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

A SUMMARY OF THE THESIS
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SUMMARY

INTRODUCTION

Education is a natural, amicable and progressive advancement of man’s connate powers. It is a mode through which the society disseminates its heritage of past experiences and transformations, system of values and the techniques or skills of transmitting it. It provides children, youth and adult with the ability to respond, make selections and lead a better life. It is an important constituent of economic and social growth and development.

Due to the existence of an ample social diversification in India, it is arduous to transform the social grounding of students, parents and their economic background. Therefore, the only choice left for us is to impart compatible or standardized teaching learning resources or methods. For improving the quality of education throughout India, there should be some common network, which administers equivalent quality education to all learners, including the individuals from the remote areas and suburbs. The answer to all the questions is Web Based Instruction.

Web based instruction means to provide a learning environment that is intermediated and facilitated via the Internet/Intranet and linked to a computer with hyperlinks to resources which are beyond the instructional domain. The instruction is developed so that the computer provides lessons in reply to student or user interactions.

Web based instruction (WBI) refers to instruction that can be provided anytime in any part of the world to anyone having an Internet connection. This has developed into something with indefinite opportunities, and constitutes a world of enhancing skills, improvement of learning and comprehending, and modifying the attitude and behavior in a course of time.

Web Based Instruction (WBI), also sometimes called Web Based Training, is defined by Clark (1996) as, “An individualized instruction delivered over public or private computer networks and displayed by a web browser. Web based training is not downloaded computer based instruction, but rather on-demand training stored in a
server and accessed across a network. It can be updated very rapidly and access to training is controlled by the training provider.”

Relan and Gillani (1997) refer to Web Based Instruction as, “The application of a repertoire of cognitively oriented instructional strategies within a constructivist and collaborative learning environment utilizing the attributes and resources of the world wide web”.

Individuals prefer to receive and process information in varied manner, by viewing and listening, reacting and doing, thinking logically and instinctively, analyzing and visualizing constantly and in fits and starts. Advocates of learning style theory assert that good teaching involves identifying individuals’ learning style and designing the instruction in accordance to that.

Keefe (1979) defines learning styles as the “composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment”.

According to Kolb (1984), “Learning Style is a product of two choice decisions (1) How to approach at task i.e., grasping experience (Preferring to do and Watch) (2) Our emotional response to the experience i.e., transforming experience (Preferring to think or feel)”.

Smith & Dalton (2005) says, “Most simply conceived, learning style is the typical way an individual likes to go about learning. Although there are characteristics of learning styles that are quite stable in an individual across different learning tasks and contexts, there can still be variation in the same learner”.

The learning style view has attained immense popularity within the education sphere, and is often discussed at levels ranging from kindergarten to graduate level. Choosing diverse methods of learning may check the students from getting annoyed and dissatisfied when they unable to rise up to their potentiality. Experimenting with diverse learning styles and learning environment might facilitate the learners for fulfilling his accomplishment and feeling of attainment. Thus, the concept of learning style is significant for the teachers and educationists for effective learning to occur.

An attitude is the evaluative statement or judgment concerning any object, individual, or event. More specifically, attitude can be referred to as a consistent
tendency to feel and act in a specific manner towards some object which may consist of some event or an individual as well.

Physics is one of the oldest academic disciplines, or probably the oldest through its inclusion of astronomy. Over the last two millennia, Physics had been considered synonymous with philosophy, chemistry, and certain branches of mathematics and biology, but during the scientific revolution in the 16th century, it developed into a distinctive modern science in its own right. However, in some subject areas such as in mathematical Physics and quantum Physics, the boundaries of Physics remain difficult to be distinguished from other disciplines.

In general, the ‘Attitude towards Physics’ is, in a way, feeling about Physics. Attitude towards Physics denotes interests or feelings towards studying Physics. It is the students’ disposition towards ‘like’ or ‘dislike’ of Physics. Students’ beliefs and attitudes have the potential to either facilitate or inhibit learning.

There are frequent developments taking place in industry, engineering, agriculture, and medicine. Science as an important tool of development plays a vital role in bringing about these developments by enhancing technological advancements, increasing national wealth, facilitating health and education. Physics is, therefore, a significant subject in science and technology as it studies the essence of natural phenomena and helps individuals comprehend the increasingly technologically transforming society (Zhaoyao, 2002).

Achievement in Physics refers to the level of learning of Physics concepts in terms of knowledge, understanding, skills and application objectives. Learning of different subjects may not yield similar results as there are many factors that affects student’s achievement. Teaching of Physics is facing dilemma for teachers as well as students. Physics lessons have the potential to inculcate creative thinking and critical analysis in students.

Use of technology has brought a lot of advantages almost in every field from science to industry, from medicine to education. Particularly, the emergence and popularity of information technology and applications for multipurpose aims gives its users not only rapidity and economic benefits but also audio and visual opportunities.
Computer revolution, which began with abacus and has now reached dual core processor, has opened new doors to understanding Physics.

Experimental researches have shown that traditional method of teaching does not always work well. Presenting visual content makes instruction effective and successful when principles of how students learn are taken into consideration. The best learning is learning by seeing and learning by oneself. Therefore, we will have to develop Physics lessons in such a way which captures individuals’ attention and in this way facilitates permanent learning. We must promote learning of Physics by employing computer based instructional methods to accelerate understanding of Physics concepts.

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 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.

**STATEMENT OF THE PROBLEM**

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

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.

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.

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.

DESIGN OF THE STUDY

The present study is an experimental one. The experiment aimed at studying the effect of web based instruction on achievement in relation to learning styles and attitude towards physics. The study was based on pre test – post test experimental design. The independent variable is the instructional strategy employed to teach the students. Two instructional strategies viz. web based instruction and conventional method of instruction were employed for the study. The classifying independent variables are learning styles and attitude towards physics while achievement in physics is the dependent variable. In the present study 2×3, 2×2, 3×2 and 2×3×2 factorial designs are used. The reason why factorial design is used is that it permits one to evaluate the combined effect of two or more independent variables simultaneously.

SAMPLE OF THE STUDY

In research project, researchers usually come across unmanageable population. So, representative of the population is drawn for the study as it is often desirable in
order to reduce expenditure, time and energy and also to produce greater precision and accuracy. Sampling refers to selecting relatively small number of individuals called subjects, to find out something about the entire population that the subjects represent. Sampling procedures provide generalization on the basis of relatively small proportion of the population.

For the present study method of random sampling was used. The school sample was drawn from representative senior secondary schools of Ludhiana district, where students have exposure to internet. First of all four schools were randomly selected from the total population of schools. From each school two sections were randomly designated as Group- I and Group-II. Among the sample of 300 students, Group-I was comprised of 150 students and Group-II was also comprised of 150 students.

**TOOLS USED**

For the present study, the researcher required various data gathering tools which varied in their design, complexity, administration and interpretation. Each tool was appropriate for the collection of certain type of information. For this study, the following tools were used to collect the data:

1. Web Based Instruction on selected units of Physics of eleventh grade was developed by the Investigator.
2. Achievement Test on selected units of Physics of eleventh grade was developed by the investigator to measure the performance of students before and after the treatment.
3. Learning Styles Test was developed by the Investigator.
4. A scale to measure Attitude Towards Physics was also developed by the Investigator.

**PROCEDURE OF DATA COLLECTION**

After selection of the sample the experiment was conducted in the following phases:

**Phase- I : Development Phase:**

In this phase, Web Based Instruction, Achievement Test in Physics, Learning Styles Test & the Scale to measure Attitude Towards Physics were developed.
Phase- II (a): Administration of Tools:

The students were randomly divided into two groups, viz., experimental group and control group. The learning styles test and the scale to measure attitude towards Physics were administered to the students of both the experimental and the control group.

Phase-II(b): Pre-Test Phase

The achievement test in Physics was administered as pre-test to both the experimental and the control group. Before starting the test, necessary instructions were given to the students. The students were told that the purpose of the test was not to evaluate them but to get useful information for some research work.

Phase- III : Implementing the Instructional Strategies:

The investigator employed two instructional strategies for the present investigation. The experimental group was taught through Web Based Instruction and the control group was taught through conventional method. Same content was taught to both the groups for the same duration of time.

Phase- IV: Post-Test Phase

After completion of the treatment, the same achievement test in Physics was administered as post-test to the students of both the experimental and the control group.

STATISTICAL TECHNIQUES USED

Statistical techniques were employed to give the concise picture to the data so that it can be easily comprehended. The following statistical techniques were used to test the hypotheses:

1. Descriptive statistics like Mean, Median, Mode, Standard Deviation, Skewness, and Kurtosis were employed to understand the general nature of data.
2. Two way (2×3, 2×2, 3×2) and three way (2×3×2) analysis of variance was employed to find out the main and interaction effects.
3. For the significant F-ratio, the t-test was employed so as to find out the significance of difference between means related to different groups and different variables.
FINDINGS AND CONCLUSION

On the basis of analysis of data and interpretation of results obtained through analysis of variance, the following conclusions were drawn:

1. There was a significant main effect of the instructional strategy on the achievement in physics of eleventh grade students. The students who were taught through web based instruction were found to score significantly higher on achievement test in physics.

2. There was no significant main effect of learning styles on the achievement in physics of eleventh grade students.

3. There was a significant main effect of the attitude towards physics on the achievement in physics of eleventh grade students. The students who have positive attitude towards physics scored significantly higher on achievement test in physics.

4. There was a significant interaction effect of instructional strategy and learning styles on the achievement in physics of eleventh grade students.

5. There was no significant interaction effect of instructional strategy and attitude towards physics on the achievement in physics of eleventh grade students.

6. There was no significant interaction effect of learning styles and attitude towards physics on the achievement in physics of eleventh grade students.

7. There was no significant interaction effect of instructional strategy, learning styles and attitude towards physics on the achievement in physics of eleventh grade students.

EDUCATIONAL IMPLICATIONS OF THE STUDY

The aim of this study was to find out whether web based instruction can enhance achievement in physics of students of eleventh grade. Web Based Education is the most suitable method of imparting instruction to the students at any place in the world at any time. Development in computer network technology and advancements in bandwidths have improved the possibilities for unrestricted access to multimedia. Web browser that supports 3-D virtual reality, animations, e-mail, chatting, video conferences, and real-time audio and video provides unmatched opportunities of learning.

These days’ individuals are growing with the visual equipments like televisions, videos, computers and internet. It is not practicable to capture the interest of these
individuals by employing conventional techniques that were used in the past. As a result of technological advancements that occurred in the last quarter of the twentieth century, a great transformation took place between the modes of presentation of knowledge at educational institutions and the modes of acquiring information in the society. So it has become tough for the teachers to teach with conventional methods.

In web based instruction, the subject material is kept at a single source location. It can be updated in a centralized way, and all individuals may view the updated version within not much time. Once the content material is updated, there are no outdated versions automatically gets removed from the web so that learners do not get confused. Web based instruction can be seemed to be the ideal solution to all the problems of instructing a large number of individuals.

Physics- the study of matter, energy and their interactions- is a scientific discipline that plays a fundamental part in the future development of human beings. Physics is a significant subject in the education of engineers, scientists, and computer professionals, as well as practitioners of the other physical and biomedical sciences. Physics is all around us. It is present in the microscopic world of an atom and in the great universe. There is physics in our day to day life. From the time we wake up to the time we fall asleep, our tasks involve physics. When we prepare our food, iron our clothes, clean the dishes, listen to music, or replies to a phone call, we utilize the principles of physics.

Students, generally find it difficult to understand the concepts in physics. Web based instruction provides new ways of teaching and learning of this subject. Web based instruction offers dynamicity to the classroom instruction through the use of videos, animations and other multimedia effects. The present study has reached the conclusion that students take more interest in internet enabled environment and respond in a much better way. The level of interaction between the computer and the individual helps in increased achievement of the students.

The present study has revealed that the interaction between the instructional strategy and the learning styles also affects the students’ achievement in physics. The students having visual, auditory and kinesthetic learning styles and taught through web based instruction showed greater achievement in physics than those who were taught through conventional method of instruction.

Students attitude have also been found to play an important role in students’ achievement in physics. The students having positive attitude towards physics scored
significantly higher on the achievement test than those having negative attitude towards physics. Therefore, efforts should be made to develop a positive attitude towards the subject in order to reap good results.

It was also reported that the web-based classroom management was more effective than traditional classroom. There was no breakout in the web-based classrooms as it is seen in the face to face classrooms. Web based instruction is anywhere, anytime instruction. Students can study at their own pace without any difficulty. It can hold the attention of students for a much longer time.

The present study therefore provides a research base for popularizing the use of web for instructing the students. It is an emerging field of interest for the educationists and the researchers. It is therefore; felt that WBI must be incorporated into the classroom teaching for improving the process of teaching & learning.

SUGGESTIONS FOR FURTHER RESEARCH

Every piece of research, which is well executed, tends to provide clues for further exploration. This is true of research in every area of life. The present study is a humble but a pioneer attempt. Due to lack of sufficient time and material at the disposal of the investigator all aspects of the problem could not possibly be studied in its completeness. But the present study opens up certain avenues for further research, which are briefly listed below:

1. In the present investigation, conclusions are based on the study of 300 students of eleventh grade. It may be repeated for larger sample and for different grades of school.
2. The study was based on the achievement of students in Physics. It can be undertaken to investigate the effect of Web Based Instruction on achievement of students in other subjects like Mathematics, Biology, Chemistry etc.
3. The investigation can be carried out to determine the usefulness of Web Based Instruction in providing distance education to the adult learners.
4. Another area of research can be addressing of the issues concerning designing and development of Instructional Websites and their use.
5. The present study was confined to Ludhiana district only. The study may be extended to other districts and even on a state or national level to make the results more reliable and valid.
6. The present study was carried out in relation to classifying variables learning styles and attitude towards physics. Research can be carried out in relation to other variables like intelligence, aptitude, interest, personality of the learners etc.

7. A separate study may be undertaken to find out the psychological effects of Web Based Instruction on the learners.