RESEARCH OF MOTIVATIONAL PHYSICS LECTURES

Marcela Chovancová

Department of Physics
Faculty of Civil Engineering
Slovak University of Technology in Bratislava
Radlinského 11, 813 68, Slovakia
Email: marcela.chovancova007@gmail.com

Abstract
Generally physics is one of the most unpopular subjects among students. Basic physics course is an integral part of all study programmes at the Faculty of Civil Engineering of Slovak University of Technology in Bratislava. We decided to contribute to higher attraction of classical physics lectures and create collection of “Motivational physics lectures”. In the article we present partial results of a research carried out in academic years 2011/2012 and 2012/2013 on the sample of students of two parallel groups of study program Building and Architecture. One of the aims we set was to evidence for proof that “Motivational Physics Lectures” in contrary to “Classical Physics Lectures” reach more positive of the teaching process among students.

Keywords: Motivational physics lecture, classical physics lecture, evaluation of the teaching process, simple motivational experiment, Power Point presentation, pictorial task.

1. Motivational Physics Lecture
One of the ways how to enhance interest in physics is integration of ICT in teaching physics (Holá, Lukeš, Ilčin 2010). Power point seems to be an inherent part of modern lecture, as it allows to teach a lecture more dynamically (Chovancová 2008) and every slide can be adapted to the pace of explaining the curriculum. During lectures we have used many video-clips from our own website (Baník, Chovancová 2006) and a lot of various physical websites for example (Hockicko 2013).
Physical experiment should form an inseparable part of a lecture. Presentation of interesting funny and mysterious experiments seems to be one of right ways how to increase student’s interest. Even a simple experiment can lead to a thought experiment and compelling results with demonstration of multiple physical effects and enable better understanding of notions and presented laws of physics. Very useful is the description of simple experiments which students may carry out at home (Baník, Chovancová 2006). Some slides are shown in the Figure 1.
The next way may be own motivational pictorial tasks (Chovancová 2013). The picture is the basis of the problem setting. The verbal part of the picture has only supplementary function and consists mainly of questions for students who have to find answers (Chovancová 2007). Some of the motivating factors used in the pictorial tasks are for example entertaining characters adapted into situations from real life.
Figure 1 Some slides from “Motivational Physics Lectures”
2. Research
Research was realized in academic years 2011/2012 and 2012/2013 on the sample of students of two parallel groups of study program Building and Architecture at the Faculty of Civil Engineering of Slovak University of Technology in Bratislava.
We applied the method of comparing two groups. Experimental group of students attended “Motivational Physics Lectures” and control group “Classical Physics Lectures” with blackboard and chalk.
In academic year 2011/2012 we realised research on 630 respondents. “Motivational Physics Lectures” could be attended by 313 students (75 from them engaged in the anonymous evaluations of the teaching process via the Academic Information System - AIS). “Classical Physics Lectures” could be attended by 317 students (64 from them engaged in the anonymous evaluations of the teaching process via the AIS).
In academic year 2012/2013 we realised research in 591 respondents. “Motivational Physics Lectures” could be attended by 369 students (86 from them engaged in the anonymous evaluations of the teaching process via the AIS). The anonymous evaluations of students from “Classical Physics Lectures” completed 108 respondents.
Respondents answered some tasks with multiple-choice answers, offering to choose from five items. Some results of the student’s evaluations are displayed in charts 1, 2,3 and 4.

Chart 1 Attendance of students at Motivational and Classical Physics Lectures in academic year 2012/2013

Chart 2 Evaluation of preparedness of lecturers in Motivational and Classical Physics Lectures in academic year 2012/2013
Chart 3 Evaluation of clarity of explanation by lecturers of Motivational and Classical Physics Lectures in academic year 2012/2013

Chart 4 Overall evaluations of Motivational and Classical Physics Lectures in academic year 2012/2013

Chart No. 1 shows the percentage share of individual respondents on lectures. As much as 78 percent of students from the first parallel group attended or completed more than half of lectures. In the second parallel group the percentage was lower by as much as 23 percent.

On chart No. 2, it is noticeable that the “other” lecture was perceived by the students as excellent or very good prepared. But in case of a classical lecture up to 14 percent of respondents spoke about poor or very poor preparedness of the lecturer.

Chart No. 3 displays obviously the “other” lecture shows a substantially better perceived by the students. As much as 92 percent of students state the subject matter is explained excellently or very good. But in case of a classical lecture 80 percent of respondents understand the lectured subject matter poorly or very poorly.

Resulting from the overall evaluation of lectures (as shown on chart No. 4), as much as 96 percent of students who attended the “other” lecture indicated its excellent or very good. On the other hand, 74 percent of the students of the classical lecture marked it as poor or very poor.
The null hypothesis “There is no statistically significant difference in the evaluation of Motivational and Classical Physics Lectures” was verified by non-parametric Mann-Whitney test on the 0.001 significance level. Results are displayed in the Table 1. All items of questionnaire clearly show a significant difference in the favour of “Motivational Physics Lectures” on the most stringent level of significance. Similar results have been gathered also in academic year 2011/2012.

<table>
<thead>
<tr>
<th>Č.</th>
<th>Items of questionnaire</th>
<th>p Value</th>
<th>Number of respondent’s answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Attendance at lectures</td>
<td>0.0000</td>
<td>86</td>
</tr>
<tr>
<td>II</td>
<td>Preparedness of lecturers</td>
<td>0.0000</td>
<td>78</td>
</tr>
<tr>
<td>III</td>
<td>Clarity of explanation</td>
<td>0.0000</td>
<td>79</td>
</tr>
<tr>
<td>IV</td>
<td>Overall evaluation of lectures</td>
<td>0.0000</td>
<td>78</td>
</tr>
</tbody>
</table>

Bar. 1. Results of non-parametric Mann-Whitney test in academic year 2012/2013

3. Conclusion
One of the ways how to make the education of the physics more popular are “Motivational Physics Lectures”. Such lectures might increase student’s participation on lectures, what contributes the initial step to success. A lot of the showed simple experiments can be carried out at home, what is the next step towards raising interest of students in physics and invoking their active approach. Implementation of ICT into the education process has essential influence on the clarity of subject matter content explanation.

4. Reference list


