthwhile to find out if WBI has the capability to bring about larger achievements of students, and how it applies to regular classroom instruction. Physics is a significant subject in the secondary school curricula. It is believed that Web can help in enhancing the learning of the students. Today, many web based learning software are available which makes learning an interesting experience for students.

To counter the challenges of present and future, to try to win in this age of information, every country will have to facilitate the excellence of its educational system, which can occur only by identifying the newer horizons and get benefitted from most recent modes of instruction.

Thus the study has been done as the investigator feels that schools should develop a vision of how technology can improve teaching-learning process and make the pupils more informative and develop the various skills and abilities.

Findings of this research might be a source of encouragement for the extensive utilization of web based instruction at different grade levels and in diverse subject areas. This study might also be a source of inspiration for researchers and educationists to design and create web based instructional tools and to undertake a range of experiments at school and college levels.
2.5 STATEMENT OF THE PROBLEM

EFFECT OF WEB BASED INSTRUCTION ON ACHIEVEMENT OF ELEVENTH GRADE STUDENTS IN RELATION TO LEARNING STYLES AND ATTITUDE TOWARDS PHYSICS.

2.6 OBJECTIVES OF THE STUDY

(i) To develop web based instruction on selected units of Physics of eleventh grade.

(ii) To develop achievement test on selected units of Physics of eleventh grade.

(iii) To study the effect of two different instructional strategies (web based instruction, and conventional method) on achievement in Physics of eleventh grade students.

(iv) To study the differences in achievement in Physics of eleventh grade students in relation to their learning styles.

(v) To study the differences in achievement in Physics of eleventh grade students in relation to their attitude towards Physics.

(vi) To study the interaction effect of instructional strategy and learning styles on achievement in Physics of eleventh grade students.

(vii) To study the interaction effect of instructional strategy and attitude towards Physics on achievement in Physics of eleventh grade students.

(viii) To study the interaction effect of learning styles and attitude towards Physics on achievement in Physics of eleventh grade students.

(ix) To study the interaction effect of instructional strategy, learning styles and attitude towards Physics on achievement in Physics of eleventh grade students.

2.7 HYPOTHESES OF THE STUDY

1. There exists no significant difference between mean achievement scores of students taught through two different instructional strategies, i.e., web based instruction and conventional method.
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2. There is no significant effect of learning styles on achievement in Physics of eleventh grade students.
3. There is no significant effect of attitude towards Physics on achievement in Physics of eleventh grade students.
4. There is no significant interaction effect of instructional strategy and learning styles on achievement in Physics of eleventh grade students.
5. There is no significant interaction effect of instructional strategy and attitude towards Physics on achievement in Physics of eleventh grade students.
6. There is no significant interaction effect of learning styles and attitude towards Physics on achievement in Physics of eleventh grade students.
7. There is no significant interaction effect of instructional strategy, learning styles and attitude towards Physics on achievement in Physics of eleventh grade students.

2.8 DELIMITATIONS OF THE STUDY

1. The present study was confined to eleventh grade students of CBSE affiliated schools of Ludhiana district.
2. The study was limited to selected units of Physics of eleventh grade.
3. The study was confined to classifying variables, i.e., learning styles and attitude towards Physics.
4. Learning styles were delimited to three styles only, i.e., visual, auditory and kinesthetic.