Original article:

A comparative study: Learning in Experimental Physiology with use of live animals V/S video demonstration as learning aids in first MBBS students

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ABSTRACT:

Background: Animals were sacrificed regularly to show experimental physiology practicals to I M.B.B.S. students. But due to certain ethical issues, ecosystem imbalance and animal right activists, there is scarcity of animals for experimental use. Hence, there is dire need to introduce a new effective alternative teaching method to replace these animal experiments. The present study was planned to find, better method amongst two methods either Video Demonstration or Live experimentation.

Material and Method: The study was conducted on small group (40 students) of I M.B.B.S. The students were taught experimental physiology by both methods. The outcome was assessed in two ways i) By comparing student’s performance in SAQ test ii) By comparing student’s perception towards two methods by using Likert scale.

Results: Knowledge gain by both the methods was same, but perception of the students towards Video Demonstration was better than Live experimentation.

Conclusion: Student’s response towards Video Demonstration as a novel Teaching-Learning method was excellent, so Video Demonstration can be a useful alternative to Live experimentation for learning experimental physiology in I M.B.B.S. students.

Key words: Video Demonstration, Live experimentation, Experimental physiology

Introduction:

Physiology courses continue to rely on laboratory observations to provide students with practical information to correlate with their developing base of conceptual knowledge. Traditionally laboratory exercises in physiology have associated use of frog, guinea pig, rat etc. as a tools to learn first-hand aspects of the subject. Animal experimentation results in cruelty to animals and of no use to medical students in later life. Animal experimentation involves manipulations of artificially induced conditions. Furthermore, the highly unnatural laboratory environment invariably stresses the animals, and stress affects the entire organism by altering pulse, blood pressure, hormone levels, immunological activities and a myriad of other functions.

There is a global trend towards reduction in animal experiments in medical undergraduate training. Animal laboratories are not necessary for teaching biological and medical principles and skills to medical students, and 85% of U.S. and Canadian medical schools have eliminated animal labs from their educational curricula. Increasing numbers of scientists and
clinicians are challenging animal experiments on medical and scientific grounds. Today’s students are starting to be exposed to technologies and media at a much younger age than previously thought. Results from a number of research studies indicate that appropriately designed multimedia instruction enhances student’s learning performance. Newer methods are proving to be better accepted and advantageous over conventional methods of teaching and learning. As these methods suffice self instructions, self evaluation as well as virtualization, they have revolutionized the process of education. The Comparative studies of simulation technologies for many aspects of medical education (e.g. anatomy, physiology, pharmacology, surgical skills, and invasive procedures) have repeatedly demonstrated superior outcomes and more efficient use of educational time and resources.

Majority of these practicals are conducted to reinforce the well known theoretical aspects of subject. Due to certain ethical issues, ecosystem imbalance and animal right activists, there is scarcity of animals for experimental use. Hence there is dire need to introduce a new effective alternative teaching methods such as audio-visual aids using high-end technology to replace these animal experiments. One of the teaching aid is using video demonstrations of animal experiments which does not require regular sacrifice of animals for each practical. Moreover, it can be repeatedly shown.

The present study was planned to assess student’s performance after Video demonstration and Live experimentation, and to note the difference.

**Material and methods:**

The present study was conducted on 40 I M.B.B.S. students who participated voluntarily. Students were divided randomly into two equal groups Group I & Group II. (20 students in each group) Two topics in experimental physiology of same level of difficulty were selected by discussion with all faculty members. (Topic A and Topic B). These two topic were taught to the students by two different teaching-learning methods, Live Experimentation and Video Demonstration. After each demonstration the evaluation was done in two forms i) Assessment ii) Feedback. Specific learning objectives (SLO) were decided. The design of the study was explained to the students before the start of the study. Topic A was taught to the students of Group I by Live Experimentation followed by Assessment & Feedback. Then, Topic B was taught to the students of Group I by Video Demonstration, followed by Assessment & Feedback.

Now, Topic B was taught to the students of Group II by Live Experimentation followe by Assessment & Feedback. Then, Topic A was taught to the students of Group II by Video Demonstration followed by Assessment & Feedback.

**Live Experimentation:** Demonstration of live animal experimentation was done by a skilled faculty member. It included detail demonstration of practical including pithing, dissection, isolation and mounting. The demonstrations were carried out in a manner to involve the student through question & answer interaction.

**Video Demonstration:** The videos of animal experiments were recorded with high quality cam recorder. The cameras were handled by skilled operators and selection of close up views was made.

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These videos consisted of complete procedure of practical including pithing, dissection, isolation and mounting. The demonstrations were carried out in a manner to involve the students through question & answer interaction. The students were asked to utilize the extra time by watching these repeatedly. 

**Assessment**: Assessment was done by written SAQ test based on SLOs of Topic A&B. Marks were compared statistically using unpaired t test.

**Feedback**: The feedback was obtained by using a Questionnaire consisting of 10 closed ended questions based on student’s perception towards the T-L method. The Questionnaire was prepared by discussion with all faculty members.

**Students feedback form [ Likert’s scale]**: Following questionnaire was provided to students.

1. Good understanding is achieved by this teaching technique
2. As a student I was comfortable with this teaching technique.
3. As a student I was satisfied with this teaching technique.
4. There was repetition of some points during the demonstration
5. Discussions were held during the demonstration
6. The session was interactive.
7. Students were given an opportunity to clear their doubts
8. This teaching technique is well organized & sequential.
9. The teacher provided guidance for self learning.
10. Teacher paid enough personal attention to the students.

The students are asked to indicate their level of agreement with a given statement by way of 5-point scale ranging from “Don’t Agree” on one end to “Very Strongly Agree” on the other end. The student have to put a mark (✓) on a point which best indicate in each statement.

Points given to each question of feedback form: Don’t Agree (1 Point ), Somewhat Agree (2 Points), Agree (3 Points), Strongly Agree (4 Points), Very Strongly Agree (5 Points).

Total points were obtained and compared statistically using unpaired t test.

**Results**: After statistical analysis of marks and points obtained after teaching by two different methods following results were obtained.

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t test value</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Exp. Method</td>
<td>20</td>
<td>14.2</td>
<td>2.53</td>
<td>0.64</td>
<td>38</td>
<td>P&gt;0.05 (NS)</td>
</tr>
<tr>
<td>Video Demo. Method</td>
<td>20</td>
<td>14.7</td>
<td>2.27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statistically there was no significant difference in the knowledge gain of the students amongst both the methods in GroupI.
Table II – For comparison in between marks obtained by two methods in Group II

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t test value</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Exp. Method</td>
<td>20</td>
<td>13.15</td>
<td>2.92</td>
<td>0.30</td>
<td>38</td>
<td>P&gt;0.05</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(NS)</td>
</tr>
<tr>
<td>Video Demo. Method</td>
<td>20</td>
<td>13.4</td>
<td>2.06</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS- Not significant at p> 0.05

Statistically there was no significant difference in the knowledge gain of the students amongst both the methods Group II.

Table III - For comparison in between points obtained by two methods in Group I

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t test value</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Exp. Method</td>
<td>20</td>
<td>41.8</td>
<td>10.3</td>
<td>8.71</td>
<td>38</td>
<td>P&lt;0.01</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>(Highly significant)</td>
</tr>
<tr>
<td>Video Demo. Method</td>
<td>20</td>
<td>63.7</td>
<td>3.74</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at P<0.05

Statistically there was highly significant difference in the perception of the students amongst both the methods. Students perceived Video Demonstration as a better TL method than live experimentation in Group I.

Table IV - For comparison in between points obtained by two methods in Group II

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t test value</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
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<tr>
<td>Live Exp. Method</td>
<td>20</td>
<td>42.8</td>
<td>9.33</td>
<td>9.79</td>
<td>38</td>
<td>P&lt;0.01</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(Highly significant)</td>
</tr>
<tr>
<td>Video Demo. Method</td>
<td>20</td>
<td>65.2</td>
<td>3.52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at P<0.05

Statistically there was highly significant difference in the perception of the students amongst both the methods. Students perceived Video Demonstration as a better TL method than live experimentation in Group II.

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Discussion:
Smith W proved that video-clips were the preferred method of demonstration in the preclinical environment6. Packer ME concluded that a carefully produced videotaped demonstration can be a useful alternative to a live demonstration in teaching the short and clear cut technique selected for his study7. In our study 75% participants opined that they understood the topic better and were comfortable with Video Demonstration. About 75% of participants were satisfied with Video Demonstration as a teaching technique as compared to 55% in live experimentation. 80% participants opined that there was repetition of some points during the demonstration as compared to only 35% in live experimentation. 25% participants opined that discussions did not take place in live experimentation while 90% participants opined that discussions did take place in Video Demonstration. 85% participants were of opinion that the Video Demonstration was interactive but only 25% were of the view that live experimentation was interactive. 85% perceived that they were given an opportunity to clear their doubts as compared to only 20% with live experimentation. 90% students opined that teacher provided guidance for self learning in Video Demonstration as against only 10% with live experimentation. 75% students opined that teacher paid personal attention for students learning during Video Demonstration as against only 25% students opined the same for live experimentation. As the close up views were provided, satisfaction, comfort & understanding might be better with Video. Video teaching can provide uniform and structured teaching for all students. Videos are transportable and students can take them home and be better prepared8. Another feature of video is availability. Video is available to students 24 hours a day as needed. These factors might encourage the students to learn by themselves8. Videos can be repeatedly shown easily. As video can be paused at any moment and can be repeated n’ no. of times discussion, interaction, opportunity to clear doubts and personal attention was more with video.

Conclusion: Student’s response towards Video Demonstration as a novel Teaching-Learning method was excellent; moreover the knowledge gain of students by both methods was almost same. Thus, The Video is a teaching aid that can be effectively used to minimize the number of animals sacrificed and to reduce the undue pain inflicted on them during practicals. Further, such use of video also fulfills the objectives of such experiments efficiently. Thus, a carefully produced Video Demonstration can be a useful alternative to Live experimentation for learning experimental physiology in I M.B.B.S. students.

References:

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