The Format of Educational Tasks for the Course of Computer Imposition in LaTeX

Irina L. Fuks*
Computer Science Department
Tomsk State University, TSU
Tomsk, Russia
fooxil@sibmail.com
* Corresponding author

Gennady M. Koshkin
Department of Applied Mathematics and Cybernetics
Tomsk State University, TSU
Tomsk, Russia
kgm@mail.tsu.ru

***Abstract*—To study LaTeX, the special format of tutorial tasks is supposed. Execution of such tasks makes for the better understanding and memorization of numerous rules of text composition.**

Keywords-desktop publishing; LaTeX; computer imposition; unassisted e-learning

I. INTRODUCTION

Over the last decade the concept of publishing in the form of the massive open online course (MOOC) [1] has formed in the field of remote access to information for education and training. The MOOCs are the richest collections of lectures, study and control tasks, excellent computer demonstrations of natural phenomena and laboratory experiments created by outstanding scientists from leading universities of the world. The MOOC training materials can be used in classroom and in online work. The most significant examples of modern MOOC can be called MIT Open Course Ware [2], edX [3], Coursera [4], Open Yale Cources [5]. The interest to the MOOC from the educational institutions and potential users is growing. Consequently, any new teaching methods that involve the use of a computer and is used in traditional training, can be interesting and useful to MOOC developers.

Training courses in the field of higher education have different purposes. For example, if the goal of the course is to explain the states of the scientific theory, in such a course it seems true a lack of practical or laboratory works. There are disciplines, focused on the development of certain technologies. Their theoretical part can be considered as a set of rules to be followed by the Executive in his work to achieve the desired result. These disciplines include the study of computer technology for creation of publications layout, i.e. computer composition. A makeup man works with the original materials of the different contents, for example, the literature for adults and children, texts with illustrations, collections of poems, music scores, art albums, scientific texts with a wide variety of special characters. Note that separate parts of the future editions can be presented in files of different standard formats, i.e. must have a finished look. Moreover, some elements of the publication will need to form or compose directly in the layout.

For the imposition of printed editions is used computer publishing systems. From the viewpoint of the features of work with the documents, these software products can be divided into 2 groups. The first group consists of those systems in which the layout process is performed in a mode of direct display of the document on the screen, and precisely in the form as this document then will look on the paper (so-called WYSIWYG-systems). Examples include QuarkXPress, Adobe PageMaker, Microsoft Publisher, Apple Pages, Adobe InDesign. The capabilities of these systems are extremely wide, but they are not designed to work with the scientific literature.

In the second group publishing systems process layout is divided into parts. First, we compose the text of the document and set the structure of the document. Next, we compile the text and create a document in a format that is not tied to a specific output device. As a result, it is possible to view the document in the form in which it will look like on paper (for example, the system TeX and the expansion pack LaTeX). The TeX system was created by D. Knuth specifically for the imposition of scientific texts [6].

II. TUTORIAL PRESENTATION ON THE TECHNOLOGY IN LATEX

In terms of breadth of training publishers, familiarity with the technology of the TeX typesetting system can be considered as a very useful part of the learning activities. It is especially necessary for those who will work in scientific publishing. As an example of books, typed and composed in LaTeX, here are [7] and [8]; the initial code of these publications was formed by the authors themselves. In addition, the important argument in favor of studying the chosen technology, we consider understanding the internal transformations of information on the computer, which is practically not formed in the WYSIWYG-systems.

In our tutorial course presentation on the technology in the LaTeX typesetting is given in the form of a set of texts of laboratory works, like [9]. The content of each work is a description of a particular item of technology. The text of the task is made so that in it studied elements of the technology are directly applied.

The basic idea of the proposed methodology is that the study and memorization of layout rules by type-setting text in which these rules are described. Such an approach allows reducing the lecture component of the course to 1 or 2

introductory classes and promoting the study of technology in a practical manner. According to the present-day tendencies, we can conclude that today's students prefer memorization of visual information instead of lecture notes, i.e. presentations, graphs, diagrams. However, without the accompanying text, content of material in terms of video series is not always restored adequately. In technological courses with a large number of clear rules, it is necessary textual description.

According to the discussed method, the text of the task is as the summary in the theoretical part of the discipline. The task is to set the text. While working on the task, the student several times handles to the rules under study. First, the student reads the text of the job, i.e. visual memory is working. Then, the text is typed, i.e. the mechanical memory is attached. After that, the studied rules are applied to the text. To make this, the text is read again, and the necessary design elements are put in this text. Each next in turn compilation and examination of the job indicate that the document is gradually taking the same form as the task. Such a sequence of the student operations makes for a better understanding and memorization of numerous commands, directives, operators, and methods by which is built the structure of the document in LaTeX. The result of all the fulfilled tasks of the course is actually a brief summary of the discipline, which can then be used as a handbook.

The fragments of several tasks are shown in Fig. 1-5.

The left and the right indentations

The left and the right indentations are defined by command

hangindent=size

A positive value of the size is the left indentation, a negative one is the right indentation. This command does not affect the indentation, it must be installed separately.

Command

hangafter=number of lines

used to specify the lines, which will (or will not) affect the indication of indentation.

A positive value of this parameter means that the indentation will not act on necessary number of the initial lines of a paragraph. A negative value of this parameter indicates that necessary number of the initial lines of a paragraph will be shifted.

Here is a paragraph of rather fantastical form. The probability of finding such a paragraph in the book is quite small. But maybe someday, these invaluable pieces of information will be useful.

FIGURE 1. INDENTATION

Alignment

To align a paragraph we must use the environments **center**, **flushleft** and **flushright**.

To the right, a bridge

To the left, a bridge

And in the middle, a little boat

FIGURE 2. ALIGNMENT

Lists

To print lists are used environments **itemize** (for marked lists), **enumerate** (for numbered lists) and **description** (for lists in which each item has a title, for example, the dictionary entry). In any case, the elements of the list are brought in command `\item`. The command `\item[argument]` displays the text of the argument as a headline item in the list.

Example of list :

- this is
- the marked
- list
  - the list
  - of the next
  - level
  - is put in it
- this is again
- a top level

FIGURE 3. CREATION OF LISTS

- **The formulas inside of the text** are surrounded on both sides by $ (math, \(, \)).
- **Excluded formulas** are surrounded on both sides by a pair of dollar signs $$ (displaymath, \[, \]).

Sums, products, integrals

The editor WinEdt has a toolbar **Math**, which produces a set of symbols for sums $\sum_{i=1}^{n} \frac{1}{i}$, products $\prod_{i=1}^{n} \frac{d}{i-d}$, integrals $\int_0^1 dx = 1$ etc.

$$\sum_{i=1}^{n} \frac{1}{i} \qquad \prod_{i=1}^{n} \frac{d}{i-d} \qquad \int_0^1 dx = 1$$

FIGURE 4. THE COMPOSITION OF FORMULAS

There are examples of intra-textual and excluded formulas in the lab «Formulas». Let's see how numbered excluded formulas look.

$$number_{subscript}^{number\ exponent(superscript)} \tag{7}$$

$$\Psi_{\sigma*\pi}^{\alpha+1} \tag{8}$$

$$\frac{6}{2} = 3 \qquad \frac{a^2 - b^2}{a - b} = a + b$$

$$(a+b)*(\frac{(c-a)}{(c-b)} + 11) \qquad (a+b)*\left(\frac{(c-a)}{(c-b)} + 11\right) \tag{9}$$

In formula (7) and the next to (7), it is shown how to work with the upper and lower indices. Unfortunately, the next formula to (7) (see page 5), is not marked, so it is impossible to refer to this number (:, .

A pair of formulas in (9) on page 5 is labeled, but previous pair of formulas is out of luck, it did not get even number.

5

FIGURE 5. THE NUMERATION OF FORMULAS AND REFERENCES

III. CONCLUSION

Experience of training activities with the presented tasks allows to emphasize the following positive developments in the work of the student and the teacher:

- The studied rules and their application are combined in a single document, i.e. in the window of single application;
- The goals and results of the work are fully clear to the student;
- Examination of laboratory works is simplified because it is reduced to the comparison of the obtained result with the original of the task. But, it is no concern of texts with references that should be checked in the initial code of the document.

We believe that the knowledge of the proposed methodology for design of e-learning materials will be useful to developers of educational courses in traditional teaching and MOOC.

ACKNOWLEDGMENT

The paper was partly supported by the Russian Foundation for Basic Research, project no. 13-07-98037

REFERENCES

[1] D. Koller, What we're learning from online education. http://www.ted.com/talks/daphne_koller_what_we_re_learning_from_online_education.html, 2012 .

[2] Site of MIT_OpenCourseWare http://ocw.mit.edu/

[3] Site of edX https://www.edx.org/

[4] Site of Coursera https://www.coursera.org/

[5] Site of Open Yale Courses http://oyc.yale.edu/

[6] D. Knuth, The TeXbook. Addison Wesley, CA: Stanford University, 1984.

[7] A. Dobrovidov, G. Koshkin and V. Vasiliev, Non-parametric State Space Models. Heber City, Utah: Kendrick Press, Inc., 2012.

[8] G. Koshkin and I. Piven, Nonparametric Identification of Stochastic Objects. Khabarovsk: Russian Academy of Science, Far East Branch, 2009.

[9] S. L'vovsky, Work in system LaTeX. http://www.intuit.ru/studies/courses/1137/137/info, 2007.