

Analysing the Types of Visuals in Textbooks of Geography and German Language: Considering the Instructional Functioning of Photographs

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ABSTRACT This study makes effort to analyse visuals as an essential part of school textbooks which can serve as key didactic means for visualising and mediating ideas to young pupils and also for supporting their exploration of the educational content. Based on two related investigations the study compares frequencies of types of visuals in selected science (geography) and foreign language (German) textbooks which are commonly used at Czech lower secondary schools. On the basis of a synthesizing approach the aim is to draw considerations about the instructional effectiveness of visuals in different school subjects. As a research method a quantitative content analysis based on the systems of categories as a research instrument was used. The inter-rater reliability of the systems of categories was verified. The research sample consisted of 794 visuals in 4 geography textbooks and 585 visuals in 4 German as a foreign language textbooks for lower secondary schools. The quantification of categories of visuals showed a significant dominance of photographs in the analysed textbooks in comparison with other types of visuals. Despite its educational importance this finding may be interpreted differently in respect to both subjects (geography, German language). Thus beneficial educational functions of photographs in foreign language subjects are compared to the limits of photographs as means for explaining abstract and complex processes in geography.

INTRODUCTION

From the earliest to the advanced stages of education, various types of visuals are included in school textbooks in order to promote pupils' learning. In connection with iconic turn and expansion of visual culture their number still increases. Visuals thus have significant influence on the appeal, attractiveness and also educational functioning of the school textbook (LaSpina 1998; Thornes 2004). Besides, visuals work as a criterion, when evaluating school textbooks, they are also important as an educational aid. They are highly suitable for picturing and mediating ideas to young learners and also for supporting their exploration of educational content (Carney and Levin 2002). Doing so, visuals possess various educational functions. They can be used as sources both for individual inquiry activities or whole-class practice. Moreover, visuals can be beneficial when explaining points of views, attitudes and values (Miller 1998). However, visuals do not usually convey their message automatically. Thus, to enhance the didactical functioning of visuals, specific circumstances have to be met (Mayer and Gallini 1990).

Important factors constituting the educational effectiveness of visuals in school textbooks are particularly: (1) socio-cultural context of the instruction, (2) the nature of the instructional

goal and (3) pupils' cognitive characteristics (Bolling et al. 2004). Moreover, a fundamental factor influencing the educational effectiveness of visuals is their instructional design, which is most obviously reflected by the type of visuals (Peeck 1993). Categorizing and evaluating the types of visuals in school textbooks have a great significance from the educational point of view. This is because various types of visuals (for example, photographs, tables, maps) significantly differ in a way in which they convey educational content. The differences in didactical functioning of the various types of visuals are most evident when comparing different school subjects. However, empirical studies, which would provide a synthesizing view on this issue, are rare.

In this study, effort is made to analyse and compare types of visuals and their instructional effectiveness in two school subjects – geography and German language (as a foreign language). As a framework for considering the visuals and their educational functioning in different school subjects, an established classification which distinguishes between representational and non-representational visuals is used (Levie and Lentz 1982; Tang 1994). Representational visuals are those, which convey educational information in a direct (tangible) way. As representational thus should be categorized

visuals which show how things really look like – for example, photographs, ordinary drawings etc. On the other hand, non-representational visuals may serve as a substitute, which only refers to the concept being visualised. They are mostly highly schematized and thus may not look like the things they represent but are related in some structural, conceptual or logical way – for example, maps, diagrams, charts etc. (Anglin et al. 2004). Special attention is paid to photographs (and their instructional functioning). This is because photographs represent the type, which is very often used to transform and to convey educational content to young pupils in Czech school textbooks. Moreover, photographs are appraised as a valuable instructional aid by (Czech) pupils and teachers themselves, which was confirmed in former studies. However, instructional functioning of photographs may not be taken for granted. Photographs do not serve automatically as a useful teaching aid – in different school subjects.

Review of Literature

The issue of visuals as educational instruments has been continuously investigated within an established research area – *Research on pictures* (Brody 1981; Levie and Lentz 1982; Levie 1987). Although the amount of theoretical literature dealing with the topic of visuals as educational instruments has accumulated (Houghton and Willows 1987; Mayer 2008), empirical studies elaborating it especially in the field of geography and foreign language school textbooks are rather seldom (see below).

In the research on pictures substantial attention has been paid to representational visuals (photographs and realistic drawings) which show things as they really look like and may thus support the comprehension of narrative text (Carney and Levin 2002). In this manner, for example, Pozzer and Roth (2003) were concerned with the relationship between photographs and captions and their integration with the main text. Nevertheless, the focus is not just put on representational visuals but also on other types of visuals. The study of Bartram (1980) and also Dean and Kulhavy (1981) showed that spatial information can be learned more effectively from nonrepresentational visuals (for example, maps) than from the text. The presumption that combination of maps and text may facilitate learning of geographical subject matter was confirmed in

the study of Verdi and Kulhavy (2002). The presumption that logical visuals (for example, diagrams, charts) are able to support understanding of relationships and structure of concepts was confirmed in several studies. For example by Dana (1980), Shah and Hoeffner (2002) and others.

According to research findings, geography textbooks should contain various types of visuals. This diversity of visuals may facilitate pupils' cognitive operations when contemplating rather complex geographical phenomena. Yasar and Seremet (2009) realized a comparative analysis of fifteen Turkish geography textbooks for lower secondary education, concerning instructional qualities of different types of visuals. The authors of the study drew conclusion that despite the fact that the analysed textbooks were richly illustrated, the individual types of visuals were represented rather unevenly and mostly photographs were used. Furthermore, those photographs served mainly illustrative purposes instead of motivating learners to contemplate the subject matter in greater detail. But there are also other studies available which deal with the categorisation and evaluation of the types of visuals in geography textbooks for various levels of school education (Kuzu et al. 2007; Sahin-Izmirli et al. 2009; Christner and Kleier 2011).

In the area of foreign language teaching, the analyses of visuals rather occur as part of more complex textbook analyses or from a specific point of view (Arikan 2005; Yuen 2011; Romney 2012). Studies directly dealing with analyses of types of visuals in foreign language textbooks are not very frequent. For example, Alley (1994) analysed Spanish as a foreign language textbooks for beginners, published during three decades (from 1960 to 1989). He observed the percentage of visuals in the selected textbooks, the size of visuals, the frequency of types (photographs, drawings, realia, graphs and diagrams, maps and reproductions of works of art) and other aspects. Comparing the textbooks published in different decades, results showed an increasing tendency of the frequency of photographs and a decreasing tendency of the size of visuals.

Background and Purpose of the Study

The purpose of the presented study is to analyse the frequency of types of visuals in se-

lected textbooks for Czech lower secondary education¹ (1). The findings of the analysis are consequently used as a basis for the consideration about the functioning of visuals as educational instruments in geography and German language textbooks (2).

The selected school subjects – geography and German language – may be associated with different educational approaches, but in this study they are considered as related though, as foreign language textbooks usually include topics with geographic content. The aim is to provide a synthesizing approach to the analysed issue and on its basis to draw considerations about the instructional effectiveness of visuals in textbooks of the selected school subjects.

To advocate the synthesizing approach and to understand the specificity of the analysed geography and German language textbooks concise information about Czech national curriculum may be beneficial. Geography as a school subject has been incorporated into the area of science subjects in the Czech lower secondary curriculum. Its content concerns two main educational domains – *Man and Nature* (focusing on science aspects) and *Man and Society* (focusing on social-science aspects) in which pupils are familiarized with the educational topics such as: (1) usage of geographic information, data sources, cartography and topography; (2) a natural image of the Earth; (3) regions of the World; (4) the social and economic environment; (5) the natural environment; (6) the region of the Czech Republic; (7) geographical fieldwork, practice and application (Ministry of Education, Youth and Sports 2007). To support pupils and their teachers in achieving the instructional goals in geography lessons, various instructional materials – including textbooks – have been published during the period after the curricular reform in the Czech Republic. Unfortunately, they are not always of good quality (Reznickova 2003).

German (as a foreign language) teaching has a long tradition in the region of the Czech Republic, which is caused partly due to the historical relations between the Czech Republic and German speaking countries (Germany and Austria). The German language belongs to the languages commonly taught at Czech lower secondary schools (it is usually taught as a second foreign language after English). As the main research attention on foreign language learning and instruction is paid to English as a first for-

eign language, this study aims to contribute to the research idea of German as a second foreign language. Like geography, the German language is also embodied in the Czech lower secondary school curriculum (concretely in the domain of *Second foreign language*). To integrated parts of this domain belongs teaching culture in a broader sense (including geographical issues) which is also supported in textbooks and other teaching aids.

Research Questions

The purpose of the presented study (see above) was transformed into the research questions (see below).

The research questions are as follows:

1. a) *What types of visuals do occur in geography textbooks used in Czech lower secondary schools?*
 b) *Is there a difference in frequencies of representational and nonrepresentational types of visuals among geography textbooks?*
2. a) *What types of visuals for teaching culture do occur in German language textbooks used in Czech lower secondary schools?*
 b) *Is there a difference in frequencies of representational and nonrepresentational types of visuals among German language textbooks?*
3. *Are there any similarities in the occurrence of types of visuals between geography and German language textbooks?*

MATERIAL AND METHODS

Design

To answer the above mentioned research questions two quantitatively oriented investigations have been conducted. In the first step, the geography and German language textbooks were analysed separately – to explore how they are designed (regarding visuals) in respect to the demands of the particular subject. In the second step, the focus was put on the comparison between the geography and German language textbooks considering the occurrence of representational and nonrepresentational types of visuals. In this manner, special attention was

paid to photographs as one of the most frequent type of visuals in textbooks (Poizzer and Roth 2003; Rose 2008; Lee 2010; Anagnostopoulou et al. 2012). These investigations are interconnected with the common research aim, but due to the specifics of the school subjects which were in focus (geography and German language), there are minor differences to be identified in the methodology. Concretely, the differences concern slight modifications of systems of categories as a research instrument.

Instrument

A quantitative content analysis based on the application of interrelated systems of categories was conducted. The systems of categories were developed considering relevant theoretical works (Woodward 1993) and empirical studies (Tang 1994; Mikk 2000) and adapted to correspond with specific characteristics of Czech lower secondary textbooks for geography and German language. The basic features of the systems were similar (having categories for considering both representational and nonrepresentational visuals), they were adjusted to the relevant subject though (modifications of categories were needed to better reflect the specifics of the selected subjects). The development of categories with definitions and concrete examples were validated during previous pilot investigations of the authors of this study.

In the case of geography, the system of categories consisted of 2 main categories – representational and nonrepresentational visuals. These were divided into general categories for the classification of the types (pictorial, cartographic, cartographical-statistic, statistical-graphic, tabular, schematic, others and combined visuals). The general categories were divided into more specialised subcategories which enabled more detailed classification. Concerning German language, the system of categories also consisted of 2 main categories – representational and non-representational, which were divided into general categories for the assessment of the types (realistic, analogous, logic, symbolic, cartographic and combined visuals). These were also divided into more focused subcategories.

The Reliability of the Research Instrument

The systems of categories applied were consulted with experts who deal with the subject

matter. The validity of the research instrument was therefore ensured. Subsequently, the inter-rater reliability of both systems of categories was verified by Cohen's Kappa (κ). During this procedure, two independent raters coded 90 pages in geography textbooks and 90 pages in German language textbooks (the raters had an instructional manual at their disposal). The aim of the verification was to develop systems of categories which enable precise assessment of visuals in geography and German language textbooks. Following values were calculated: for geography textbooks $\kappa = 0.59$ (overall agreement was 70 %), for German textbooks $\kappa = 0.87$ (overall agreement was 94.12 %). Both obtained values of the inter-rater reliability can be considered satisfactory (Landis and Koch 1977), although in the case of geography the value was lower, which might be caused by the fact that by higher frequencies the value of the coefficient may decrease.

Sample

The research sample consisted of 794 visuals in 4 geography textbooks and 585 visuals in 4 German as a foreign language textbooks which are commonly used at Czech lower secondary schools. More concretely, in the case of geography, textbooks for human geography were selected. They were those, typically used in human geography lessons at Czech lower schools by children aged 13–15. German textbooks concerned the same age of children as the geography textbooks (corresponding with pupils learning German for 2 years). Two textbooks coming from Czech publishers and two textbooks coming from German publishers were used. In these textbooks visuals were selected just with cultural (geographical) content.

Method

Data collection was carried out by the authors of this study. Visuals were coded according to the corresponding system of categories. To prevent fatigue of coders the visuals were coded in intervals which lasted approximately 120 minutes. A quantitative content analysis based on the instrument was used. To illustrate the frequency of different types of visuals (especially photographs) different statistical indicators were used. For a general overview relative counts (percentages) were calculated. In

order to get more detailed information about the distribution of visuals in analysed textbooks the Pearson's Chi-square test (χ^2) was used. In the results the researchers focused mainly on the most frequent types as the majority of types showed a low frequency.

RESULTS

The results of the investigation confirmed that there are significant tendencies in the textbooks of both analysed school subjects (geography and German language) considering the distribution of the visuals and their didactical functioning. The quantification of categories of visuals showed a significant dominance of photographs in the analysed textbooks in comparison with other types of visuals (especially in German language textbooks). The following description of the results is organised according to the research questions.

What Types of Visuals Do Occur in Geography Textbooks Used in Czech Lower Secondary Schools?

In geography textbooks the highest amount of visuals refers to photographs ($n = 464$; 61 % in total). Photographs also represent the most frequent type of representational visuals in geography textbooks. The proportion of representational versus nonrepresentational types of visuals, however, differs in the analysed geography textbooks. The frequency of representational types of visuals varies from 41.67 % (third textbook) to 76.66 % (fourth textbook), whilst the frequency of nonrepresentational types of visuals ranges from 23.34 % (fourth textbook) to 58.33 % (third textbook).

Is There a Difference in Frequencies of Representational and Non-representational Types of Visuals among Geography Textbooks?

Concerning the occurrence of representational and nonrepresentational visuals, there is a statistically significant difference among individual geography textbooks, which was confirmed by the Pearson's chi-square test ($\chi^2 = 28.59$; $p < 0.05$). Whereas in the first and in the fourth of the analysed textbooks the ratio works in favour of representational visuals, in the second and in the third one the amount of represen-

tational visuals is exceeded by nonrepresentational visuals (Table 1).

Table 1: Frequency of types of visuals in individual geography textbooks (n = 794)

Nature of the visual	Text book 1 (%)	Text book 2 (%)	Text book 3 (%)	Text book 4 (%)
Representational	50.44	48.80	41.67	76.66
Photographs	49.56	44.76	37.50	75.28
Non-representational	49.56	51.20	58.33	23.34

Figure 1 represents the results of the analysis of proportions of photographs versus other types of visuals in the analysed geography textbooks. The ratio of photographs to other types differs significantly among the analysed geography textbooks. It ranges from 75.28 % (fourth textbook) to the 37.50 % (third textbook) in favour of photographs. However, in all of the analysed textbooks the photograph is the most frequent type of all visuals.

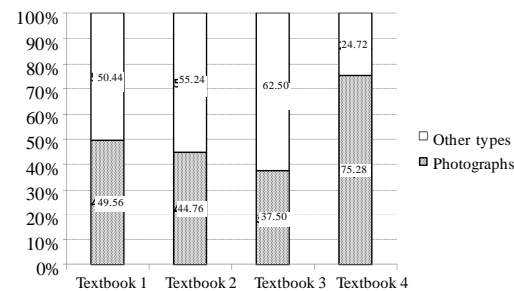


Fig. 1. Frequency of photographs versus other types of visuals in individual geography textbooks (n = 794)

What Types of Visuals for Teaching Culture do Occur in German Language Textbooks Used in Czech Lower Secondary Schools?

In the case of German language textbooks the situation is different. The most frequent type of visuals is also the photograph (71.45 % in total) in German language textbooks but the second most frequent types are drawings (12.82 %). However, the proportion of representational versus nonrepresentational visuals works convincingly in favour of the first one mentioned in German language textbooks. The distribution of representational types of visuals varies from 84.11

% (third textbook) to 95.09 % (second textbook), whilst the distribution of nonrepresentational types of visuals do not exceed 16 %.

Are There Differences in Frequencies of Representational and Non-representational Types of Visuals among German Language Textbooks?

In German language textbooks, no statistically significant difference between representational and nonrepresentational types of visuals was found out by the Pearson's Chi-square test ($\chi^2 = 7.33$; $p = 0.06$). The distribution of types in individual German language textbooks is evident in Table 2 and Figure 2.

Table 2: Frequency of types of visuals in individual German language textbooks (n = 585)

Nature of the visual	Text book 1 (%)	Text book 2 (%)	Text book 3 (%)	Text book 4 (%)
Representational	92.41	95.09	84.11	89.51
Photographs	71.72	80.39	68.69	68.55
Non-representational	7.59	4.91	15.89	10.49

Figure 2 shows the proportion of photographs versus other types of visuals in the analysed German language textbooks. The frequencies of photographs exceed 68 % in every individual textbook. The frequency of photographs (versus other types) differs only slightly among analysed textbooks. It ranges from 68.55 % (fourth textbook) to the 80.39 % (second textbook) in favour of photographs.

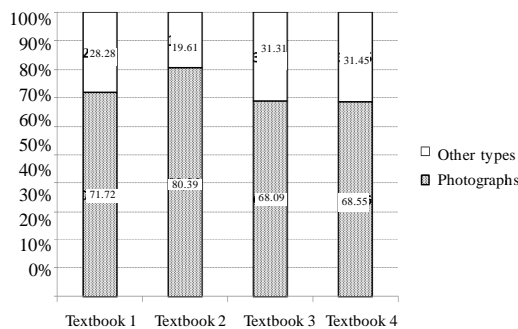


Fig. 2. Frequency of photographs versus other types of visuals in single German language textbooks (n = 585)

The comparison between the analysed textbooks shows that in the case of geography textbooks the proportion of representational versus nonrepresentational visuals varies significantly. So it is in the case of photographs and other types of visuals. Although the most frequent type of visuals is the photograph, the overall proportion works in favour of other types of visuals in the analysed geography textbooks. The exception is the fourth geography textbook in which the frequency of photographs significantly exceeds the amount of other types of visuals. In German language textbooks, the proportion of representational types of visuals predominates. This is because of a high frequency of photographs in the analysed textbooks. The frequency of photographs exceeds the frequency of all other types of visuals. In all of the analysed textbooks it does not fall under 68 %. The differences between the proportions of photographs to other types are not so distinctive in the case of German language textbooks (in comparison with the geography textbooks).

Are There Any Similarities in the Occurrence of Types of Visuals Between Geography and German Language Textbooks?

As the most frequent type of visuals which was identified both in geography and German language textbooks are photographs, the comparison of the frequencies of photographs was drawn. The Pearson's Chi-squared test showed that there is no statistically significant difference between the sample of geography and German textbooks ($\chi^2 = 2.50$; $p = 0.11$). The above described differences among analysed geography textbooks indicate that geography textbooks which are used at Czech lower secondary schools differ significantly in the manner in which they are designed to convey and explain complex and rather abstract geographical phenomena (this finding is explained further in the discussion).

DISCUSSION

The results of the presented study showed a strong prevalence of photographs compared to other types of visuals in the analysed textbooks. Similar findings have been confirmed also in other studies: for example, Alley (1994), who analysed Spanish language textbooks, Lee

(2010), who dealt with science textbooks, or in the study of Pozzer and Roth (2003), who analysed biology textbooks. However, in the presented study the findings can be interpreted differently in respect to subjects which were in focus.

In the case of geography textbooks, photographs may be perceived as a skilful didactical instrument. As Rose (2008) states, this is because they are highly capable of conveying information about the appearance of a place. This is usually because they are easily understandable and thus cognitively effective for young pupils (Purnell and Solman 1991). Nevertheless, during geography lessons pupils also learn rather abstract and complex phenomena. In this context, if photographs are treated automatically as an easily understandable didactical instrument, they needn't support pupils' elaboration of educational content in sufficient manner. Without proper instruction (for example, from the teacher) they may easily attract pupils' attention, but on the other side the elaboration of geographical subject matter will be supported only in a restricted manner. This presumption corresponds with the study of Yasar and Seremet (2007). The authors found out that although photographs prevailed in (Turkish) geography textbooks for lower secondary education, they served mainly decorative purposes and their potential to facilitate deeper elaboration of educational content was rather limited. It should be also taken into account that photographs are more likely to be preferred by young pupils, as graphs and diagrams can be more difficult to understand for them (Myers 1990). This fact is considered also by Lee (2010) who claims that high-fidelity images, such as photographs, are increasingly replacing schematic and explanatory visuals in the interest of promoting familiarization to pupils.

Concerning German textbooks, the explanation of a high frequency of photographs as representational visuals can be supported by the didactical principle of authenticity of teaching materials (Gilmore 2007). By means of photographs pupils can see the picture of reality of foreign countries which they may encounter in the future. Therefore, motivation to learn about German speaking countries plays here an important role, as well. In addition, photographs are usually easy to understand and can help comprehension of text (this is especially useful for learners with a lower level of the foreign lan-

guage). Photographs are also appropriate as stimuli of communication in the foreign language among pupils and between pupils and the teacher because photographs can elicit previous experience and knowledge of pupils and thus motivate them to speak in the foreign language. However, also other types of visuals are needed for teaching culture of German speaking (and other) countries – for example maps, which are useful for presentation of geographic topics, or pictograms (stylized visuals resembling an object or a concept from daily life), which might vary in different countries. Surprisingly, there is a low amount of maps and plans (cartographic visuals) and pictograms in the analysed sample of German textbooks, presumably due to the above mentioned advantages of photographs.

According to the Pearson's Chi-squared test it can be discussed that there is a similar tendency considering the frequency of photographs in geography and German language textbooks. However, internal differences in the occurrence of photographs within the research sample have to be mentioned. Geography textbooks showed significant differences considering the frequency of photographs compared to the other types of visuals. They also significantly differed in the frequency of representational and nonrepresentational visuals. This could be interpreted in that manner that in geography textbooks various educational approaches how to familiarize pupils with geographical content can be identified. These approaches are often conditioned by factors such as educational goals, grade, convention of the publisher, marketing etc. In contrast, German textbooks are more consistent in their distribution of photographs, which might be interpreted by aiming at the development of the (intercultural) communicative competence as one of the main goals of teaching foreign languages (see for example, Byram 1997).

Photographs are a useful visual aid in respect to both subjects discussed. However, some of their limits are to be mentioned. In general, based on former studies (Mikk 2000) it is recommended that in order to support pupils' mental processes there should be more differentiated types of visuals included in school textbooks (not only representational, but also nonrepresentational visuals like logical and cartographic visuals). Non-representational visuals have a great potential to support pupils in their mental elaboration of the phenomena. More fre-

quent distribution of nonrepresentational visuals in school textbooks thus could better facilitate pupils' transition from the level of concrete thinking to the level of more abstract understanding of educational content.

LIMITATIONS OF THE STUDY

The study aimed to provide a synthesising view on photographs from the perspective of different subjects. Nevertheless, the sample size (two subjects selected) might be considered a limit of the study as other subjects were not involved. The research sample could be also enriched by textbooks for various levels of school education (for example, primary or higher education). Useful would be to compare Czech geography and German language textbooks with their equivalents which are used in foreign countries. Further investigation could be also focused on considering other qualities that contribute to the instructional functioning of visuals (for example, educational functions, the degree of abstractness etc.). In addition, considering pupils' and teachers' points of view might contribute to the validity of the presented results. These points can be viewed as a challenge for further investigations of visuals in school textbooks and their instructional effectiveness.

CONCLUSION

Based on a synthesising approach, this study was an effort to analyse visuals as key educational means and an essential part of school textbooks. More concretely, the purpose of the study was to analyse the frequency of types of visuals in school textbooks for Czech lower secondary education. The findings of the analysis were used as a basis for the consideration about instructional effectiveness of visuals as educational instruments in geography and German as a foreign language instruction.

To meet the purpose of the study, research questions focusing on the occurrence of types of visuals in geography and German language textbooks were first formulated and answered by means of findings of a content analysis based on systems of categories and the Pearson's Chi-squared test. The results showed that both in geography and German textbooks there is a prevalence of photographs as representational visuals over other (non-representational) visuals.

However, there are slight differences of the proportion of visuals within the samples, which was interpreted according to the educational specifics of the subjects.

Subsequently, a research question dealing with similarities in the occurrence of types of visuals between geography and German language textbooks was discussed. The focus was put on photographs as the most frequent types of visuals. The Pearson's Chi-squared test showed that there is no statistically significant difference in the occurrence of photographs between the sample of geography and German textbooks.

The most important finding is that in geography and even German language textbooks the most frequent types of visuals are photographs. Despite its educational importance the finding related to the dominance of photographs was interpreted differently in respect to both subjects (geography, German language). Thus beneficial educational functions of photographs in foreign language subjects were compared to the limits of photographs as means for explaining abstract and complex processes in geography. In addition, the significance of nonrepresentational visuals having a great potential to support pupils in their mental elaboration of phenomena was discussed.

To conclude, the main contribution of the presented study is perceived in the attempt of a synthesising approach considering the educational potential of visuals from different subject perspectives because of lack of similar studies. Moreover, another contribution of the study is the categorisation of types of visuals which enables the assessment of visuals in school textbooks. With slight modifications the mentioned systems of categories could be effectively used for evaluation of textbooks also in other school subjects.

RECOMMENDATIONS

The development of the school textbook is a demanding and rather complex process. Besides, numerous factors such as the authors themselves, publishers' requirements, finances, time limits, etc. may influence "every day" functioning of the textbooks. On the basis of the presented results, implications for textbook authors and publishers as well as teachers are thus drawn:

- ♦ School textbooks should include more types of the non-representational visuals (for example, maps, schemes), which ought to be selected with respect to the organizational structure of the explanatory text. Such visuals facilitate pupils' cognitive elaboration of rather complex and abstract phenomena.
- ♦ More interrelated visuals (for example, pictorial combinations or series) should be included in school textbooks to promote pupils' understanding of the educational content.
- ♦ The visuals in textbooks should be accompanied by information which would specify displayed phenomena. The information indicating educational purpose of the visual would be beneficial, too.
- ♦ On the other hand, the amount of unclear visuals (for example, small-size photographs on the margin of the page) should be reduced in textbooks, because these may cause extraneous processing and thus hinder pupils' cognitive attention.

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NOTE

1. According to the International Standard Classification of Education this level corresponds to the ISCED 2.

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