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<tr>
<th><strong>Author</strong></th>
<th>Theng, Cecilia Cheen Fah</th>
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<td><strong>Title</strong></td>
<td>Studies on the use of demonstrations to foster conceptual understanding on the topics of levers and pulleys in primary students</td>
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<td><strong>Supervisor</strong></td>
<td>Subramaniam, R.</td>
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The study compares the effect of demonstration teaching versus traditional teaching (chalk-and-talk) in fostering conceptual understanding on the topics of levers and pulleys among fifth-graders (primary 5 pupils) of a co-educational school in Singapore. It also solicits the views of pupils on demonstration teaching in the learning of these topics. No previous studies on these have been attempted so far.

A key aspect of the study has been the development and validation of evaluation instruments to gauge the effectiveness of both forms of teaching – these include a survey form and cognitive tests on both topics.

For the topic on levers, a total of 110 pupils (59 boys and 51 girls) were exposed to the traditional teaching method while 105 pupils (53 boys and 52 girls) were exposed to the demonstration teaching method. On the topic of pulleys, 104 pupils (53 boys and 51 girls) were exposed to traditional teaching while 105 pupils (50 boys and 55 girls) experienced the demonstration teaching.

A key focus of this study was to investigate the differences in the cognitive understanding of the physical science topics between the control groups which underwent the traditional teaching of levers and pulleys respectively and the experimental groups which experienced the demonstration teaching for the same...
topics. Short cognitive tests consisting of multiple choice questions for both topics were administered to both control and experimental groups. The findings revealed no significant difference in the cognitive scores for the test on levers between the control and experimental group (p>0.05). Likewise, no significant difference was also detected for the test scores between both groups on the topic on pulleys (p>0.05).

Another key area of focus was to analyze the responses of the pupils in the control group which experienced traditional teaching followed by demonstration teaching and compare these with those given by the experimental group which had undergone only demonstration teaching. A survey instrument was used for this purpose for both topics – levers and pulleys.

Though the control group had experienced the traditional teaching prior to the demonstration teaching for the topics on levers and pulleys, the analyses of the survey instruments did not reveal any significant differences in their responses from that of the experimental group in both instances. The mean score for all the 20 items in the survey instrument for the control group for levers was 82.5 (out of a possible maximum of 100) while the mean overall score for the experimental group was 85.8. For the pulley survey instrument, the overall mean score for the control group was 81.0 and that for the experiment group was 81.7. In other words, both groups responded positively to the demonstration teaching of levers and pulleys.
The key findings from the survey instrument administered for the topic on levers are:

i) The pupils in the experimental group felt that they understood the relevant concepts in the topics better compared to the pupils in the control group; they also found the lesson more enjoyable and were more excited when watching the demonstrations compared to the pupils in the control group.

ii) There were no significant differences in the responses across gender among the pupils in the control group.

iii) The boys in the experimental group felt more strongly that they were better able to understand the concepts in the topic of levers than the girls.

The key findings from the survey instrument administered for the topic on pulleys are:

i) The pupils in the experimental group felt that they were better able to understand the concepts in the topic of pulleys as compared to those in the control group and they also felt that they were better able to apply the concept of pulleys in their everyday lives compared to those in the
control group. Their preference for demonstration teaching to traditional teaching was more pronounced than those in the control group.

ii) No significant gender differences were detected between the views of the pupils within the control group.

iii) The boys in the experimental group were more interested in wanting to know more about pulleys than the girls, and they also thought that they had learned more about pulleys from the session than from what they had read in the textbook. They got more excited when they watched the demonstrations, and found the demonstration teaching more effective than the traditional teaching in arousing their interest to know more about pulleys compared to the girls.

The implications of the findings; limitations of this study, and suggestions for further work are also discussed.