Abstract

The purpose of the study was to ascertain if the use of Web-based teaching-learning significantly improved the secondary school students' performance and to compare the effectiveness of the traditional teaching-learning with the web-based learning using pre- and post-test measurements. This study adopted pre-test post-test experimental design for the collection of data. A sample of 100 secondary school students from Burdwan district (in India) was selected. The data collected were analyzed using appropriate statistical methods-descriptive and inferential statistics. Students in the treatment group also completed a survey, a questionnaire regarding perceptions and attitudes toward web-based learning. The collected data were analyzed using χ² test. The results indicated that the use of Web-based learning significantly impacted students' scores from pre-test to the post-test. The findings of the study revealed that the effectiveness of web-based learning in secondary classroom was better than that of the traditional teaching-learning. The study also suggested that an online learning had a positive impact on student learning.

1. Introduction

The traditional teaching-learning methods in secondary school have been questioned as majority of the educators search for alternative ways of presenting material, engaging students, and improving academic performance (Jain, 2006). As a result of such enquiry, the use of computers and the Internet have become integral part of today’s classroom. Moreover, the Internet has facilitated the development of Web-based learning for students’ learning and assessment across various disciplines. Bliwise (2005) defines Web-based tutorials as computerized demonstrations that are used for active learning exercises. The Web-based learning has become acceptable as a complement to lecture method as it improves students’ level of understanding of materials and allows learners to
control the sequence and pace of the instructional materials. The internet is becoming a part of our daily lives, and its presence in formal education system is very much of low degree. Web-based learning seems to dominate the attention of educators and students.

As a teaching tool, computers are used for multimedia presentations in the classroom along with computer-based courseware and tutorials. Online computer tutorials provide self-paced, independent learning, allow for remediation, and provide for a means of distance and asynchronous education. Online teaching tools can be expensive to purchase or develop in addition to the cost of acquisition and maintenance of equipment. Therefore, before instructors adopt computer-based learning as a teaching tool, the effectiveness of this teaching modality must be documented. In addition, educators must find the best approach for initiating computers as learning tools to make a successful transition from traditional learning to technology-enhanced learning.

Web-based learning is that which makes use of the internet (or a local intranet). There are many ways in web based learning, such as tutorials, online discussion groups and online evaluation. Online tutorials are similar to face-to-face teaching. They provide information structured by the teacher in a way that will facilitate the learning. Tutorials are often enhanced by features such as multimedia (sound, pictures, movies, and animations), links to online resources (full-text journal articles etc.) and self-assessment tools. In online discussion, teachers act the role of facilitators, monitoring and guiding the discussion as needed and helping students to find additional resources. Communication among group members can be asynchronous (delay between sending a message and receiving the response) or synchronous. The most obvious advantage of WBL (Web-Based Learning) is that it overcomes physical distances. This is the cardinal feature separating WBL from other computer-assisted instructional methods, and enables WBL to facilitate the teaching of students scattered across different places in the same city, different cities and even different countries. The result of distance independence is that learners have the opportunity to participate in the same instructional activities regardless of the real location. The influence of web-based learning in case of distance education is immense because of its physical distance independence.

Distance learning also permits the possibility of economies of scale. Once a WBL tutorial has been developed, class size is limited only by server capacity and bandwidth. It is possible for schools to share resources and thus avoid redundancy in developing course materials. Individual components of a course (for example, a paragraph of text, an animation, or a video clip) can be indexed and made available for use in other courses.

Potentially, computer-based education can increase effectiveness and efficiency in the education of students, while increasing student interest. When students are involved and interested in a particular subject, their learning most likely will be effective.

2. Review Of Literature
Clark (1983) showed that the media (e.g., video, computer) are merely like instrument that deliver instruction but did not influence students’ learning. Alexander (1995) suggested that we focused on the way in which students learn using the technology rather than the media. Parson (1998) stressed the importance of understanding how technology can affect learning when used by learners. Mitchell and Jolley (1999) found significant positive correlation between students who used a self-guided, web-based tutorial and exam performance. Desrochers, House, and Seth (2001) reported higher scores among students who used Web-based tutorials to apply knowledge of assessment and intervention to a novel clinical situation compared to students who learned the material in a lecture-only format. Similarly, Wilson and Harris (2002)
evaluated the use of interactive tutorials in an introductory psychology class and found that students who learned from the Web-based tutorial scored better on examination than students who learned only from lecture method.

Another study was conducted by Bolliger and Supanakorn (2011) which revealed that the majority number of the study participants thought that the web based learning were useful in learning and reviewing the knowledge effectively. The majority of the participants considered that the web based tutorials helped them to spend less time in learning the material and completing the assignment..

3. Objectives Of The Study
   i. To find out the effectiveness of web based learning in secondary classroom.
   ii. To compare the effectiveness of the traditional teaching-learning with the web-based learning.

4. Methodology
   This study adopted pre-test post-test experimental design for the collection of data. The students were being exposed to both the traditional teaching-learning and web-based learning. For these purpose students of class X were randomly grouped into two separate sections (each of 50) and accommodated into separate classrooms. One group was exposed to traditional approach of teaching (Control group) and the other group was exposed to web-based learning approach (Experimental group). Before and after the treatment (web-based teaching-learning), two achievement tests in the subject of Physical Science were administered for the two groups. The data collected were analyzed using appropriate statistical methods. Descriptive statistics including means and standard deviations were calculated on test scores for both groups. Inferential statistics (t-test) was employed for test of significance. Students in the treatment group also completed a survey, a questionnaire regarding perceptions and attitudes toward web-based learning. The collected data were analyzed using χ² test.

Sample
   The present study was conducted on a sample of 100 secondary school students (class X) of Makhaltore Madhyamik Vidyalaya in Burdwan district, W.B affiliated to West Bengal Board of Secondary Education. The sample was drawn using random sampling technique. The sample (100 students) was grouped randomly in two sections each of 50 students.

Tools and Techniques
   Twenty-items multiple choice self-made achievement tests (Full marks-20) of science subject (P.Sc.) were administered on the total sample as pre-test and post-test. A survey questionnaire regarding perceptions and attitudes toward web-based learning was also employed to the treatment group i.e. experimental group.

5. Results And Discussion

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of students (N)</th>
<th>Mean</th>
<th>S.D.</th>
<th>t- critical ratio</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>50</td>
<td>7.26</td>
<td>3.45</td>
<td>0.35</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Control Group</td>
<td>50</td>
<td>7.02</td>
<td>3.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It is evident from the above table that students of Experimental and Control groups did not differ significantly so far as their achievement in the pre-test was concerned. So it is clear that though the mean score of the experimental group was greater than the mean score of the control group, but it was not significant.

**Table 2: Data and result of test of significance of the difference between the means of Post-test scores of the students in Experimental and Control groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of students (N)</th>
<th>Mean</th>
<th>S.D.</th>
<th>t- critical ratio</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>50</td>
<td>12.2</td>
<td>2.92</td>
<td>4.21</td>
<td>Significant at 0.05 level</td>
</tr>
<tr>
<td>Control Group</td>
<td>50</td>
<td>9.66</td>
<td>3.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the above table, it was clear that there was significant difference between the post-test scores of the experimental and control groups. It was also evident that the mean of post-test scores of the experimental group was significantly greater than the mean of post-test scores of the control group.

**Table 3: Student responses to survey questions regarding perceptions and attitudes about computer usage in education**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.1 - I am acquiring effective knowledge from web based learning</td>
<td>38</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q.2 - I want to spend too much time in web based learning.</td>
<td>35</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Q.3 - I am able to learn at my own pace</td>
<td>24</td>
<td>20</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Q.4 - With this learning method, I am better able to visualize the ideas and concepts</td>
<td>40</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

A summary of responses to the selected questions from the survey from the students in the treatment group (experimental group) of the present study were shown in Table 3. Most participants (76%) of the experimental group strongly agreed that they were able to acquire knowledge effectively through web based learning. 70% of them strongly considered that they would like to spend too much time in web based learning. 48% strongly were agreed and 40% were agreed that computerized web based learning helped them to learn at their own pace. 80% of the respondents strongly agreed that they were able better to visualize concepts. After collecting different opinions from different students, these were categorized and test of significance (χ² test) had been made.
From the above table, it was evident that for all the questions, observed ratings were significant.

6. Conclusions

The above discussion confirmed the benefit of computerized web-based learning on test score results. The students of Experimental and Control groups did not differ significantly so far as their achievement in the pre-test was concerned. This showed that the two groups were similar. But, the mean of post-test scores of the experimental group was significantly greater than the mean of post-test scores of the control group. From this, it could be concluded that the students who got the treatment (web based teaching) significantly received better knowledge and ideas than the students who did not get the treatment. From the survey study, it was also evident that majority of the students from experimental group showed extremely positive attitude towards the web based learning. The general consensus of the survey was that the web-based learning was a useful learning tool for the students.

Summarizing all the above facts, it could also be extended that effectiveness of web based learning in secondary classroom was better than that of the traditional teaching-learning. The study also demonstrated that an online learning or tutorial had a positive impact on student learning. The ability of the web based learning to incorporate information, images, animations, interactive problems, quizzes provides variety to maintain student interest. In addition, students may feel a greater sense of engagement in the learning process. Attitudes toward subject matter improved in a computer-based instruction class to a greater degree when compared to a traditional lecture class.
References


