Abstract

In today’s world, education systems must constantly evolve in order to effectively respond to the rapidly changing demands of the societies they serve. Innovations in curricula, methodologies, materials and technologies may require major changes in the design and organization of the environments in which they are housed. The need for developing an instructional strategy for teaching human physiology is very important to make teachers and students aware of the scientific principles that govern the advances being made in medicine. The present study aims to find out the effectiveness of multimedia programme in perceiving human physiology among senior secondary school students in Aligarh district. A sample of 100 senior secondary school students was selected randomly and was studied. A questionnaire method of survey was used to find out the effectiveness of multimedia programme in perceiving human physiology. Primary data were collected by conducting direct structured interview using questionnaire. All the respondents were asked the same question and they were informed about the purpose of the study. Mean, standard deviation and t-test analysis was applied to test the hypotheses. The findings and observations were the result and outcome of the interpretations made during the study of analysis. The results found that majority of the senior secondary school students were satisfied about the multimedia programme. The results of the study also show that teaching through multimedia programme is effective over traditional method as the performance of experimental group senior secondary school students in the post test is significantly higher than the post-test performance of control group senior secondary school students.
1. INTRODUCTION

Research work is being continuously done in the field of science and also in the related teaching methods and materials. In order to keep pace with the development of science, the need for new instructional strategies was greatly felt. One such innovative teaching strategy is called multimedia programme. This teaching strategy has been chosen and studied by the investigator in his research work.

In view of the growing importance of science education, old concepts and methods of science teaching have therefore, rather become outdated and obsolete and an entirely new ethos and approach to science curriculum have come into existence. Moreover, unprecedented developments of scientific research, new discoveries, new methods and new techniques of investigation, in the early twentieth century, has created a need and urge to examine and reorganize science teaching programmes at all levels in schools and colleges. Institutions are functioning in an era of rapidly emerging new technologies. Some of them, like information and communication technology, have fuelled a veritable explosion of rising expectations everywhere. When such is the pace of developmental processes, it becomes fairly imperative on the part of the students not only to possess sound knowledge and understanding of fundamental concepts, but also to understand and appreciate the ramifications of various developments in the science and technology, especially in the context of their future career. The situation underscores the significance of research in science and in science education and it is high time for the educationists to evolve a proper and appropriate strategy for teaching science.

At the senior secondary level, the science subject is divided into Physics, Chemistry, Botany and Zoology according to Uttar Pradesh State board syllabus. The subject of Zoology deals with the life history, distribution, structure, reproduction and importance of animals including Homosapiens, the human beings. ‘Human Physiology’ is one of the units of the Zoology subject. ‘Human Physiology’ is the branch of physiology devoted to the biochemical and chemical functions taking place inside the body. In general, the study of human anatomy helps the students to do their higher studies in Medicine, Physiotherapy, Nursing, Degree courses like B.Sc., Zoology, Microbiology and Biochemistry. Apart from acquiring technical knowledge, it is necessary for human beings to know and control their own systems of their body for spending a healthy and happier life. Hence the investigator has selected the unit “human physiology” to teach through multimedia programme for the senior secondary school students in the present investigation.

An instructional or teaching strategy refers to a pattern of teaching act that serves to attain certain goals and to guard against others. An instructional strategy is a purposefully- conceived and determined plan of action. It also occupies a central position in formal education system. Instructional strategies aim at establishing relationship between teaching inputs and learning outputs, mainly in terms of realizing the learning outcomes. Instructional strategies include innovative teaching methods, approaches and teaching techniques.
In the present times the teaching has become now learner-centered, despite the fact that still many methods are teacher-centered such as historical method, biographical method, and lecture method, lecture cum demonstration method but there few methods of teaching which are child-centered such as project method, discussion, seminar, assignment method and workshop. The pupil-centered methods also include individual methods such as programmed instruction, computer aided instruction, instructional modules and various multimedia packages.

Upgrading biology curriculum by introducing human physiology demands a change in the instructional strategy. The need for developing an instructional strategy for teaching human physiology and human systems such as circulatory system, reproductive system and digestive system is very important in order to make teachers and students aware of the scientific principles that govern the advances being made in the field of medicine. The functions of the internal organs of human body can be easily explained through a multimedia programme. This also saves the use of expensive chemicals and sophisticated instruments which are beyond the reach of senior secondary schools. In schools, the required equipment to explain the human physiology is not available. In this scenario, the working mechanism of internal organs can be explained by a multimedia programme, which when used as an instructional strategy will make the task of learning human physiology easier, cost effective and less expensive. In the present study the investigator aims to find out the effectiveness of multimedia program in perceiving human physiology among senior secondary school students in Aligarh district.

2. REVIEW OF RELATED LITERATURE

The review of related literature studies is as following:

- **Chang, Kuo-En et al. (2008)** studied the effects of learning support in simulation based physics learning. The results of the study revealed that the outcome for learning about the basic characteristics of an optical lens was significantly better for simulation-based learning than for laboratory learning.

- **Djeassilane (2008)** investigated the effect of computer aided instruction (CAI) in enhancing the academic achievement of higher secondary school students in commerce. The findings of the study showed that the computer aided instruction was effective in helping the students of the experimental group to perform better in the post-test. It proved the effectiveness of the computer aided instruction in commerce developed by the investigator. And also it was found that the experimental students had more favourable attitude towards computer assisted instruction.

- **Garnett, Hackling and Oliver (2009)** developed an interactive multimedia package to improve students’ understanding of the particulate basis of chemical reaction, and their ability to interpret chemical equations and solve problems based on equations. The study showed that interactive multimedia provided learners with access to a rich information source and appropriate activities to promote learning and understanding.
O’Day, Danton (2010) studied on “using animations to teach biology: past and future research on the attributes that underlie pedagogically sound animations”. Multiple technical resources (commonly referred to as multimedia) are currently used by many instructors to communicate difficult topics and concepts to their students in meaningful ways. Various sources have shown that animations are more effective than static sequential images. This study evaluated how animations can be and have been used as effective teaching and learning tools in biology and what more needs to be done to understand their true value.

Ozmen, Haluk (2010) studied, “The influence of CAI on students’ conceptual understanding of chemical bonding and attitude towards chemistry: A case for Turkey”. The results of this study suggested that teaching-learning of topics in chemistry related to chemical bonding can be improved by the use of computer-assisted teaching materials.

Pryor, Caroline and Bitter, Gary (2010) used multimedia to teach in-service teachers and studied its impact on learning, application and retention. This study found that the video modeling in the module was effective in helping teachers learn and discourse strategies were learned, applied and retained.

Rotbain, Marbach-Ad and Stavy (2011) used a computer animation to teach high school molecular biology. The achievements of the experimental group were compared with those of a control group. Analysis of the post-test showed that the mean score of the experimental group was significantly higher than the mean score of the control group.

Vernadakis et al. (2012) examined the effect of multimedia computer assisted instruction (MCAI), traditional instruction (TI) and combined instruction methods on learning the skill of shooting in basketball. Additionally, a comparison of the students’ attitudes towards the MCAI and TI methods was made. Students took pre-test, post-test and retention written test covering techniques and rules of the games. Post-test results indicated that there is no significant difference between the groups concerning the written test. Nevertheless, the attitude test scores of the CI group were more favourable to MCAI method than the TI method. Retention test results showed that groups retained the knowledge acquisition. However, the combined method of instruction tended to be the most effective for cognitive learning.

Victor, Adeosun Olufemi (2012) investigated the relative effects of three multi-media instructional packages on Nigerian students’ achievement in social studies. The purpose was to determine which of the combinations of videotape recording presentation, pictures and the chalk and talk method; the combination of audiotape recording presentation, pictures and the chalk and talk method and the combination of pictures and the chalk and talk method. The study revealed that the combination of pictures and the chalk and talk method was most effective among the packages tested in the learning of social studies.

3. OBJECTIVES OF THE STUDY
The present study has the following objectives:
I. To develop a Multimedia programme for the unit of human physiology from XI standard Zoology subject in order to teach the senior secondary school students.

II. To find out the effectiveness of Multimedia programme in teaching human physiology among senior secondary school students of Aligarh district.

4. METHODOLOGY
In order to carry out this study a sample of 100 senior secondary school students was selected randomly and was studied for the purpose of investigation. A questionnaire method of survey was used so as to find out the effectiveness of multimedia programme in perceiving human physiology. The data was collected by using a simple questionnaire as an instrument. Primary data were collected by conducting direct structured interview using questionnaire. All the respondents were asked the same questions in the same fashion and they were informed about the purpose of the study. The sampling technique, size of the sample, variables of the study, description of the tool used and administration of toll are elaborated. Mean, SD and t-test analysis was applied to test the hypotheses.

Sample
A sample of 100 senior secondary school students was selected randomly and was studied in Aligarh district.

Data Collection
The present study aims at developing and using multimedia programme for perceiving human physiology for senior secondary school students in order to enable them to understand the concepts very easily through individualized instructional technique. It is maintained that the multimedia programme may reduce monotony in the classroom by bringing out real life situations and motivate them for self-study and provides better opportunities for individual pace of learning and according top one’s ability.

The study intends to develop a multimedia programme for human physiology for XI standard zoology subject prescribed by Uttar Pradesh State board syllabus and find out the effectiveness of the multimedia programme through experimentation in perceiving human physiology among the senior secondary school students. The study provides a scope for the development and use of many multimedia programmes in the concerned discipline as well as other disciplines for the benefit of learners of different categories. Hence the multimedia programme can be sued as an individualized instructional technique for the students of different categories in the science subjects as well as other subjects.

5. ANALYSIS & INTERPRETATION
The data analysis and interpretation was done in the following way:
The mean, standard deviation and co-efficient of variation were computed for the control group students in their performance in human physiology between the pre-test and post-test.
“Performance of control group students between pre-test and post-test in human physiology”
Table 1: Performance of control group students between the pre-test and post-test in human physiology

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pre-test</td>
<td>100</td>
<td>42.68</td>
<td>13.60</td>
<td>31.86</td>
</tr>
<tr>
<td>2.</td>
<td>Post-test</td>
<td>100</td>
<td>52.46</td>
<td>13.28</td>
<td>25.31</td>
</tr>
</tbody>
</table>

The co-efficient of variation of the pre-test and post-test for the control group students was found to be 31.86 and 25.31, which reveals that the control group students are most consistent in their performance in human physiology in the post-test than the pre-test. From the table 1, it could also be seen that the control group students have improved in their performance in human physiology in the post test than the pre-test. To find out the significance of the difference between the control and experimental group students in their performance in human physiology in the pre-test, the ‘t’ test was used.

Table 2: ‘t’ value between the control and experimental group students in their performance in human physiology in the pre-test

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>‘t’</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Control</td>
<td>100</td>
<td>42.69</td>
<td>13.60</td>
<td>0.17</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>2.</td>
<td>Experimental</td>
<td>100</td>
<td>43.32</td>
<td>12.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**There is no significant difference between the control and experimental group students in their performance in human physiology in the pre-test.**

The obtained ‘t’ value 0.17 is not statistically significant since it is less than the table ‘t’ value 1.96 for 50 df at 0.05 level of significance. Hence, the null hypothesis is accepted. It shows that there is no significant difference between the control and experimental group senior secondary school students in their performance in human physiology in the pre-test. It is therefore concluded that both control and experimental group students have the same level of performance in human physiology in the pre-test.

To find out the significance of the difference between the control and experimental group students in their performance in human physiology in the post test, the ‘t’ test was used.

Table 3: ‘t’ value between the control and experimental group students in their performance in human physiology in the post-test

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>‘t’</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Control</td>
<td>100</td>
<td>52.46</td>
<td>13.28</td>
<td>14.38</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>2.</td>
<td>Experimental</td>
<td>100</td>
<td>92.81</td>
<td>5.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**There is no significant difference between the control and experimental group students in their performance in human physiology in the post-test.**

The obtained ‘t’ value 14.38 is statistically significant since it is greater than the table ‘t’ value 1.96 for 50 df at 0.05 level of significance. Hence, the null hypothesis is rejected. It shows that there is significant difference between the control and experimental group students in their performance in human physiology in the post test. It is therefore
concluded that the experimental group students performed significantly better in human physiology than that of control group students in the post test.

To find out the significance of the difference between the pre-test and post-test mean scores of control group senior secondary school students in the performance in human physiology, the ‘t’ test was used.

Table 4: ‘t’ value for the pre and posttest mean scores of control group students in their performance in human physiology

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>‘t’</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pre-test</td>
<td>100</td>
<td>42.69</td>
<td>13.60</td>
<td>2.62</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>2.</td>
<td>Post-test</td>
<td>100</td>
<td>52.46</td>
<td>13.28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no significant difference between the pre and post test mean scores of control group students in the performance in human physiology.

The obtained ‘t’ value 2.62 is statistically significant since it is greater than the table ‘t’ value 1.96 for 50 df at 0.05 level of significance. Hence the null hypothesis is rejected. It shows that there is significant difference between the pre and posttest mean scores of control group students in the performance in human anatomy. It is therefore concluded that the control group senior secondary school students have improved in their performance in human physiology in the post-test.

6. SUGGESTIONS

The present study aims at developing and using multimedia programme for perceiving human physiology for senior secondary school students to enable them to understand the concepts very easily through individualized instructional technique. It is maintained that the multimedia programme may reduce monotony in the classroom by bringing out real life situations and motivate them for self-study and provides opportunities for individual pace and ability. The present study was done on the senior secondary school students in Aligarh district due to the dearth of time, but it can be done on a larger scale and thereby more valuable results could be obtained.

7. CONCLUSION

The study intends to develop a multimedia programme for human physiology for class eleventh standard zoology subject, which has been prescribed by U.P. board syllabus and find out the effectiveness of the multimedia programme through experimentation in perceiving human physiology among the senior secondary school students. The study provides scope for the development and use of many multimedia programmes in the concerned discipline as well as other disciplines for the benefit of learners of different categories. Hence, the multimedia program can be used as an individualized instructional technique for the students of different categories in the science subjects as well as other subjects.
The results of the present study revealed that the experimental group students who used multimedia programme performed significantly better than that of the control group senior secondary school students who did not use, which implies that the multimedia programme has tremendous impact upon the performance in human physiology than the students learning through traditional method. This proves the effectiveness of the multimedia programme in human physiology developed by the investigator. The present study also shows that the performance of the control and experimental group senior secondary school students in the post-test is significantly higher than the pre-test. But the performance of the experimental group senior secondary school students in the post-test is more significantly higher than the post-test performance of control group senior secondary school students. Thus, it proves the supremacy of the multimedia programme over the traditional method.

8. REFERENCES


