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## **The comparison of Slovak and Polish physics textbooks focusing on illustrations**

### **Abstract**

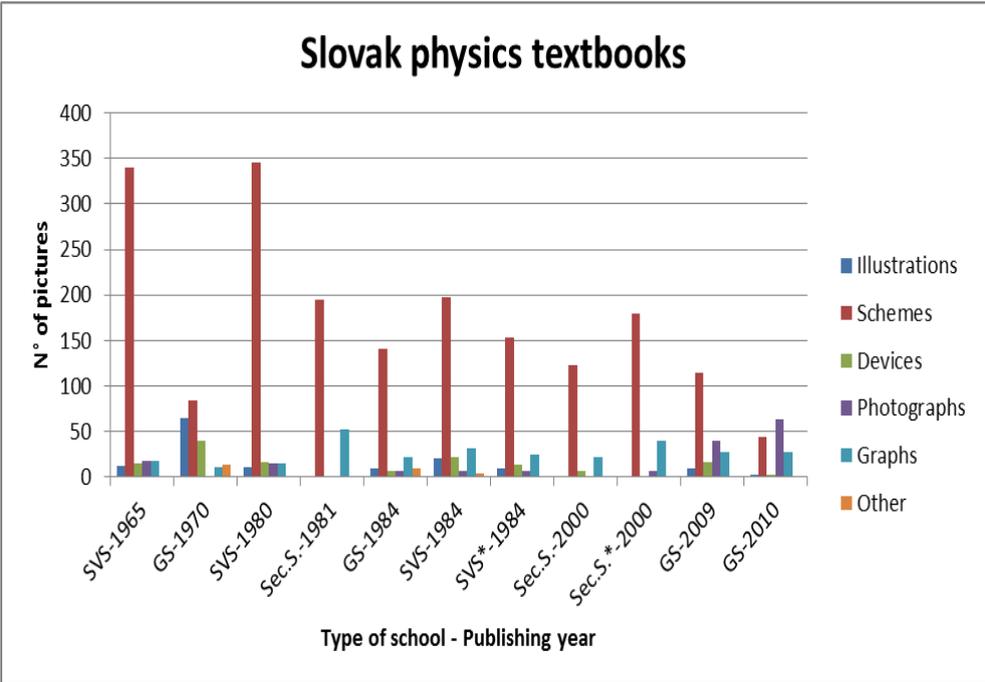
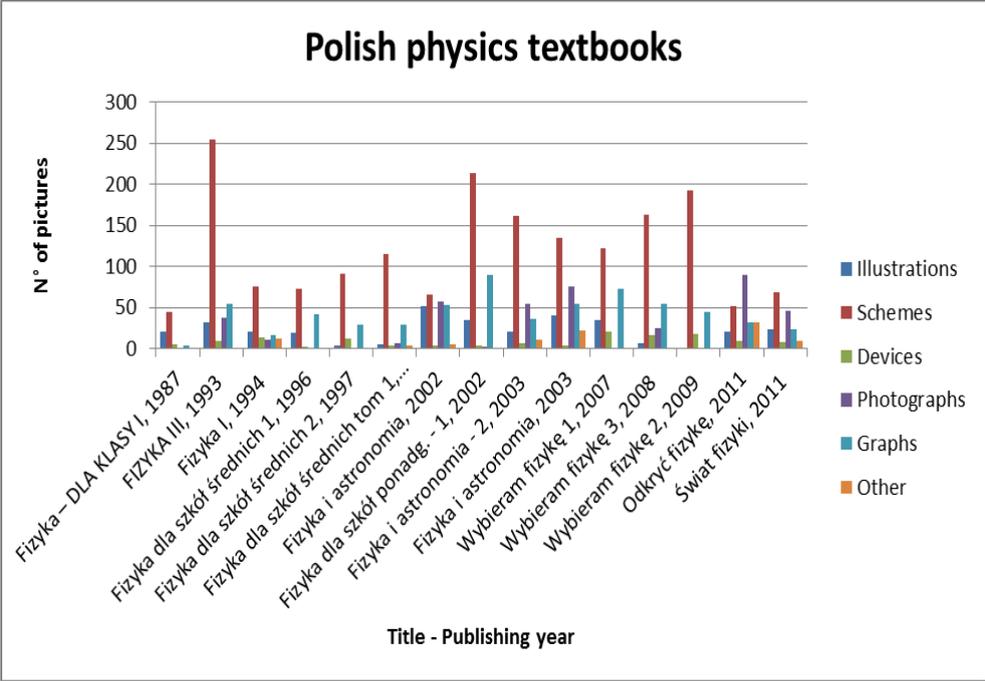
*Professional public in the field of creating textbooks coincides that illustrations are an important part of an educational text, and there should be given due attention to them. They have not only motivating character, but they also simplify understanding and deepen memorizing. The authors of this article have previously made a research of the extent to which illustrations have been used in physics textbooks in Slovakia. This article provides a comparison of physics textbooks of two countries, Slovakia and Poland. It focuses on the quantitative use of images in the textbook, further distinguishes the different types of images and their quantitative representation. On the basis of data provides this article an overview of the development of the use of images in physics textbooks in both countries.*

**Key words:** *textbook, images, illustration, schema, physics*

The images aren't only a part of a children's fairy tale books, but also of textbooks and scientific literature. Not only to fulfill the role of motivation, but they also have many other functions. Several authors assign them different functions, of all at least a brief characteristic from the publication Carney and Levin, 2002: *In a related review, Peeck (1993) lists a number of reasons why pictures should facilitate learning, including increasing motivation, focusing attention, depth of processing, clarification of text content, dual-coding theory, distinctive encoding, decreasing interference/decay, processing support for the type of information typically extracted from a specific type of text (e.g., Waddill et al., 1988; Waddill and McDaniel, 1992), and serving as mental models (e.g., Glenberg and Langston, 1992; Gyselinck and Tardieu, 1994) [Carney, Levin, 2002].*

We chose a general expression *images*, which denotes all visual display. Those are further divided into categories, which are described in the *Explanatory* section.

The following two tables show the number of images used in physics textbooks in the years 1987 to 2001 in Poland and from 1965 to 2010 in Slovakia. The images are divided into different categories according to the previously mentioned division.



In both graphs the most significant group are schemes, it means that physics textbooks in Poland and Slovakia used to the greatest extent pictures of schematic type.

As for the balance in the use of different types of images, the most balanced textbook of Polish production seems to be the last two books of 2011, *Odkryć fizykę* and *Świat fizyki*. This could mean that the Polish physics textbooks tend to the balance of images of various types. On the other hand, from the researched Slovak textbooks we consider the most balanced, textbook of 1970.

## Explanatory

*Portraits or photos of personalities* – include images of celebrities from the fields of physics in any kinds of portraits, paintings, drawings, graphics, photo.

*Illustrated images describing action* – it means the illustrations, not photos, which describe action, physical property... etc., through real things, objects, characters are captured in three dimensions. It is clearly visible what in the picture is, though not necessarily be understood without interpretation. Included here are the pictures that have meaningful or artistic value.

*Schema, vectors, schematic images* – This group includes some pictures illustrating also the action, the physical property ... etc., but are shown only schematically, are two-dimensional and usually require a description. We include a designation scheme vectors here.

*Photos of places* – include places, mostly in the photos as labs, cities, power plants etc.

*Pictures or photos of devices* – displays devices, details, respectively parts of devices, components (bearings... etc.). This category includes only pictures or spatial representation of the apparatus, wiring devices are included in the category of *schema*.

*Graphs, maps and diagrams* – includes various types of graphs, maps, maps of universe and diagrams.

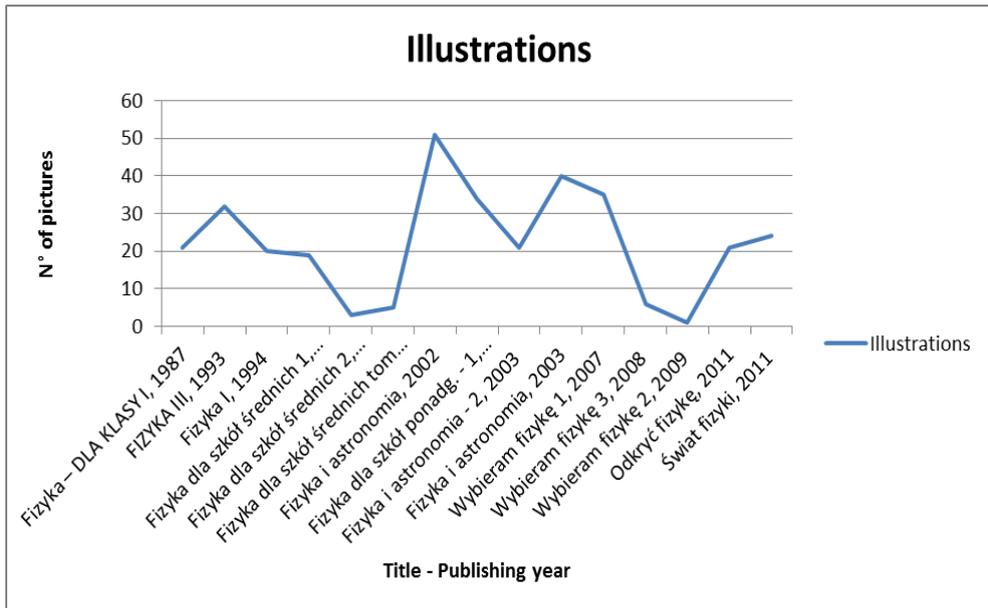
*Other images – photos* – This group includes images that did not correspond to the inclusion of the categories above. Specifically the images of processes, the photographic plate etc.

## Evolution of number of illustrations

The experts agree on the fact that the images are in the educational literature and therefore in textbook as well highly desirable and help students recall the contents later. *Illustrations are further assumed to bring about multiform mental representations of the instructional materials, which will help later recall of the contents (e.g., Paivio & Csapo, 1969) [Hannus, Hyöna, 1999].*

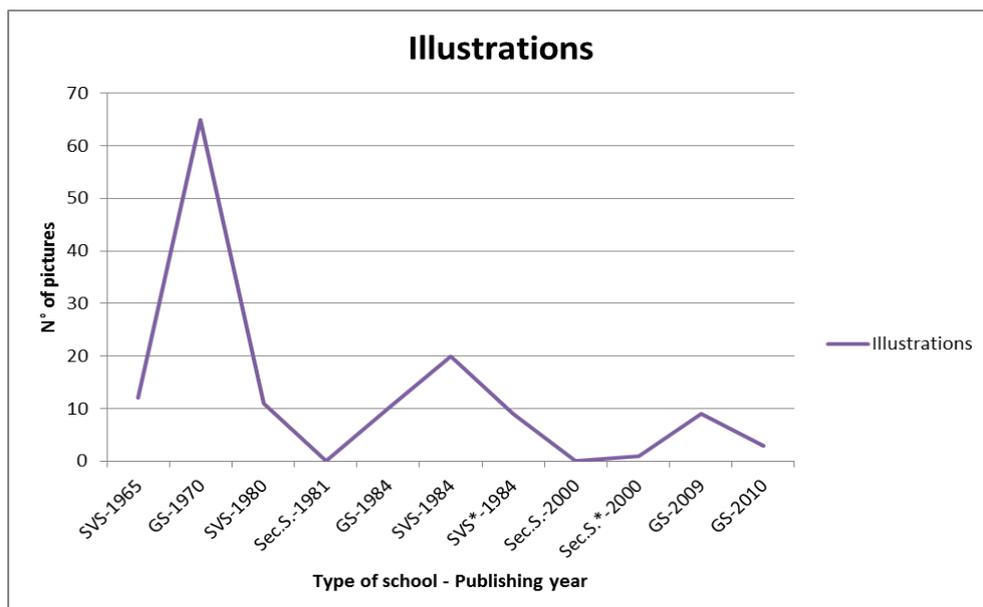
Let us focus now on the specific type of images namely illustrations. In physics textbooks are used to a small extent. Illustration can express very concise way the idea, and is information-bearing. Through illustrations can be explained intellectually challenging curriculum that is otherwise difficult for the reader's imagination. *Our research has shown that understanding of scientific text that explains a cause-and-effect system can be greatly improved, especially for less experienced learners, by annotating multi-frame illustrations that portray step-by-step changes in the status of the parts of any to-be-explained system [Mayer, Steinhoff, 1995].*

Poland



On the chart of the development in Poland we see the alternation of increase and decrease in the number of illustrations in textbooks and the recent years can be considered as an upward trend.

## Slovakia

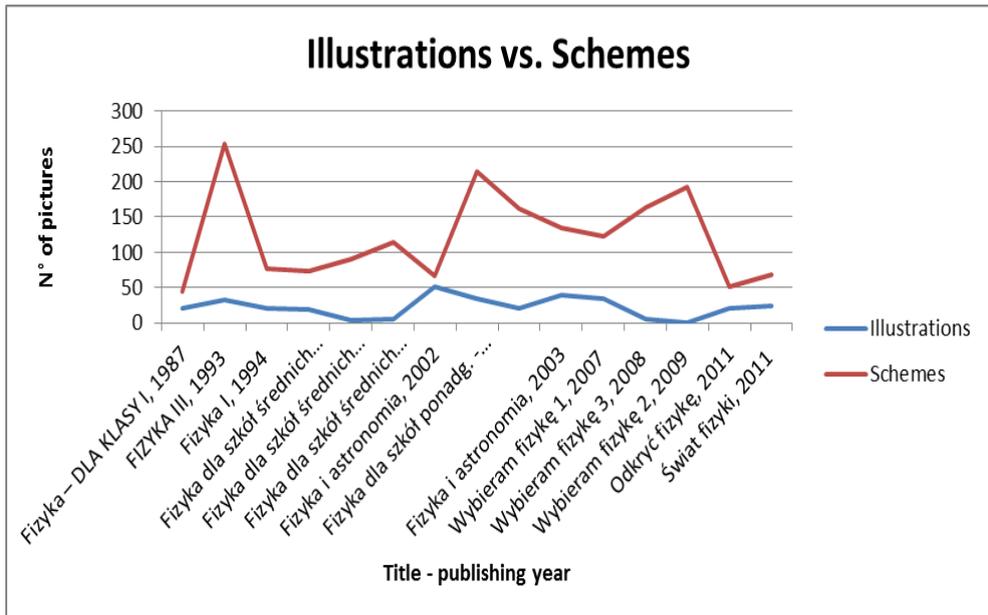


The graph of Slovak textbooks indicates a significant increase in 1970 and a slight increase in 1984, the trend in recent years is declining.

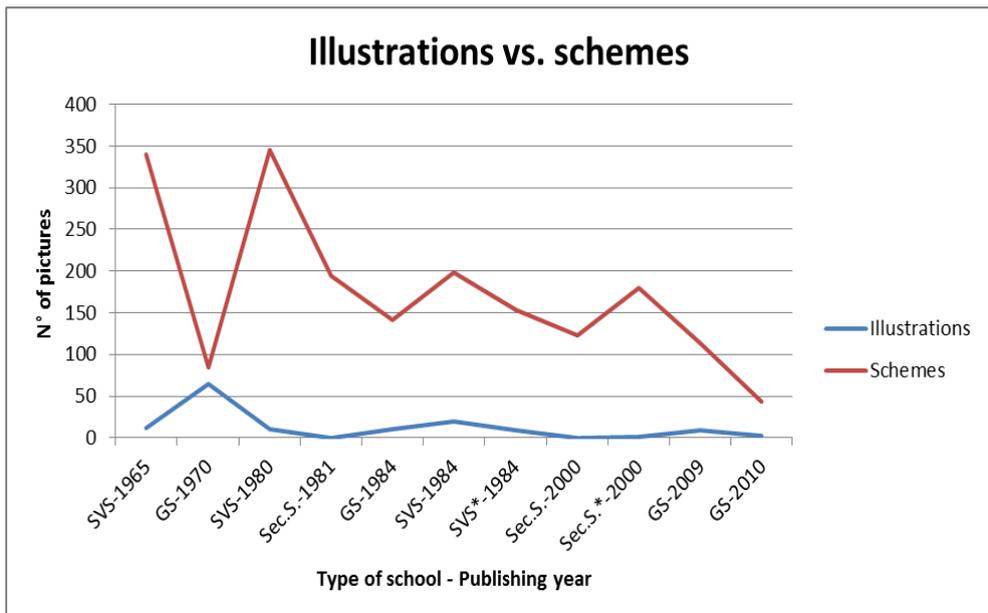
### Illustration vs. Schemes

In the graphs below, let us look to comparison of the number of illustrations with the highest group of all images used. The following charts compare the number of illustrations with the number of schemes in the textbooks. In general we can say that in the comparisons of both countries dominate highly schemes over illustrations.

Poland



Slovakia



In Poland, we register an upward trend in both the number of schemes and the number of illustrations, closeness of these two groups is observed in 2011 in a textbook

Odkryć fizykę. In Slovakia, the number of illustrations and schemes approximates in 1970 and 2010, but both groups have generally decreasing character.

## Discussion

Smith and Elifson devoted to a similar examining of trend development of the number of images in textbooks: *Smith and Elifson (1986) compared history textbooks of the 1960s with those of the 1980s and found a tremendous increase in the number of pictures* [Carney; Levin, 2002]. Opposed to the their findings, we concluded that the increase is not so significant. In Poland, the trend in the number of images used in physics textbooks is slightly increasing and the number of illustrations increases as well. On the contrary in Slovakia, the trend is still downward, we see convergence in the number of illustrations and schemes in 2010, which is due only to a decrease of both.

We brought comparison of trends in the use of images in physics textbooks in Poland and Slovakia. Especially we focused on the type of images – illustrations, because we consider them as an excellent mean of transmission of information through visual media. We studied 15 Polish physics textbooks published between 1987 and 2011 for various grades and types of secondary schools. In Slovakia, we examined 11 textbooks for 1<sup>st</sup> and 2<sup>nd</sup> grade of high schools and grammar schools issued between years 1965 to 2010.

## Acknowledgment

This research could be conducted with the aid of the Department of Physics at UP in Krakow. To its members, especially to the dean prof. W. Błasiak belongs great acknowledgment for their help and support. The same acknowledgment go to the Department of Physics and to the dean of the Faculty of Natural Sciences of UKF in Nitra prof. Zelenický for the help in ensuring participation in this conference.

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