Applied Mechanics and Materials Vols. 519-520 (2014) pp 1605-1608
Online available since 2014/Feb/06 at www.scientific.net

doi:10.4028/www.scientific.net/AMM.519-520.1605

LMS and Power Point Physics Lectures

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Keywords: LMS, Power Point, training Physics, multimedia in training Physics, digital lectures

Abstract. There is a big gap between level of multimedia possibilities and level of using multimedia in training physics at the universities. In this paper the advantages and disadvantages of Power Point physics' lectures are described. It is noted that one from important advantages is coordination of Power Point with Learning Management System. The examples of writing formulas, drawing graphics in time are presented in this paper. It is described the animated image illustrating the operation of a heat engine with the help of aniline drop. Test results allow us to give in this paper some guidelines on slide design to make information perceiving from the screen easier for students.

Introduction

It is well known that educational content is the main and most difficult element of the educational process and includes curricula, programs, standards and materials of training courses. The complexity of this element in the informational educational environment increases due to the fact that e-learning requires the development of the content of such courses with an electronic matrix, which are studied by means active and interactive methods and used as in-person and remote and mobile learning, the so-called electronic educational and methodological content. These high-tech electronic educational resources of training content are the goal of an integrated e-learning platform - Learning Managament System - Blackboard (LMS-Blackboard), the implementation of which has already begun in our university. It should be noted that some foreign universities have been using such systems for a long time; and the potential of information technology and online resources provides a teacher with additional means of quality training. Introduction of LMS-Blackboard does not replace full-time training classes by online ones. On the contrary – the organization of students' independent work, quality control of teachers and student progress, interaction between teachers of same training course, ensuring "transparency" of all educational and methodological content of the educational program to establish links between training courses, the study of which forms related competence – all these become possible to perform in extracurricular time.

LMS – is a high-level, strategic solution for planning, implementation and management of all university training activities, including online learning, virtual classrooms and in-person courses. The main goal – is replacing isolated and fragmented curricula for systematic methodology to evaluate and improve the competence and performance on a university scale. For example, LMS greatly simplifies international certification, allows companies to relate training initiatives with strategic objectives, develop effective methods of knowledge management of the enterprise. LMS's orientation - is the management of students' activity by tracking their progress and growth in all types of training activities. An overall integrated e-learning platform can be applied to all forms of education and has standard building blocks of educational and methodical content. What of contents' presentation you can choose in this electronic environment. For sure it might be multimedia.

Every modern university always sets the problem of development of e-learning resources, which includes, for example, e-lectures [1]. Besides alternative methods of learning (distance, mobile), given electronic resources can also go with traditional learning process. Today's universities have a wide variety of multimedia equipment: computers, projectors, interactive whiteboards and others.

However, the availability of this technical equipment is not always enough to create electronic materials that meet quality requirements. The traditional way of lecturing that has been practiced for centuries and has many advantages, especially concerning lectures on physics. In this paper we describe advantages of POWER POINT, when you try to create physics' lectures using multimedia.

Digital lectures in physics

Successive writing of formulas on the blackboard and accompanying comments of lecturers make learning process simple enough. On the other hand, physics course is saturated with a great amount of abstractions, which is a major cause of intellectual difficulties for most students. Obviously, inclusion of multimedia demonstrations of physical phenomena into the course of lectures may simplify learning process. The question is - can we broadcast the entire lecture from computers and make it a such way that all the advantages of its traditional form of representation will be taken into account. Such problem was not set in published studies on developing of e-learning materials [2, 3].

Power Point combines two types of programs - graphic editor and slide show publishing tool. There are a lot of similar programs, but the difference between Power Point and all other programs is in its graphics capabilities that are focused not only on the creation of images, but also on the accompanying text and numerous additions that allow to "revive" the content of the slides. The main advantage of Power Point is its availability in the Microsoft Office software pack, which makes it accessible to any user. An important advantage of Power Point is an economic making of files with small sizes. Furthermore, we can submit Power Point lectures to LMS, because they are friendly program.

Power Point works well with a number of other programs. For example, you may put into a Power Point slide an animation made in Easy GIF Animator, while retaining all the original features. In addition, Power Point slides work well with documents made in programs such as Xara Designer; Corel Draw, Adobe Image Ready, and others [1].

One of the main advantages of the traditional form of lecturing is a successive text appearance on the board. Whether it is a text, diagram, drawing - they are not drawn and written at the same time, but sequentially, and it is significantly easier to read and learn then than the already-made forms. This is the first multimedia opponents' argument against of multimedia lectures. Power Point has a function to set the required text appearance rate, make up successive graphs and draw simple drawings with changes; headline desired areas and sequentially write derivation of formula. There is no doubt that the readable text appearing letter by letter, good-looking graphs that are plotted starting from the coordinate system, understandable formulas and animations not only decorate the lecture, but make it more understandable, and, if necessary, the required areas are marked with different colors.

PowerPoint allows you to draw simple pictures and set simple animations within these pictures. For example, operating principle of a heat engine is popularly explained with the help of an animated image.

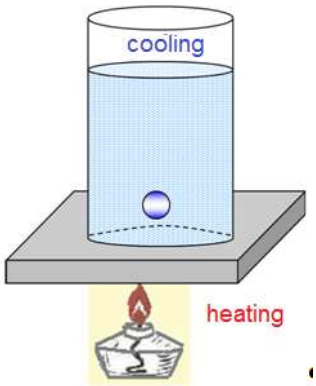

Fig. 1. Simple animated image illustrating the operation of a heat engine with the help of aniline drop

Aniline drop inside a glass of water heated by the burner that is under the glass expands and rises, then compresses, cooling down in the upper layers of the water and goes down.

Formulas in PowerPoint are typed in Equation - formulas editor. It is very convenient to use explaining notes while learning and headline a part of a note under the formula. And the time of occurrence of these effects is coordinated with explanations of the lecturer. For example, obtaining a relation for the energy of harmonic oscillator, it is possible to emphasize the presence of kinetic and potential energies and make intermediate transformations.

Each element of the process is shown by stages .lease use the “Equation” button for equations and positioned correctly using one tab space before and one after, as below.

Please note, that digital lecture with Power Point slides doesn’t look like a presentations. Thus, when the graph has a complicated description, which cannot be made within one slide, for example, sequential changes on three graphic slides "Dependence of interaction energy on the relative position of two objects". On the first slide there is a problem statement, coordinate axes, two objects in the middle of the coordinate axes and energy change that is drawn along the x axis of the second object relatively to the first one. Coordinates of reference points (stopping points) are fixed. On the second there is a discussion about two areas of objects motion. The graph is located here at the same place and has the same form as the first slide. The graph is completed with color hatching during the discussion of the second slide and previously identified areas of the motion. And on the third slide where the graph without changing its location is transported in a form that was completed on the second slide there are the rest areas of the graph where there is no motion, these areas are hatched with a different color.

PowerPoint disadvantages

In addition to specified advantages of Power Point, there are a number of difficulties associated with program limitations.

First of all, the time of animation is limited. There is a need in physics courses to show long-lasted animation, for example, random movement of gas molecules. However, it is not available. Besides, it is impossible to show the movement of the radius vector of the subject that moves from one point to another. The program allows only to specify starting and ending position of the subject, which is not so evident. However, these disadvantages were not significant and do not reduce the benefits described above Power Point.

Running Headers

The above-described advantages of PowerPoint allow to make up a multimedia lecture in a such way, that a number of well-known students problems become easy to solve. The first problem is attention wandering that a lot of students have while listening to lectures in their traditional form with monotonous and non-colorful presentation. In the case of multimedia lectures these signs are excluded, but attention wandering is inevitable if the text that appears on the slide and the words spoken by a teacher are different. As it was shown above, Power Point may exclude this effect.

Second and not less serious problem of multimedia lectures - students are bad in graphs apprehending if they are shown on the slide in their final form. This problem can also be removed using Power Point. With help of this program you can set the desired text appearance rate that fits teacher’s speech rate. Information appearance on a slide is discrete. When it’s necessary, teacher may give expanded explanation delaying the time between appearing lines with text or formulas.

As noted above, all the graphs are displayed sequentially, as well as while drawing on the blackboard with a chalk, from the point of reference and the coordinate axes. If necessary, Power Point allows you to color the necessary areas of the graph, including animation.

We carried out testing of students to identify the best way to make up a slide. Test results allow us to give some guidelines on slide design to make information perceiving from the screen easier for students.

1. Slides design should be simple and strict.
2. Slides should not be overloaded with information, pictures and animations.
3. You should not seek to structure the lecture with slides. As in textbooks, the structural element is a logical portion of a material that has its name. A portion may be stated on multiple slides. However, the basic relation or image under discussion should be shown on each slide, by the way, images location on the slides should not be changed.
4. Optimal font color - bright blue with a warm yellowish background, this contrast doesn't tire eyes and goes well with black color of formulas. For subjects without formulas, the best mix of colors is- yellow font with a grass-green background. This combination is the best for eyes because of their sensitivity as an optical device is maximal in the range of frequencies corresponding to the yellow-green color gamut.
5. Formulas are printed using Equation that works perfect with Power Point.
6. Font size should be at least 18.
7. More than three different colors on the same slide are not desirable.

Therefore this well-known and easy for using program might be very useful when training such difficult disciplines as physics.The section headings are in boldface capital and lowercase letters. Second level headings are typed as part of the succeeding paragraph (like the subsection heading of this paragraph).

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