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E-book of Physics for Self-Learning

The increase in technology globally has made information more easily accessible through the World Wide Web and content has been enhanced increasingly to provide alternative ways of sharing information. Many universities, including Vinnitsia National Technical University in Ukraine, are working to develop e-books on various subjects. Ukraine has been a very active country in the process of making information accessible in education over the last decade.

E-books are a great source for students who work from home and are not in easy reach of a library. As they are also available to everyone at one time, as opposed to a physical copy of a book shared amongst several students, it makes the ability of accessing information far easier. Only one book need be purchased, so it is more economical and the simplicity in searching through the e-book at ease means the specific information one requires is often easy to find. This convenience of e-books provides a new approach to learning, which in itself can improve the interest of students and their willingness to learn.

An electronic book (also e-book, ebook, digital book) is a text and image-based publication in digital form produced on, published by, and readable on computers or other digital devices [Gardiner, Eileen and Ronald G. Musto 2010: 164].

The most of the first electronic educational editions were the electronic copies of printed publications and, mostly, do not take into account computer capabilities. Sometimes the equivalent of a conventional printed , e-books can also be born digital [<http://en.wikipedia.org/wiki/E-book>]. The Oxford Dictionary of English defines the e-book as „an electronic version of a printed book”¹.

E-books, as usual, exist without any printed equivalent. Recently much attention is paid to the development of computer e-books, where serious steps are being taken to create a new generation of textbooks.

This article describes the basic elements of design and methods of an introductory e-book called „Physics. Mechanics. For international students and students of General Pre-university Training Centre of Vinnitsia National Technical University” by Tvorun O., Stasenko V.

When we searched online for the e-book „електронний посібник, фізика”, unfortunately it did not produce results. We therefore decided to describe in this article the development process and methodology of creating an new generation

¹ „e-book”. Oxford Dictionaries. April 2010. Oxford Dictionaries. April 2010. Oxford University Press (accessed September 02, 2010).

e-book. We describe in this article the process and methodology of development in the introduction of our new generation e-book for this new learning process.

In the beginning, author should be convinced of the expediency of creating an e-book which is online. The following shows the results of the survey of 6 students group:

| Question | Yes | No | Other |
|--|-----|----|--------------------|
| Presence of home computer | 133 | 2 | 6 – will be soon |
| Your own skills of work with PC | 86 | 2 | 53 – beginner |
| Availability at home of free Internet access | 119 | 22 | – |
| Evaluation of Internet work skills | 120 | 21 | – |
| Is it appropriate to use IT in education? | 106 | - | 35 – in the future |
| Availability skills to use e-mail box | 110 | 31 | – |

Survey results showed that the creation of an electronic textbook will be useful for our students. Creating electronic textbook is a very difficult and long process. In our case, creating of e-book „Physics. Mechanics. For international students and students of GPuTC VNST” took about two years.

The tools we chose for making the e-book are: Web-browsers, Hypertext Markup Language HTML, Notepad text editor, image editors, multimedia platform Macromedia Flash, language JavaScript.

To create quality e-books, the author needs to find quality material to fill the e-book and know programming a little. It is important one follows these guidelines:

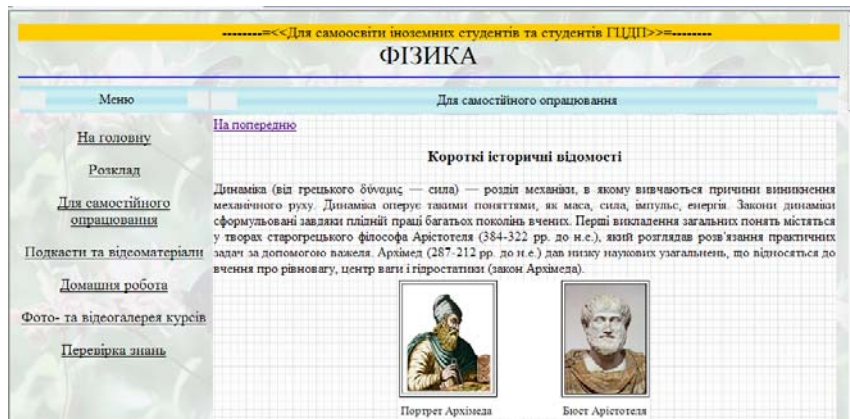
1. Training material should be broken up into blocks;
2. Each block should contain detailed illustrations;
3. Illustrations should be chosen so as to explain the material, which is perceived as difficult;
4. Core material block should be one unit by using hyperlinks. Hyperlinks can unite and also separate blocks of e-book.

We developed an e-book which has a menu that contains: Home, calendar, schedule lessons, problems for testing one’s learning, video and podcasts, homework, photos and videos of our students (Pic. 1).

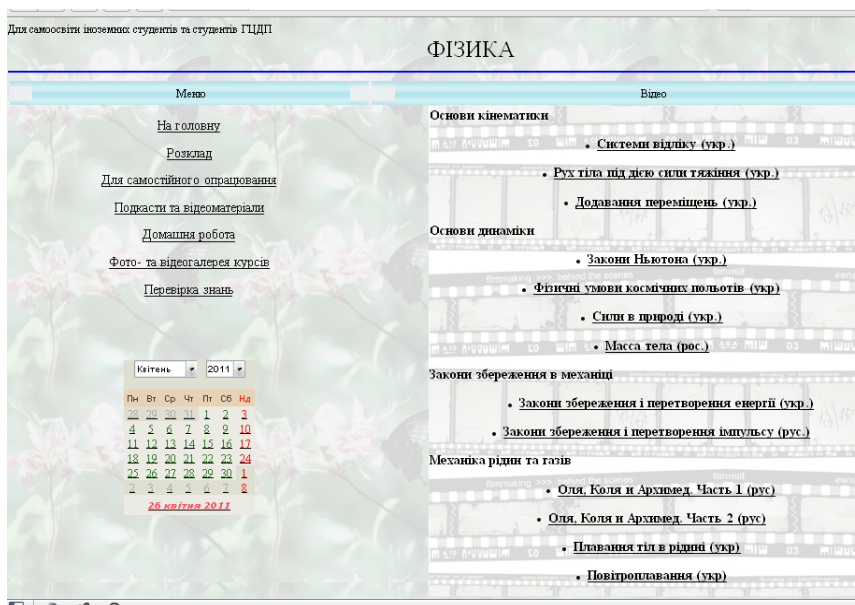


Pic. 1. The title page of our E-book

The menu item „for self-testing” (Pic. 2) consists of four sub-paragraphs (the basis of kinematics, the basis of dynamics, conservation laws in mechanics, fluid mechanics), each containing problems, historical information, theoretical material, word puzzles, crosswords, chaynvordy, quiz questions (with answers), poems and prose. Suggested tasks allow students to independently verify their knowledge, identify confusing points, gaps in knowledge and then consider the solution of the problem by using a hyperlink.



Pic. 2. The menu item „for self-testing”



Pic. 3. The item „Podcasts and video”. The list of available videos

The item „Podcasts and video” (Pic. 3) podcast includes a table of individual dictations on various formulae of Mechanics and list of viewable videos. Most of those videos have been translated by author in Ukrainian.

Students often complain about the difficulties in the study formulae (Pic. 4). Podcasts can be used to study the formulae. via listening audio-responses to dictations or browsing video-responses. Also, students should use the dictation function for self checks. All those audio have been developed by author.

| № | Тема диктанту | Тривалість | Розмір | Кількість формул | Аудіо відповідей | Відео відповідей |
|---|---------------------|------------|---------|------------------|------------------|------------------|
| 1 | Кінематика | 2:42 | 4,95 Мб | 10 | Навісні | - |
| 2 | Кінематика | 2:37 | 4,81 Мб | 10 | Навісні | - |
| 3 | Кінематика | 2:24 | 4,41 Мб | 9 | Навісні | - |
| 4 | Кінематика-Динаміка | 2:54 | 5,33 Мб | 10 | Навісні | Навісні |
| 5 | Кінематика-Динаміка | 2:24 | 4,42 Мб | 10 | Навісні | - |
| 6 | Кінематика-Динаміка | 2:50 | 5,20 Мб | 10 | Навісні | - |
| 7 | Кінематика | 3:22 | 6,16 Мб | 10 | Навісні | - |
| 8 | Динаміка | 2:46 | 5,09 Мб | 12 | Навісні | - |

Pic. 4. The item „Podcasts and video”. The list of available Podcasts

In the „Home Work” item (Pic. 5), students can find problems; the answers of each which give them letter of the Ukrainian alphabet. Having solved some problems the student will receive word on the Ukrainian language. This task also is very convenient for self-checking. At this item you can also download the test problems of the General Pre-university Training Centre.

Розв'язки задач вказують потрібні літери для прихованого слова:

| | | | | | |
|-----------------|---|---|---|---|---|
| № задачі | 1 | 2 | 3 | 4 | 5 |
| Отримана літера | | | | | |

1. Визначте силу Архімеда, яка діє на тіло об'ємом 2 м³, повністю занурене в рідину густиною 103 кг/м³. Вважайте, що $g = 10 \text{ м/с}^2$.

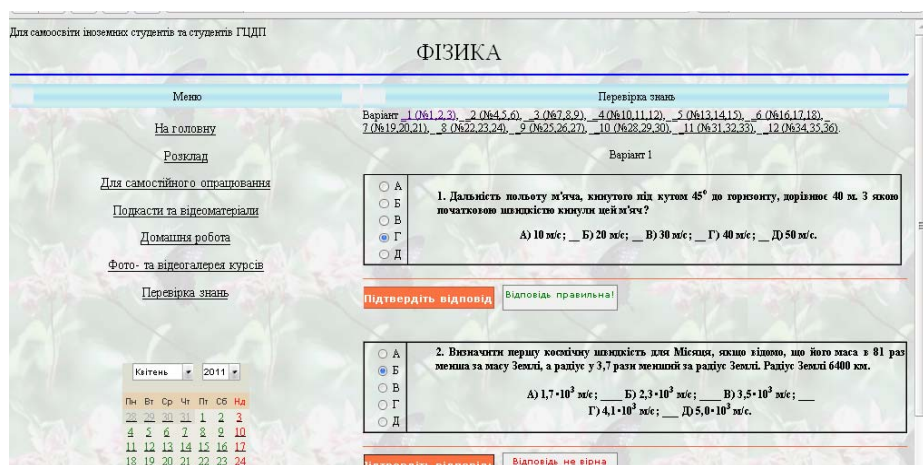
| | | | |
|--------|--------|--------|---------|
| А | Б | В | Г |
| 1000 Н | 2000 Н | 3000 Н | 20000 Н |
| Н | А | Д | Г |

2. Яку максимальну пішіймальну силу має тит, який зроблено з 10 колод об'ємом по 0,6 м³ кожна, якщо густина дерева 700 кг/м³.

| | | | |
|-------|-------|-------|-------|
| А | Б | В | Г |
| 16 кН | 18 кН | 10 кН | 18 кН |
| А | В | Е | Д |

Pic. 5. The menu item „Home Work”

Item „Testing” (Pic. 6) contained in the menu and allows using twelve different variants of computer tests for revealing the level of student learning. Each of these options has 4 problems (kinematics, dynamics, conservation laws, fluid mechanics). The computer based test however, is not intended for assessment.



Pic. 6. The menu item „Testing”

The site presents material in a way that complements classroom lessons. Our goal is to interest students of physics and develop their skills in self-education.

The e-book was tested in seven groups of students of GPuTC VNST, including a group of international students from Ecuador (in sum there was 59 students). We carried out a survey shown here:

| Question | Yes | No |
|---|-----|----|
| Does information from e-book is useful for your study | 47 | 12 |
| Does viewing educational films is useful for study? | 58 | 1 |
| Do you feel an improve into your knowledge? | 59 | – |

This e-book was presented at three conferences (in Vinnitsa, Lugansk and Kirovograd, Ukraine). All respondents expressed their desire to use our tool to improve knowledge of the mechanics and to improve the skills of self-education.

Literature

„e-book”. Oxford Dictionaries. April 2010. Oxford Dictionaries. April 2010. Oxford University Press. (accessed September 02, 2010).

Gardiner, Eileen and Ronald G. Musto (2010), „The Electronic Book” In Suarez, Michael Felix, and H.R. Woudhuysen. The Oxford Companion to the Book. Oxford: Oxford University Press, 2010, p. 164.
<http://en.wikipedia.org/wiki/E-book>

Abstract

The article considers the problems and methods of the creating and use E-books of Physics in the education process for Self-Learning.

Key words: Information technology, self-learning, students, physics, E-book.

E-książka w uczeniu się fizyki

Streszczenie

W artykule przedstawiono rozważania nad problematyką i metodami opracowywania oraz wykorzystania e-książek w procesie uczenia się fizyki.

Słowa kluczowe: technologia informacyjna, uczenie się, student, fizyka, e-książka.