Effect of multimedia-based instruction on academic achievement and attitude of secondary level chemistry students

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ABSTRACT

This study was conducted to explore the effect of Multimedia Instruction on academic achievement and development of attitude of secondary level students towards chemistry. An experiment was conducted with 10th class students studying Chemistry at Government Higher Secondary School Nawanshehr Abbottabad. Multimedia Instruction program was developed by the researchers using text, video and animation mode of presentation, covering four chapters from the textbook of Chemistry for 10th class. Pretest post-test control group design was used to carry out this study. The students were assigned to two groups of 35 each, using matched random sampling technique on the basis of pre-test scores. For pre-test and post-test, an achievement test including one hundred test items of multiple choice and an attitude scale with fifty items on five point Likert type scale were used as data collection tools. To determine the significance of difference, t-test was used. The findings showed that performance of the students of experimental group was significantly better than the students of control group in all the achievement domains, that is, Domain of knowledge, comprehension and application and the development of attitude towards chemistry as well. Multimedia-based instruction proved to be better than the conventional method.

Key words: Effect, multimedia instruction, traditional lecture method, academic achievement, attitude.

INTRODUCTION

The poor achievement level of students in science subjects has made their parents and teachers anxious. Students' performance in science courses particularly in chemistry in the previous secondary level exams has been observed to be poor. Chemistry has a close relationship with the other science disciplines and it has broad scope in medical science, biotechnology, industry, environmental sciences, agriculture and pharmacy etc. These subjects cannot be studied comprehensively without the knowledge of chemistry. Researchers pay great attention towards chemistry due to its valuable role in science subjects. Chemistry has made a vital place in secondary school curriculum due to these factors (Condie and Livingston, 2007).

There are many reasons of poor achievement of chemistry students such as lack of trained and qualified science teachers, deficiency of science equipment in school laboratories, overcrowded classrooms, method of teaching, students' domestic background, individual differences, low standard of primary education etc. There is also a big problem of less time duration for academic activities at school during a year. A suitable method of instruction has its own significance in the area of students achievement in chemistry as well as science subjects (Neo and Neo, 2001; Norheyati and Siew, 2004; Kim and Gillman, 2008; Neo and Neo, 2009; Tssai, 2009; Chien and Chang, 2012).

There are many advantages of utilizing technology effectively in the classroom. It increases the learning of students and enhances their achievement ratio also by providing them opportunities of interest in the learning process particularly at secondary level (Abbot, 2007). Due to the vast use of computer-based technology in the recent
times, now the digital electronic classroom has become the compulsion of the modern era in the field of education (Nwanze, 2014; Gyang, 2008). Chang et al. (2004), urge the need of technology in education and state that “Many exercises that go away from the conventional method are accessible on the web (p. 521), even though teachers do not use these facilities absolutely.”

Multimedia instruction enhances students’ learning importantly as compared with the conventional lecture method. Karperrt et al. (2005) articulate that Multimedia instruction is more useful in fact based science subjects but it is not effective in courses such as Mathematics where students’ critical thinking power is required to be developed. Teaching through multimedia is a time consuming and pain taking activity as compared with the traditional method generally adopted by educators. Adegoke (2011) describes that the academic performance of the students who were taught by traditional lecture method along with the use of computers was significantly better than those who were educated by conventional lecture method only at the college level. Basturk (2005) also showed the similar findings by conducting research in statistics. According to him, the performance of students in statistics was significantly different when taught by multimedia mode of instruction than those who were instructed by conventional lecture method in achievement scores in mid-term and final examinations at college level.

Findings of many previous researches disclose that multimedia based instruction is very effective and useful rather than the conventional lecture method. Tati and Ayas (2013) are of the view that lesson planning for multimedia programs should be made in accordance with the needs and academic environment of the students. Situational analysis is closely linked with the multimedia based instruction. Gender of students also plays an important role for the effectiveness of multimedia teaching as opined by some researchers. In some cases, impact of multimedia is very creative as regards to the development of attitude and achievement in gender differences. Whereas some researchers such as Achor and Kalu (2014) contradict this statement, they articulate that multimedia has no specific effects on the gender issue whether the students are male or female in science subjects. Some researchers of the recent times are too interested in examining the effect of multimedia with the gender differences. Collazos et al. (2008) describe that the participants having less female students showed low index of achievement as compared with class where female students were in majority or equal. But Spencer (2004) did not find any meaningful difference in achievement and attitude on the college students of different genders who were instructed by the use of multimedia and online internet sources in mathematics teaching as compared with the conventional method. However, female college students took a long duration to complete their prescribed science course when multimedia mode of instruction was applied to them as compared with those taught using general lecture method.

But Kirkapatic and Cuban (1998) disclosed the facts in their research studies that there was no particular effect of multimedia instruction on average achievement and attitude gains of both the male and female students of experimental and control groups after treatment with the help of computer software and on line internet sources.

Owolabi and Oginii (2014) showed that the mean attitude and achievement scores of the secondary level science students were significantly higher when instructed using ordinary lecture method along with multimedia instruction rather than those students taught using traditional lecture method only. Similar researches also endorsed these facts that the performance of multimedia based instruction had a meaningful effect on the students’ performance rather than the traditional pedagogy in the achievement area. Multimedia approach also develops students’ motivation and interest in study of science subjects. In multimedia instruction text, videos, animations and sounds make the instruction colorful and source of interest for the students while only book, black/white board, chalk etc. are used only in traditional methods.

But using multimedia instruction approach in a classroom is very expensive and somewhat difficult as compared with traditional method (Evans et al., 2008). Particularly in our country educational setting, experience of employing multimedia instruction in our classrooms is very hard and strange for the teachers because lack of financial resources become the hurdle in its way of implementation. Also expertise multimedia teaching staff is not available to practice it effectively. Now science and technology has also made rapid changes in the field of education as well. Those times have passed when departments of audio-visual aids were established to obtain encouraging results in achievement level of students. Now multimedia is used to a very high quality level in the educational institutions and a great deal of work is to be required in this field in the coming days. Large quantity of sources is required for the science teachers to become expertise in using multimedia to quench the educational thrust of the science students (Hykle, 2011).

Multimedia is source of providing opportunities to the students simultaneously to get education in schools as well as at homes. Technology provides a number of sources for better instruction in the classroom and it has reduced the teaching burden of teachers to a great extent just making their job as facilitators and guide (Kay and Knaack, 2007). Through multimedia instruction, students are provided the sources of learning at home in shape of online courses and tutorials. Teachers have been utilizing the elements of multimedia, video, text, animation, sound etc. in the form of audio-visual aids by some way or the other. Now these elements have been combined together to make a powerful tool of instruction, providing a great deal of knowledge to the students and teachers, known as multimedia-based instruction (Andersen and Brenk, 2013: 25-26). The basic five components of multimedia that are effectively used in
interactive multimedia are animation, graphics, sound, text and video. By using multimedia based instruction, teachers and students can easily manage their teaching and learning activities according to the requirements of teaching learning process. Elements of multimedia are tied together like a chain completing the whole process. A variety of options are provided to students and teachers through multimedia to choose their best one. Since computer based multimedia instruction has developed a lot, so it is the requirement of the modern era to organize and plan the curriculum according to the needs of this age. Computer assisted multimedia provides the students and teachers easy approach to worldwide website (www) being a huge reservoir of knowledge and information from where everyone may get his desired knowledge. Multimedia may be applied at home as PC also in the form of educational games.

According to Serin (2011), there is great concern of teachers about the development of students thinking skills and problem solving techniques which are the necessary part of this technological society for success. Due to the technological development, many types of teaching tools are developed for effective classroom science instruction. Multimedia is one of the applied tools for classroom teaching. It is source of providing a huge educational data to the teachers in the form of text knowledge, educational visuals and phonetic sounds. Hence the students are capable of taking advantage of available learning techniques. Multimedia provides many types of content knowledge for the students to sort the contents of their choice and utilize. Multimedia instruction fosters the motivation and interest factors among the students in the classroom. Attendance rate of the students is also increased in their lessons and they do their homework with great interest and zeal. Students participate in classroom learning activities with a happy mood. Multimedia develops students' creative abilities as compared with rote learning only (Nwanze, 2014; Owolabi and Oginni 2014; Sun et al, 2008).

Through multimedia instruction, students are able to evaluate their learned skills at any time. It enables the students to select the suitable elements and apply them effectively in an appropriate teaching learning situation. The essential features of multimedia are its hardware and software. Multimedia is a unit of its five elements that enables the students to polish their creative potentialities and share their knowledge with other students. Multimedia use in classroom can be very beneficial for students to learn difficult and abstract concepts in science subjects especially in chemistry.

**Statement of the problem**

Science teachers adopt numerous teaching methods for teaching chemistry at secondary level. But it has been observed that most of the teaching methods do not develop students learning achievement and students attitude towards chemistry. Traditional teaching methods are unable to enhance the achievement level of the students as well as their interest level in learning science subjects at secondary level. Chemistry plays a vital role in science because it has a deep relationship with the other science courses e.g. Pharmacy, agriculture, medicine etc. Despite these facts, the achievement level of secondary level students in chemistry is not encouraging at country level as well as in KP. The research studies in this field reveal that the poor academic performance involves many factors such as students and teachers attitudes and beliefs about learning of chemistry, lack of qualified science teachers, learning situation and the most important one is the pedagogy of instruction. Using technology such as multimedia in classroom instruction is one of the modern approaches that is applied to enhance the achievement level and development of interest and attitude among the students. However, a very little research work has been done in Pakistan and KP regarding impact of computer assisted multimedia instruction on development in achievement and attitude in chemistry. Hence, the gap existing in this field of research requires a comprehensive work in this area to enhance students achievement and development of attitude. Therefore this research study was conducted to determine the effect of multimedia-based instruction on the achievement and attitude of science students of chemistry class at secondary level.

**Objectives of the study**

The objectives for this experimental study were as follows:

1. To investigate the effect of Multimedia-based instruction on academic achievement of secondary level Chemistry students.
2. To explore the significance of difference of the academic achievement between experimental and control group students.
3. To examine development of attitude level among the learners of experimental and control groups.

**Research hypotheses**

Underlying hypotheses were examined to achieve the objectives at the significance level of $\alpha = 0.05$.

**H1**: Mean achievement scores of the students of experimental and control groups are not significantly different from each other before experimentation.

**H2**: Mean academic achievement scores of Experimental group students are significantly greater than the mean achievement scores of Control group students after treatment.

**H3**: There exists no statistical significant difference between average attitude scores of Experimental and Control group students before experimentation.
**Table 1:** Sample of experimental study.

<table>
<thead>
<tr>
<th>S/N</th>
<th>No. of students</th>
<th>Assignment</th>
<th>Mode of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>Random</td>
<td>Multimedia</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>Random</td>
<td>Lecture Method</td>
</tr>
</tbody>
</table>

**H4:** Mean attitude scores of experimental group are significantly larger than average attitude tallies of control group students after experimentation.

**METHODOLOGY**

To conduct this study, pretest, post-test control group design was used because Campbell and Stanley (1963) propose that this research designs fits well in all the settings where experimental research studies are to be conducted. According to Gay (2009), this research design controls all the sources of interior legality, which may affect the study.

**Sample**

For the construction and validation of achievement test and attitude scale, all the 120 secondary level male science students of GHSS Nawanshehr Abbottabad belonging to rural as well as urban areas constituted the population for this study.

The sample of 70 students was selected from the population randomly. Sampled students were equally distributed into two equivalent classes of 35 students each according to their achievement marks obtained on conducting pretest (Table 1).

**Research instruments**

For collecting data from the sampled students, two research tools were prepared. An achievement test from the text book of 10th class Chemistry was developed containing 100 test items of MCQs type covering three achievement areas of knowledge, comprehension and application. Also attitude scale (Likert scale) about chemistry consisting of 50 items on five points rating was constructed to examine attitude tallies of both groups towards chemistry prior and after experimentation.

**Validity of test**

To judge the validity of the instruments, theses were handed over to five expert science teachers to express their observations about the language and format of test items.

**Pilot testing**

These instruments were pilot tested on a group of 25 science students other than the sampled students. On the basis of pilot-testing, the questionnaire items reported unclear or confusing statements were discarded.

**Reliability of the test**

To calculate the reliability of test items, split half technique was used. Reliability correlation coefficient was measured 0.82 from the data collected by pilot testing which showed that both tests had reliable index.

**Procedure of experiment**

From the population, two classes consisting of 35 students each, were constituted equivalent according to the achievement scores of students, forming each one to be an average class size. One of these classes was selected for multimedia instruction through the toss of a coin. This class was termed as Experimental group while the other class was kept for traditional lecture method. This class was named as Control group. This study was organized and planned for a span of eight weeks starting from first day of treatment. The contents of the course that were to be taught were distributed into forty units and proper lesson planning was made for every unit.

Students of control group were instructed using ordinary lecture method while students of experimental group were instructed using multimedia based instruction in its laboratory of school where the necessary equipment such as computers and multimedia projector were properly installed. For instruction of the lessons to experimental group, a laptop, digital multimedia projector, a white board screen and video discs were used. During the all time of lessons presentation, an IT expert of multimedia remained present in the class. The participants were advised to take their necessary notes during the lesson presentation. Students were actively supervised and guided during the presentation period.

At the end, a post-test was conducted from the two classes for comparison of achievement marks. Similarly a post-test of attitude scale was given to students of both experimental and control groups to compare their attitude scores after treatment.

**Data collection and analysis**

To collect data, students responses were obtained on the answer sheets and necessary tables were constructed using computer software. These responses gave average
Table 2: Difference between the achievement scores of experimental and control group students regarding significance of t-value on pretest.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>35</td>
<td>29.20</td>
<td>10.33</td>
<td>0.60*</td>
</tr>
<tr>
<td>Experimental</td>
<td>35</td>
<td>30.66</td>
<td>9.89</td>
<td>0.60*</td>
</tr>
</tbody>
</table>

*Non significant at 0.05 level.
Tabulated value of t at 0.05 level=1.96.

Table 3: Significant difference w.r.t. t-value between achievement scores of experimental and control group students on post test.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>35</td>
<td>37.74</td>
<td>14.45</td>
<td>5.68*</td>
</tr>
<tr>
<td>Experimental</td>
<td>35</td>
<td>55.94</td>
<td>12.97</td>
<td>5.68*</td>
</tr>
</tbody>
</table>

*Significant at α=0.05 level.
Tabulated value of t =1.96.

achievement tallies of students of both classes in accordance with the objectives of the study. T-test was used for comparison of achievement tallies in form of their means and standard deviations.

RESULTS

The main purpose of this study was to explore significant difference among the average academic achievement scores and attitude tallies of the students of both the groups before and after the experimentation. For this purpose, t-test was utilized to analyze and interpret the obtained data as shown hereafter.

Treatment effect on significance of students' overall achievement level

Effect of treatment with the use of lecture method and Multimedia instruction on the students of experimental and control groups regarding their achievement in subject contents of chemistry is shown in Table 2.

Table 2 shows that the average academic achievement score of Experimental group students (30.66) is not significantly different from the average academic achievement score of Control group students (29.20) from each other with respect to value of t(0.60) calculated less than tabulated value of t(1.96) at α=0.05 level of significance on conducting pretest of four units of chemistry. Therefore, both groups were equivalent on the intellectual level of students before the experimentation.

Analysis of the measurements in Table 3 shows that average academic gains of experimental group (55.94) is significantly different from the average academic scores of control group (37.74) in terms of t-value (5.68) found greater than the tabulated value of t (1.96) at the significance level of α=0.05 on taking post test of four units of 10th class chemistry. Therefore, academic performance of Experimental group students was higher than students of control group on post test after experimentation in learning mentioned units (Figure 1).

Effect of Treatment on development of students' attitude level

The effect of experimentation on the gain in attitude tallies of experimental and control group students is explained hereafter.

Analysis of the calculations of in Table 4 indicates that the mean attitude development score of Experimental group students (64.20) is not significantly different from the mean attitude development score of Control group students (65.51) from each other with respect to value of t(0.16) calculated less than the tabulated value of t(1.96) at α=0.05 level of significance on conducting pretest of attitude scale of chemistry. Therefore, both the groups were equivalent on the attitude level of students before the experimentation in development of attitude towards chemistry.

Analysis of the measurements in Table 5 indicates that mean attitude score of experimental group (96.60) is significantly different from the mean attitude score of control group (72.03) in terms of t-value (4.54) found greater than the tabulated value of t (1.96) at the significance level of α=0.05 on taking post test of attitude scale of chemistry. Hence, the attitude development of Experimental group students was better than the students of control group on post test after experimentation (Figure 2).

Effect of treatment on three domains of achievement and attitude level

The difference between the mean scores of achievement
Figure 1: Comparison of difference between mean achievement scores of experimental and control groups.

Table 4: Significant difference w.r.t. t-value between the average attitude scores of experimental and control group students on pretest.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>35</td>
<td>65.51</td>
<td>16.42</td>
<td>0.16*</td>
</tr>
<tr>
<td>Experimental</td>
<td>35</td>
<td>64.20</td>
<td>18.67</td>
<td></td>
</tr>
</tbody>
</table>

*Non significant at $\alpha=0.05$ level
Tabulated t-value=1.96.

Table 5: Significant difference w.r.t. t-value between achievement scores of experimental and control group students on post test.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>35</td>
<td>96.60</td>
<td>24.52</td>
<td>4.54*</td>
</tr>
<tr>
<td>Control</td>
<td>35</td>
<td>72.03</td>
<td>21.02</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at $\alpha=0.05$ level.
*Tabulated value of t at 0.05 level=1.96.

Figure 2: Comparison of difference between mean attitude scores of experimental and control groups.
and attitude in three areas before and after treatment is shown in Table 6.

Analysis of the Table 6 shows that the mean score of experimental group (12.42) is not significantly different from that of control group (13.48) w.r.t. value of t(0.46) less than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in knowledge area on conducting pretest.

Table 6 shows that the mean score of experimental group (9.57) is not significantly different from that of control group (9.31) w.r.t. value of t(0.58) measured less than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in comprehension area on conducting pretest. The mean score of experimental group (7.51) is not significantly different from that of control group (7.68) w.r.t. value of t(0.51) measured less than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in application area on conducting pretest.

The above analysis shows that both the groups were at the same level of equivalence in achievement area before the treatment.

Table 7 shows that the mean score of experimental group (21.45) is significantly different from that of control group (16.14) w.r.t. value of t(5.92) measured greater than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in knowledge area on conducting post-test.

Also, Table 7 shows that the mean score of experimental group (17.65) is significantly different from that of control group (11.58) w.r.t. value of t(5.84) measured larger than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in comprehension area on conducting post-test. The mean score of experimental group (15.11) is significantly different from that of control group (9.71) w.r.t. value of t(5.31) measured greater than the tabulated value of t=1.96 at α=0.05, regarding their performance in the domain of achievement in application area on conducting post-test.

The above analysis indicates that the students of the experimental group outclassed the students of the control group regarding their attitude scores in post-test.

**DISCUSSION AND CONCLUSIONS**

The main objective of the study was to explore the effect of treatment on the performance of experimental and control group students regarding their achievement in chemistry and development of attitude towards chemistry.

**H:1** Mean achievement score of experimental group (30.66) was not found significantly different from the mean achievement score of control group (29.20) on pretest in terms of t-value (0.60) less than the critical value (t=1.96). Therefore both groups were equivalent on the intellectual level of students before experimentation. These results endorse the supposition of hypothesis.

**H:2** Significant difference was found between the mean achievement score of experimental group (55.94) and that of control group (37.74) regarding t-value (5.68) comparatively greater than the critical value (t=1.96). This showed that the performance of experimental group was better than that of control group related to achievement in chemistry on post test after treatment.

**H:3** No significant difference was found between the average attitude score of Experimental group (64.20) and the Control group (63.51) regarding value of t (0.16) less than the tabulated value of t(1.96). Therefore, both groups were found equivalent on the attitude level before treatment.

**H:4** Also there was found a significant difference between
Table 6: Significance of difference between mean scores of experimental and control groups in three domains of achievement on pretest.

<table>
<thead>
<tr>
<th>Domain of learning</th>
<th>No. of items</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Knowledge</td>
<td>40</td>
<td>12.42</td>
<td>13.48</td>
<td>4.26</td>
</tr>
<tr>
<td>Comprehension</td>
<td>32</td>
<td>9.57</td>
<td>9.31</td>
<td>4.01</td>
</tr>
<tr>
<td>Application</td>
<td>28</td>
<td>7.51</td>
<td>7.68</td>
<td>3.74</td>
</tr>
</tbody>
</table>

Table 7: Significance of difference between mean scores of Experimental and Control groups in three domains of achievement on post test.

<table>
<thead>
<tr>
<th>Domain of learning</th>
<th>No. of items</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E</td>
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<td>E</td>
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<tr>
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<td>40</td>
<td>21.45</td>
<td>16.14</td>
<td>5.27</td>
</tr>
<tr>
<td>Comprehension</td>
<td>32</td>
<td>17.65</td>
<td>11.58</td>
<td>5.51</td>
</tr>
<tr>
<td>Application</td>
<td>28</td>
<td>15.11</td>
<td>9.71</td>
<td>4.98</td>
</tr>
</tbody>
</table>

Table 8: Significance of difference between mean scores of experimental and control groups in three domains of attitude development on pre-test.

<table>
<thead>
<tr>
<th>Aspects of attitude</th>
<th>No. of items</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Interest</td>
<td>20</td>
<td>57.42</td>
<td>58.65</td>
<td>10.11</td>
</tr>
<tr>
<td>Career choice</td>
<td>13</td>
<td>48.36</td>
<td>50.01</td>
<td>8.71</td>
</tr>
<tr>
<td>Activities</td>
<td>17</td>
<td>59.25</td>
<td>58.34</td>
<td>8.35</td>
</tr>
</tbody>
</table>

Table 9: Significance of difference between mean scores of experimental and control groups in three domains of attitude development on post-test.

<table>
<thead>
<tr>
<th>Aspects of attitude</th>
<th>No. of items</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Interest</td>
<td>20</td>
<td>94.25</td>
<td>69.14</td>
<td>13.12</td>
</tr>
<tr>
<td>Career choice</td>
<td>13</td>
<td>85.69</td>
<td>60.32</td>
<td>11.21</td>
</tr>
<tr>
<td>Activities</td>
<td>17</td>
<td>79.54</td>
<td>59.78</td>
<td>14.21</td>
</tr>
</tbody>
</table>

The mean attitude score of experimental group (72.03) and that of control group (59.60) regarding measurement of t(4.54) comparatively greater than the tabulated value of t (1.96) on α=0.05 level of significance. Hence the performance of the students of experimental group was better than the control group students on post test which validates the hypothesis.

These results are in line with the findings of the previous research studies such as Adegoke (2010), Chang and Yea-Ru (1999), Kuti (2010) etc. From the above findings, the following conclusions are drawn: Computer assisted multimedia based instruction is more effective than the traditional teaching methods. Students learning is developed quickly and their involvement and interest in their lessons are enhanced remarkably. Students take part in learning activities with great interest and motivation as compared with traditional teaching strategies.

It is recommended that multimedia instruction might be introduced at secondary level to promote students achievement level and interest particularly in science subjects such as chemistry. Teachers may be provided with the necessary training in this regard to execute multimedia instruction effectively in their classrooms and the government at national as well as KP level should take steps to establish such departments which may provide sufficient training to the science teachers.

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