

EFFECT OF LECTURE FORM ON PROGRESS IN STUDIES

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Abstract

The results of statistical analyze of the lectures form effect on the progress in studies are presented. Two variants of lecture material representation are compared: the classical lecture with the use of traditional blackboard and chalk and the lecture in the form of slide-show. The results of ten examinations (for the last eight years) on the discipline "Chemistry of high-molecular compounds" has been treated. The significant increase (54 %) of excellent marks share and the decrease (25 %) of unsatisfactory marks share has been revealed as a result of the progressive lecture form as slide-show.

Key words: *natural science education, statistical analyze, lectures form, slide show, classical lecture, script, Adobe InDesign.*

Introduction

Classical lecture with use of a usual board and a chalk served the purpose pending the centuries. The modern technical facility allows to raise dramatically the quality of the lecture material demonstration and visualization. The problem of accurate transfer and correct perception of the information especially takes place at teaching to natural science disciplines when it is necessary to show chemical and mathematical formulas, complicated drawings, schemes, tables, microphotos and spectra. The urgency of the mentioned problem increases in connection with complication of the modern information in the field of chemistry, biology, physics and related subjects. The equations of reactions and chemical formulas treating processes of vital activity, nature management, chemotherapy and industrial technologies, become sophisticated and grow in size. At reading of the basic lecture courses in large auditoriums gathering 100 and more students, the blackboard and chalk cannot provide complete, clear and operative representation of formulas and drawings any more. Recently teachers widely use electronic lectures-presentations with animations, as well as three-dimensional models, various videorecordings (Frankowicz, 2006; Shishonok, Rutsky, Makarenko & Krul, 2006; Shishonok, 2007; Shishonok & Makarenko, 2009). The improvement of new lecture forms, as well as the comparative evaluation of their efficiency are necessary.

Methodology of Research

The courses of lectures are developed for demonstration on the screen in auditorium in the form of original, author's slide show. The lecture material has been made up in Adobe InDesign 6.0.5 software in the form of the layout for press. The scripts written by authors in JavaScript language allow to convert the layout for the press to the set of slides automatically. At this conversion pages parameters are modified according to the screen geometry, as well as headings, captions and definitions are highlighted with coloring. Simultaneously the enlarged copies of graphic objects and definitions are appended to the lecture material. As a result by pressing the formula, the equation or drawing and definition their at most enlarged copy is appeared on the screen, and this copy is linked by the cross-reference with its parent object in the text of lecture. Received thus layout of slide show will be converted to Adobe PDF format which is read by Adobe Reader software.

Each lecture represents the set of approximately 20 slides, including full text and graphic materials. In the text material the basic terms and definitions are highlighted. The graphic material contains chemical and mathematical formulas, the equations of reactions, spectra, photos, schedules and drawings. While slides demonstration the teacher can enlarge the definitions, formulas and drawings up to the size of the projector screen. Zooming-in of the image allows to apprehend the material not only by hearing, but also visually.

Several fragments of slides can serve as examples:

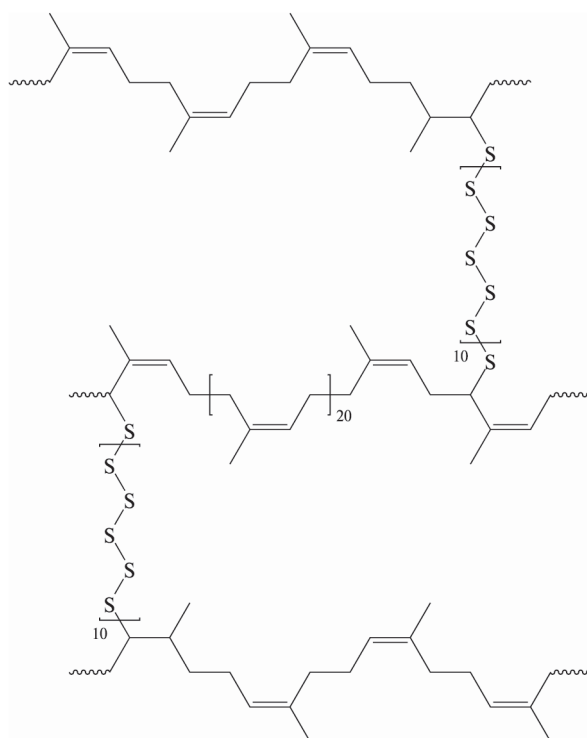


Figure 1. Formula of rubber (set-1, 4-polyisoprene).

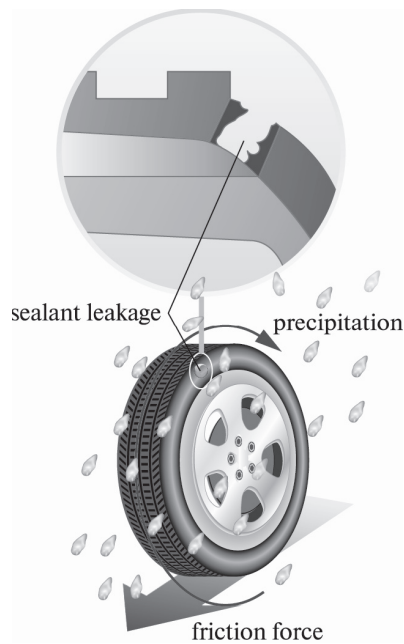


Figure 2. Animation frame «Latex of natural rubber encapsulates the punctured tires».

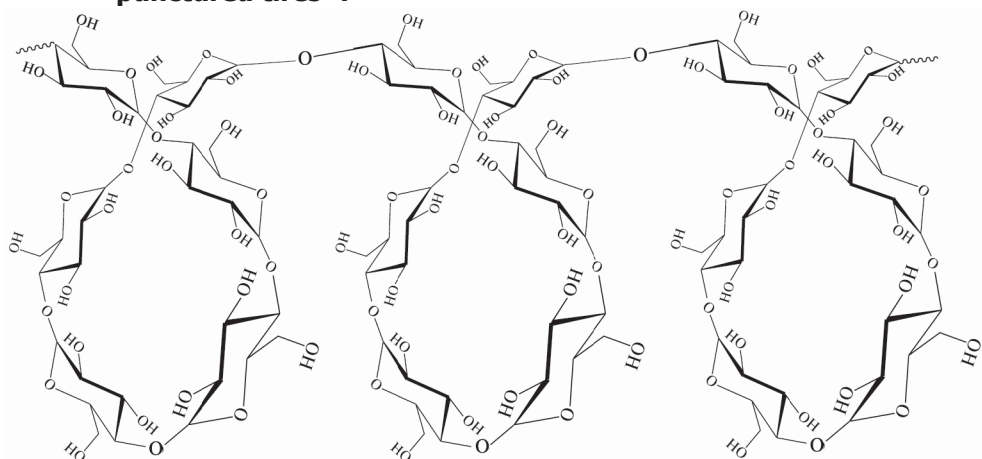


Figure 3. Amylase helix.

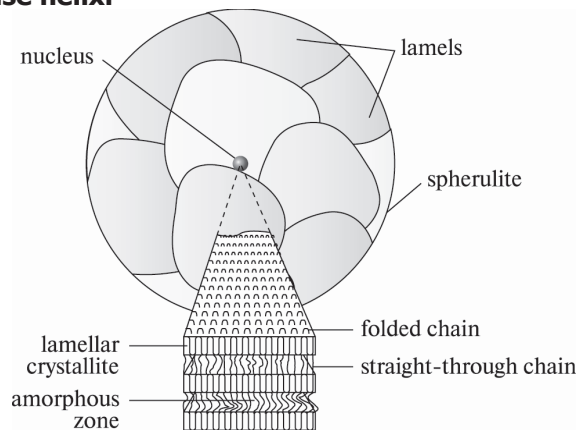


Figure 4. Scheme of spherulite structure.

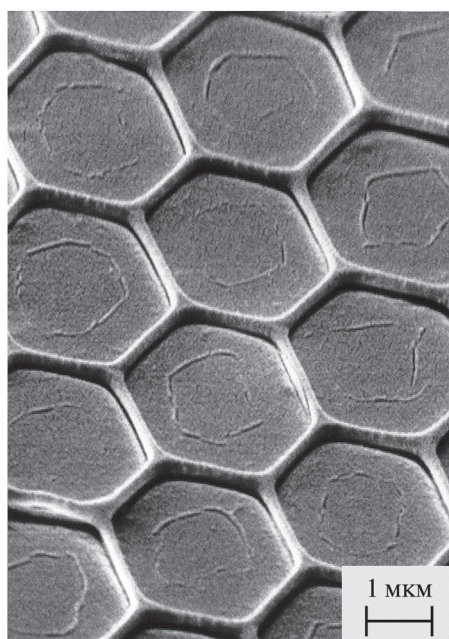


Figure 5. Electronic microphoto of carbon net from cellulose nitrate.

On the basis of original lecture slide shows the author's tutorial has been published: (Shishonok and Krul, 2010).

The lectures in the form of slide show has been tested at the Belarusian state university during the recent 4 semesters while reading of the basic and special disciplines: «High-molecular compounds», «Structure and structural modification of high-molecular compounds», «Chemical modification of high-molecular compounds», — for students of the “chemistry” speciality, as well as in the lecture course «Polymeric materials» for undergraduates. The lectures in the classical form when the equations of reactions and drawings are written and drawn by the teacher with a chalk on blackboard, had been read by this article first author within 25 years. At stem lectures on the basic course «High-molecular compounds» were present from 60 to 100 students; at lectures on special courses — up to 20 students or undergraduates.

The efficiency of the new lecture form has been estimated in comparison with the classical lecture form by results of examinations. In total the results of ten examinations on the basic discipline «High-molecular compounds» for recent seven years are processed. Thus, the comparative analysis of efficiency of different lecture forms has been spent according to the data of the educational process in which took part over 1000 students.

Results of Research

The results of research are presented in the form of chart on Figure 6. Examinations marks are indicated on abscissa axis. The marks are gave on 10-mark scale and united in 4 basic groups: “unsatisfactory” (0, 1, 2 and 3), is “satisfactory” (4 and 5), “good” (6 and 7) and “excellent” (8, 9 and 10).

As follows from fig. 6, at the new lecture form of slide show the share of “excellent” marks has essentially increased, approximately by 54 %. Simultaneously the share of “unsatisfactory” marks has decreased for approximately 25 %. The shares of “good” and “satisfactory” marks has decreased approximately on 12 % and 17 % accordingly (Figure 6).

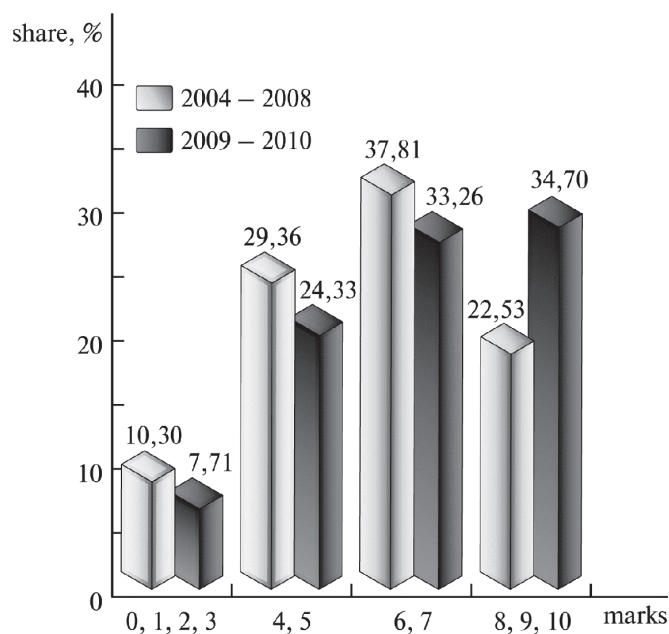


Figure 6. Examinations results after the listening to lectures in the classical form (2004 – 2008) and in the new one (2009 – 2010).

Discussion

The received results should be considered only as the preliminary estimation of the efficiency of slide show since the new lecture form is employed while short term. Nevertheless, at transition to slide show the positive tendency — reduction of the share of “unsatisfactory” marks and the growth of the share of “excellent” marks is revealed: just about 8 % of students got “unsatisfactory» marks, and about 35 % of students — “excellent” marks.

It is obviously that demonstration of complicated structural formulas in a large scale in aggregate with detailed elaboration of drawings, photos and charts, as well as the efficiency of the information presentation, and, as consequence, its consolidation which slide show provides, have led to progress. Probably, those students, who earlier, at the classical form of lectures, did not have not enough clearness in graphic presentation of the material, as well as the completeness and depth of the information, have managed to indicate the improved result.

Really, the writing of polyisoprene (rubber basis) formula (Figure 1) on blackboard takes a lot of time whereas during the slide show it is possible to explain essentially prominent aspects, for example bonds types in the molecule as well as to show video clip, that illustrates the practical importance of caoutchouc and rubber in automobile tires production (Figure 2).

Figure 3 unequivocally testifies to advantages of large-scale demonstration of difficult, helical molecules. Drawings and photos, like the ones on fig 4 and 5, that allow to give in detail the structure of polymer crystal formations and to show successes in nanotechnology, provoke interest of the audience to the difficult, but perspective and called-for branch of knowledge.

For the reception of more authentic results, that allow to reveal the merits and demerits of the new forms, the further accumulation of data is required.

Conclusions

The preliminary comparative analysis of two lecture forms, the classical and the new (slide show) ones, has revealed the efficiency of last one. At transition to the progressive lecture form the share of “excellent” marks has increased by 54 %, while the share of “poor” marks has decreased for 25 %. Slide show materials will be perfected and will serve as the basis for the textbook «High-molecular compounds».

References

- Frankowicz, M. (2006). Information and communication technology in science teaching: how promote system thinking In: *Proceedings of International Scientific Practical Conference “Information & communication technology in natural science education - 2006”*. Siauliai: Siauliai University, 2006.
- Shishonok, M.V. (2007). New concept of self-dependent work of students. In: *Proceedings of International Scientific Practical Conference “Information & communication technology in natural science education - 2007”*. Siauliai: Siauliai University, 2007.
- Shishonok, M.V. & Makarenko, E.V. (2009) Universal lecture material: digital technology of creation and automatic modification. *Problems of Education in the 21st Century*, Vol. 16, p. 89–94.
- Shishonok, M.V. & Krul, L. P. (2010). *Principles of chemistry of high-molecular compounds*. Minsk: BGU.

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