

Visuals in Geography Textbooks: Categorization of Types and Assessment of Their Instructional Qualities

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Abstract

The article focuses on the issue of visuals in geography textbooks and their assessment. The issue is explained from the perspective of educational and cognitive psychological theory and the theory of textbooks. The general purpose of the presented research is to develop a research instrument for categorising the types of visuals in geography textbooks and for assessing their instructional qualities – their abstractness, text relatedness and caption aptness. The investigation was conducted as a content analysis of 963 visuals in five Czech lower secondary human geography textbooks. The research findings showed that in the analyzed textbooks realistic visuals predominate, photographs in particular. Evaluation of relation between the visuals and expository text proved a more or less equal representation of text related visuals and text elaborating visuals. As far as the caption aptness of visuals in geography textbooks is concerned, the most commonly represented ones are identifying captions and extensional captions. The research documented that recommendations of educational and psychological research are not sufficiently reflected in the analysed textbooks which provides opportunities for applied research into this area as well as for textbook production.

Keywords: content analysis, geography, images, instructional quality, pictures, representations of content, textbooks, visuals

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Introduction

The use of visuals as means of communication and depiction of both everyday and exceptional life situations dates back long into history (see Kress & van Leeuwen, 1990, pp. 3–4). As human communication developed, so did the use of images. Nowadays it is possible to use numerous means of expression to represent various phenomena (e.g. Schnotz, 2002, pp. 102–105). Some authors speak about a prime of *visual culture* (e.g. Dikovitskaya, 2005) as well as an *iconic turn* (LaSpina, 1998). This trend is also reflected in geography textbooks. Although the volume of images in geography textbooks grows at the expense of text (cf. Walford, 1995), visuals are predominantly perceived as add-ons rather than fully-emancipated educational tools. There is therefore a lack of serious and research-based considerations about the visual component of printed textbooks. This article focuses on visuals in textbooks and analyses their potential to enhance learners' learning. Emphasis is placed upon the categorising of the types of visuals and assessing their instructional qualities since it is considered to strongly influence the learners' cognitive interaction with educational content as well as the learning process itself. The development of a diagnostic instrument – a system of categories – is described. Further on, results of a content analysis are presented. It aimed at the analysis of visual material in current Czech lower secondary human geography textbooks in terms of its potential to facilitate pupils' learning.

Terminology

Analysing visuals in textbooks and elaborating on their use as an educational medium is however complicated due to ambiguous terminology. In theoretical as well as empirical studies, rather miscellaneous terms are used, such as *visual display* (Cook, 2006), *illustration* (Boling et al., 2004), *picture* (Peeck, 1993), *visual text* (Väisänen, 2005); *visual representation* (Elia, Gagatsis, & Demetriou, 2007).

In this paper the term *visuals* is used when describing visual materials in the textbooks (Pettersson, 1990; Newton, 2005, p. 433). Visuals are represented by simplified outer images of phenomena derived from the subject of the textbook, for example photographs, map sketches, drawings, paintings, maps, plans, graphs, schemas, tables, geometric formations, pictograms and others. In comparison with the terms mentioned above, the term visual is specific because it makes reference to difference between processing of inputs of various modalities in a human mind (Paivio, 1971). Furthermore, it contextualises the problem within methodological frame of textbook research aimed at structural elements in textbooks (e.g. Bamberger, 1992).

Theoretical Background

There are more theoretical frameworks for the analysis of the role of the visual phenomena (Ball, & Smith, 1992, p. 31). What we find significant is especially the multidisciplinary research area which combines the pedagogical and cognitive-psychological approach together with communication studies in human responses to visual representations analyses – *Research on Pictures* (e.g. Levie, 1987, 1984). Particularly the theories explaining the perception of visuals serve as an important framework for analyses of representations in visuals (e.g. Anglin, Towers, & Levie, 1996). These theories tackle the question of what the “key” characteristics are that ensure functioning of visuals in the course of learners' learning process or pursuing

educational goals (Levin, 1983, pp. 211–237). Learning from pictorial representations has been considered beneficial for learning. Readers are therefore referred to meta-analyses and review studies in particular which support this idea (Peeck, 1987; Levie 1987; Levin, Anglin, & Carney, 1987; Scheller, 2010; Lieber, 2012). Nonetheless, visuals in textbooks are only efficient as educational medium in specific circumstances (e.g. Mayer & Sims, 1994; Mayer & Gallini, 1990). It has been proven that the real contribution of visuals is often disputable in school reality contrary to generally accepted assumption that visuals facilitate learners' learning (e.g. Peeck, 1993, p. 228).

The concepts of cognitive psychology therefore serve as another basis to our approach since they clarify the processes involved in the elaboration of visuals in textbooks. One of those theories is the *Dual Coding Theory* (e.g. Paivio, 2007). It presumes the verbal and nonverbal information to be processed by different communication channels in a human mind. Verbal inputs are transformed into abstract linguistic units (logogens), while the nonverbal system works with image generators (imagens). In comparison with the verbal system, the nonverbal system is based on parallel cognitive processes which enable the whole structure of depicted reality to be captured spatially at a given moment. In terms of this “cognitive basis”, elaborate concepts, i.e. visual representations, can be generated in a human mind. Visual representations are essential for learning because they facilitate the “simplification” of scientific findings (often very complex ones) so that learners can understand them.

The effectiveness of learning from visuals does not necessarily depend on learners' cognitive abilities, moreover, the types of visuals in geography textbooks and their instructional qualities can also contribute significantly to the effectiveness of learning.

Categorization of Types and Instructional Qualities of Visuals in Geography Textbooks

Review of research on geography textbooks was summarised e.g. by Graves and Murphy (2000). This paper operationalizes the research into visuals in the textbooks by means of categorising the types of visuals and assessing their instructional qualities that are considered “crucial” in the theoretical and empirical studies mentioned above as far as enhancement of learning is concerned. These characteristics include *the type of visual* and its three “essential” qualities: (1) *abstractness*; (2) *text relatedness*; (3) *caption aptness*. This chapter presents current state of research of the observed qualities of visuals in textbooks, outlines their theoretical elaboration and illustrates the opportunities to grasp them empirically in more detail. One of the anonymous reviewers questioned the relevance of some of the presented research studies which have been conducted in other scientific domains than geography education (e.g. physics or history education). We agree with this fundamental comment; a lack of empirical studies focusing on particular characteristics of visuals in geography textbooks lead towards building a domain-general conceptual framework. Although the literature review was carried out properly, in case of some characteristics (e.g. text relatedness, caption aptness), due to the lack of more current research, we were forced to refer to relatively old literature.

The Type of visual

The type of visual can be characterised as a sum of attributes (i.e. a number of details, colours, the extent of concreteness), by means of which the visual represents a particular part of reality (Ballstaedt, 1997, p. 199). In case of geography textbooks various visuals are comprised of, for instance, photographs, pictures, maps, graphs etc. According to Tang's findings (1994), there is usually very little difference in the type of visuals used in textbooks coming from various cultural regions. Yasar and Seremet (2007) came to a similar conclusion as a result of the content analysis they performed on fifteen Turkish lower secondary geography textbooks in terms of visuals. Although the textbooks were amply illustrated, the individual types of visuals were represented rather unevenly, mostly photographs were used. Furthermore, those photographs served mostly as illustrative components to the text only instead of motivating learners to contemplate the subject matter in greater detail. Similar conclusions were drawn by Kleppe (2010) in his research on history textbooks. However, in case of foreign language textbooks photographs are not predominant (see e.g. Pešková, 2012). Visuals are arranged in textbooks so as to serve particular instructional purposes (cf. Levin, 1981). The importance of the variety of visuals is highlighted in a number of research findings since the type of the visual determines the way its content is processed by learners (Roth, Bowen, & McGinn, 1999).

Abstractness

The extent of abstractness of the visuals is characterised by the number of details it comprises as well as its structure, elaboration, composition etc. What may also be of importance is the quality of reproduction of the visual, for example its brightness or vividness (Evans, Watson, & Willows, 1987, p. 98). The presentation of educational content in the form of abstract visuals may accelerate and improve understanding of the subject matter. Abstract visuals may contribute to the formation of "more precise" mental models by means of emphasis on the substantial features of objects or phenomena (Ballstaedt, 1997). On the other hand, new information may be rendered challenging in case it is presented in the form of symbols unknown to learners or overly complex. The optimum number of abstract visuals therefore depends on the age of learners, their preferences and cognitive styles (Schnotz, 2002, p. 117). The extent of abstractness of visuals may also be important for the extent of integration of the acquired knowledge. It is documented by the results of a study by Einsiedler and Martschinke (1997). They concluded that the elaborate, however, less structured visuals which prevail in German lower-secondary textbooks (e.g. detailed photographs and drawings) do not support learners to create structured mental models. The frequency of highly elaborate as well as well-structured visuals which assist in cognitive elaboration (e.g. a timeline complemented by a realistic image) was rather low in the assessed textbooks. Mikk (2000, p. 288) has also conducted an analysis of visuals' abstractness in chemistry textbooks. Research into the extent of visuals' abstractness is rarely conducted within the area of textbook research.

Text relatedness

Text relatedness is one of the key characteristics of visuals. As results of research into this topic show, learners acquire knowledge better if it is presented by means of various communication codes (e.g. Paivio, 1971; Mayer, 1997). However, the information

should correspond with the various codes it is presented through. In other words, one code should not depict information completely different from another code. A textbook presents its content to learners by means of verbal and visual codes. It is therefore important that the information in the text corresponds at least partly with the information comprised in the visuals and vice versa. Levin and Mayer (1993) assess text relatedness of visuals and the expository text in textbooks in terms of educational functions fulfilled by visuals. Analogical, mnemonic, representing and organising visuals are considered to correspond with the text and therefore to enhance the process of learning while, for example, decorative visuals only relate to the content of the text partially. According to the authors, visuals may not influence the acquisition of the subject matter positively in case learners don't see the visual as text related or they do not understand its instructional purpose. Nevertheless, what is more important than the opinion of researchers or textbook authors according to the text relatedness is the way the relatedness of visuals to the expository text is perceived by learners themselves (or their teachers).

Caption aptness

A caption can be perceived as a link between a visual and the expository text in the textbook. It is an essential connection between the visual and textual components of the textbook. It can outline the context and as such facilitate the interpretation and understanding of the content (Ballstaedt, 1997, p. 247). A caption complementing a visual may also direct the learner's attention to crucial aspects; therefore there is smaller possibility for the learner to overlook relevant information (Peeck, 1993, p. 230). Nonetheless, these benefits only come in case the caption provides some supplementary information in addition. In this perspective a content analysis of primary and lower secondary physics textbooks conducted by Woodward (1993) proves to be interesting. Its results show that the assessed textbooks comprised mainly identifying captions and captions paraphrasing the expository text. On the other hand, captions providing supplementary information related to the visuals were few and far between.

Methodology

The methodology of our study is presented below with regard to the theoretical background and current state of knowledge. The aim of the study and sampling will be delineated as well as the methodical procedure. Our research instrument will be introduced – a system of categories for categorising and for assessing the particular instructional qualities of visuals in geography textbooks.

The Aim of the study

It is the primary aim of the study to determine what types of visuals are presented in current Czech lower secondary human geography textbooks and what instructional qualities these visuals possess. Based on the aim of the study, two research questions were formulated:

1. What types of visuals occur in current Czech lower secondary human geography textbooks?

2. What instructional qualities are possessed by the visuals in current Czech lower secondary human geography textbooks?

Research sample

Research sample consisted of five Czech lower secondary human geography textbooks (for learners between 10–14 of age³), where 963 visuals altogether were analysed. The sample comprises all human geography textbooks currently used in the Czech Republic: Marada et al. (2008), Voženilek et al. (2003), Chalupa et al. (2003), Valenta et al. (2004), Mirvald & Štulc (2001). Some of the textbooks analysed may not seem to be up-to-date. However, this is because the lifetime of the textbooks is more than five years at Czech lower secondary schools. Then new editions of textbooks are usually produced (sometimes just with minor changes). It is also common practice in the Czech Republic that older pupils pass their textbooks on younger ones, when they progress to the higher school year.

In our study the human geography textbooks were analysed. This was because pupils usually have some difficulties when contemplating about human geography. Of our interest therefore was the manner, in which the school geography textbooks are enriched with visuals, to facilitate pupils' exploration of the human geographical phenomena, which may be of rather complex and abstract nature. More specifically, we used the same research sample as in our previous studies that focused on investigating different aspects of Czech lower secondary human geography textbooks (cf. Knecht, 2008).

Research instrument

The study was conceived as a deductive qualitative content analysis (for particular steps see Gläser-Zikuda, 2008, p. 72). A system of categories developed by Janko (2013) was utilised as a research instrument. This category system consists of items aimed to categorise the types of visuals in geography textbooks and to assess their abstractness, text relatedness and caption aptness. The system of categories is presented in the tables 1–4.⁴

The following categories were included into the system of categories for the assessment of the types of visuals (Tab. 1).

Table 1.

System for the categorising of the types of visuals

Category	Item
Cartographic	T1.1 Map
	T1.2 Map draft
	T1.3 Plan
Cartographical-statistic	T2.1 Cartogram
	T2.2 Cartodiagram

³ The learners of the age of 10–14 were selected because in the Czech lower secondary education it is in this level that the human geography subject matter is taught.

⁴ The system of categories was created as one entity. However, in this study it is divided into four partial (yet still interrelated) tables for reasons of clarity.

Statistical-graphic	T3.1	Graph
Tabular	T4.1	Table
Pictorial	T5.1	Photograph
	T5.2	Drawing/painting
	T5.3	Fine art reproduction
Schematic	T6.1	Geographical cross-section
	T6.2	Scheme
Others	T7.1	Cartographical sign
	T7.2	Logo
	T7.3	Other sign, mark
Combined	T8.1	Pictorial combination
	T8.2	Pictorial series

Abstractness of the visuals was assessed through the following categories (Tab. 2).

Table 2.

System of categories for assessment of abstractness of visuals

Quality	Description
R1 Realistic	Visuals (pictures and photographs), where objects and phenomena are depicted as what they look like in reality, including all the details.
R2 Partially realistic	Visuals (pictures and drawings) close to reality. Crucial (characteristic) features are depicted while minor ones are omitted.
R3 Unrealistic (Abstract)	Abstract visuals depicting objects or phenomena by conventional means of specific graphic characters or systems of characters.

The following categories were added to the system in order to assess the text relatedness of the visuals and the expository text (Tab. 3).

Table 3.

System of categories for assessment of text relatedness of visuals

Quality	Description
S1 Unclear text relatedness	There is no clear relation to the text content. Objects, phenomena and situations depicted are not described in the text.
S2 Text related	Examples of objects, phenomena and situations (or their segments) generally referred to in the

	text are depicted. Content of the text is paraphrased. Even if it were supplemented by an analogous visual, the context of the presented information would not be distorted.
S3 Text elaborating	Further information on objects, phenomena and situations directly referred to in the text is presented. Elaborates on the information, therefore increases its informative value and extends the text.

The caption aptness of the visuals was assessed through evaluative categories presented below (Tab. 4).

Table 4.

System of categories for the assessment of caption aptness of the visuals

Quality	Description
None	There is no caption.
Identifying	Identifies the object depicted by the visual.
Paraphrasing	Repeats or paraphrases at least a part of the main text.
Extensional	Includes further information on the depicted object that has not been presented in the main text. The object, phenomenon or situation depicted by the visual is typically described in detail. It might consist of several sentences.
Activating	Caption as a question or a task aimed at the reader.
Combined	Caption combining characteristics of more than one category.

In order for the system of categories to be reliable, it was necessary to test it in terms of inter-rater reliability. To estimate the degree of consensus between two raters, *Cohen's kappa* (κ) was calculated in SPSS (version 18). Levels of *direct agreement* (%) were also calculated for more accuracy (Tab. 5). Conventionally, a Kappa of <0.2 is considered poor agreement, 0.21–0.4 fair, 0.41–0.6 moderate, 0.61–0.8 strong, and more than 0.8 nearly complete agreement (cf. Gwet, 2008).

Table 5.

Results of the assessment of the system of categories in terms of inter-rater reliability

Indicator	Type of visual	Instructional qualities		
		Abstractness	Text relatedness	Caption aptness
Cohen's Kappa (κ)	0.59	0.80	0.37	0.79
Direct agreement (%)	70.6	86.5	55.1	85.4

In general, it can be concluded that the system of categories we developed meets the standard requirements for inter-rater reliability, with the exception of the *text relatedness* category which only reached low levels of *Cohen's Kappa* (κ) (Tab. 5). Reaching an acceptable level of agreement proved to be rather difficult in case of this category even after adjustments to the system were made in the form of reduction and particularization of its definitions. Low level of Cohen's Kappa – i.e. low level of inter-rater agreement – may have been caused by the fact that the *text relatedness* of the visual is a specific quality whose assessment can be burdened with higher degree of subjectivity.

Procedure

The research was conducted in the form of descriptive study. The aim of a first phase was to analyse current state of scientific knowledge and solutions to the issue. The purpose of the review of relevant theoretical and empirical studies was to identify theoretically sound criteria for the assessment of qualities of visuals in textbooks. In the second phase those criteria were elaborated on and transformed into categories. This comprised several consequential steps, which have been built on current state of scientific knowledge as well as on experts' opinions. This ensured the validity of the research instrument. The system of categories was subsequently tested in terms of reliability (see Table 5) and revised. The revisions were accompanied by systematic critical reflection of description of each category in relation to the theoretical basis. The following third phase of the research concentrated on content analysis. In this phase each of the assessed visuals was assigned to a relevant category. Procedures of data collection and statistical analysis were carried out by trained researchers – the authors of the study – who were equipped with a coding manual. MS Excel 2007 and Statistica (version 8) were used for statistical processing and evaluation of the data.

Findings

This part of the paper presents the results of the content analysis focused on the categorising of the types and assessing particular instructional qualities of visuals in Czech lower secondary human geography textbooks. The results of the analysis reflect the full research sample, i.e. 5 human geography textbooks where 963 visuals were assessed. Each of those visuals was categorised according to the type (Fig. 1), and assessed in terms of abstractness (Fig. 2), text relatedness (Fig. 3), and caption aptness (Fig. 4).

Categorising the types of visuals

The results of the assessment of the types of visuals indicate that a *photograph* is the most frequently used one (58.4%) in the analysed textbooks. In comparison with photographs, other types of visuals appear considerably less frequently in the textbooks. A *table* which makes up 9.1% of the total number of visuals assessed in this study is the second most frequent type. The third most frequent type of visuals is the *map draft*

(8.1%). It is interesting to note that such visuals as *a map*⁵ (0.1%), *a plan* (0.4%) or *a geographical cross-section* (0.5%) are rather scarce in Czech human geography textbooks. The following graph (Fig. 1.) provides for more detailed representation of the results of the assessment of the types of visuals in Czech human geography textbooks.

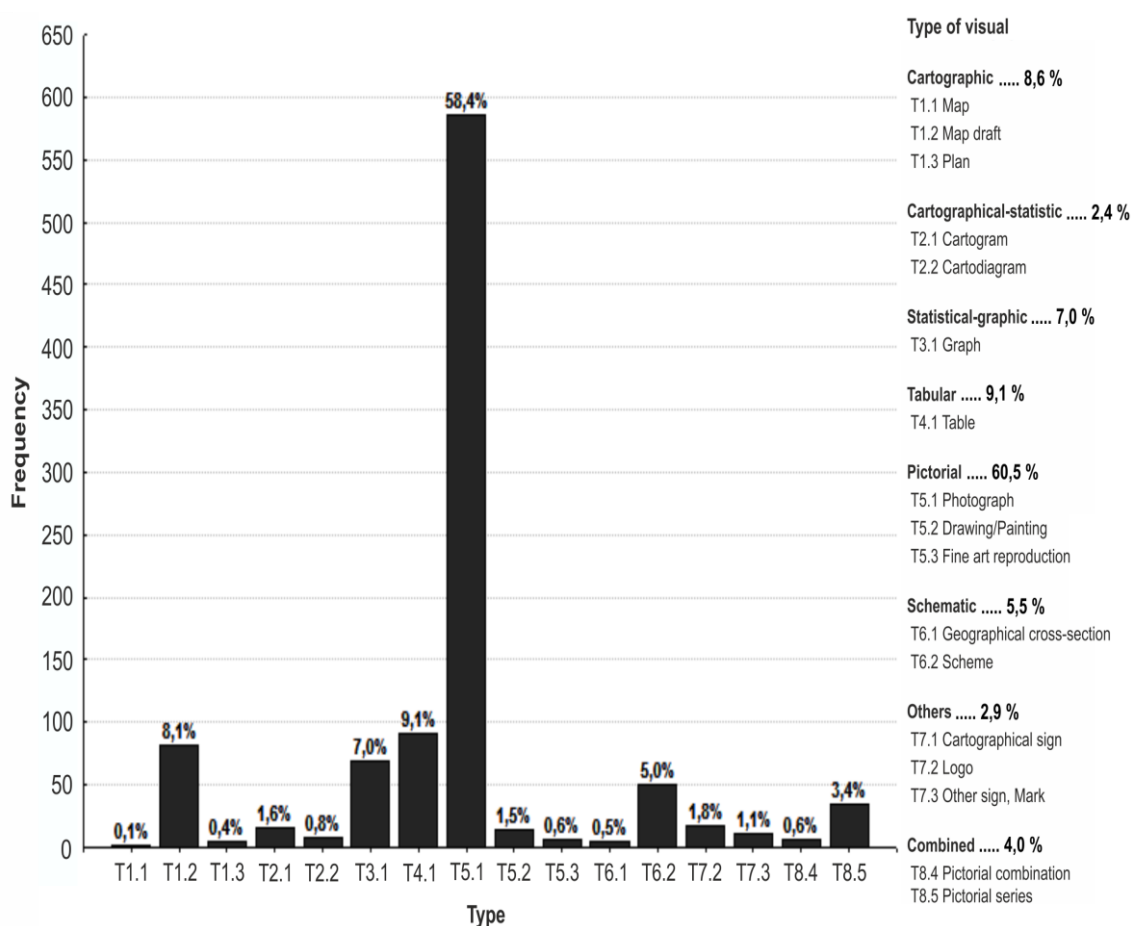


Figure 1.

Overall score of the types of visuals in geography textbooks (n = 963).

Generally, it can be concluded that pictorial types of visuals are predominant means of conveying what is taught in geography textbooks (60.5%) (see Fig. 1.). The dominant position of a photograph was also confirmed in the comparison of analyses amongst the individual textbooks (see Janko, 2013). Even though the frequency of photographs used in particular textbooks differs, their prevalence is always about 50%. On the other hand, cartographical-statistic types of visuals such as cartograms are generally less used in geography textbooks (2.4% altogether). It can be concluded that the representation of visuals which can be characterised as specific for geography education (e.g. tables, graphs, map drafts etc.), is considerably less frequent in comparison to photographs. It also differs considerably among individual textbooks.

⁵ By a *map* a real cartographic work is meant – reduced and adjusted image of land surface rendered into a plane with all its particulars; or its cutout, while a *map draft* represents a generalised cartographic work emphasising key objects, phenomena or situations on a map base.

Assessment of the abstractness of visuals

The results of the assessment of visuals in terms of their abstractness document that *realistic visuals* (photographs, realistic drawings etc.) prevail significantly in the human geography textbooks while the prevalence of *unrealistic* (i.e. abstract) *visuals* (graphs, schemes etc.) is approximately one third (Fig. 2.). The prevalence of *partially realistic visuals* (e.g. line drawings) can be described as low (2%) in the analysed textbooks. The findings arising from the assessment of visuals' abstractness also correspond to some extent with the conclusions drawn from the assessment of the types of visuals in the textbooks (see above).

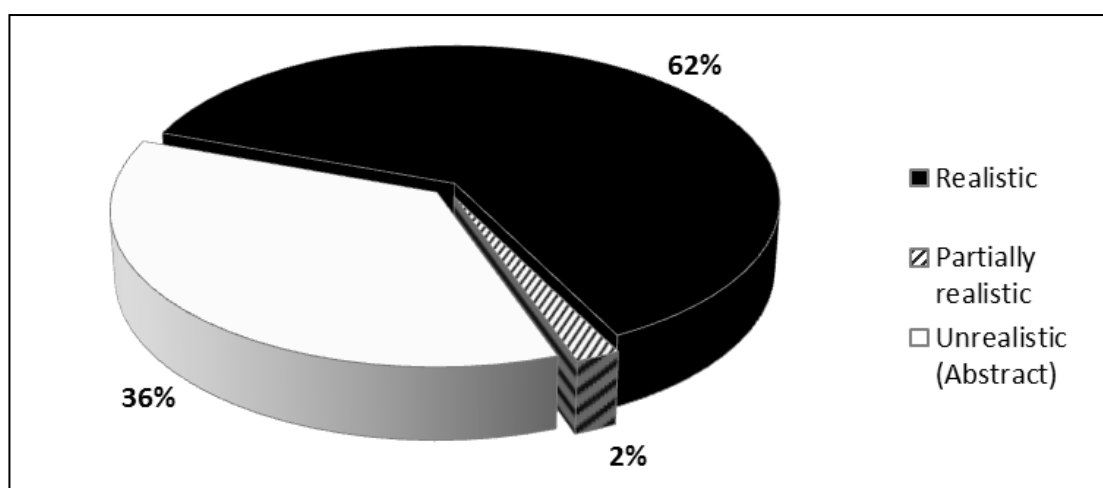


Figure 2.

Overall representation of visuals according to their abstractness in the analysed geography textbooks (n = 963).

As our graph (Fig. 2.) shows, realistic visuals prevail in the analysed human geography textbooks. Those are the items that represent the contents of the geography textbooks to learners in detailed but at the same time less structured way (cf. Einsiedler & Martschinke, 1997, p. 125).

Assessment of text relatedness of visuals to the expository text

As was mentioned earlier, visuals do not affect the understanding of the expository text if the students do not see visuals as text related. The assessment of the extent of relatedness of the visuals and the expository text documented that there is approximately equal prevalence of *text related* visuals (46%) and visuals that *elaborate* on the text (45%) in the analysed textbooks (Fig. 3.). Both those types of visuals mentioned above can facilitate learners' understanding, for instance by means of paraphrasing the expository text (text related visuals) or offering additional information (text elaborating visuals). On a less positive note, the textbooks contain considerable number of visuals with no direct correspondence to the expository text (9%).

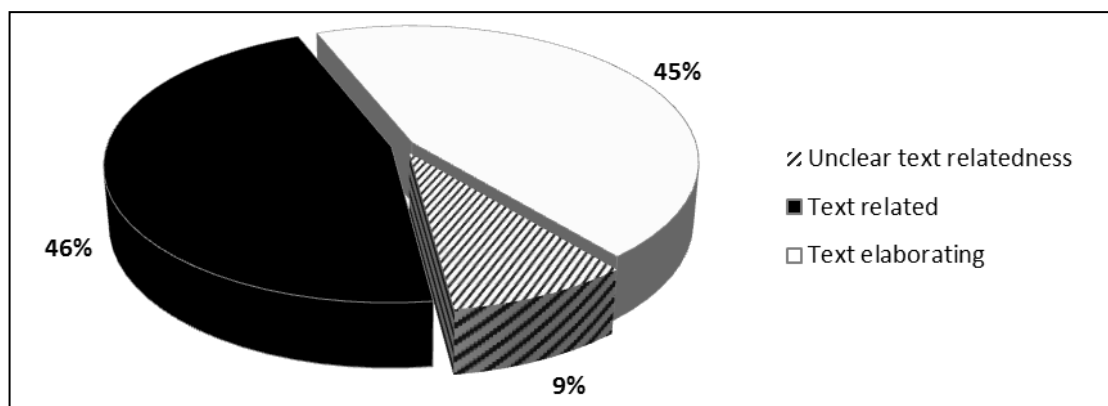


Figure 3.

Overall representation of visuals according to their text relatedness in the analysed geography textbooks ($n = 963$).

Assessment of the caption aptness of visuals

As far as the assessment of the caption aptness of the visuals is concerned (Fig. 4), it was documented that *identifying captions* are most prevalent in the analysed human geography textbooks (48%). The second most frequent type of caption is the *extensional caption* (28%). Other types of captions are represented considerably less in the analysed textbooks – *paraphrasing caption* (7%) and *combined caption* (7%). The results serve as a basis for other facts substantial in the didactic context. They show, for example, that visuals are scarcely complemented by *activating captions* – i.e. captions in the form of a task or an exercise (1%). Another serious finding is that there are numerous visuals (9%) complemented by *no captions whatsoever*. The absence of a caption may be of crucial importance for learners in order to obtain the required information from the visual and utilise it subsequently, for instance to reach the educational goal.

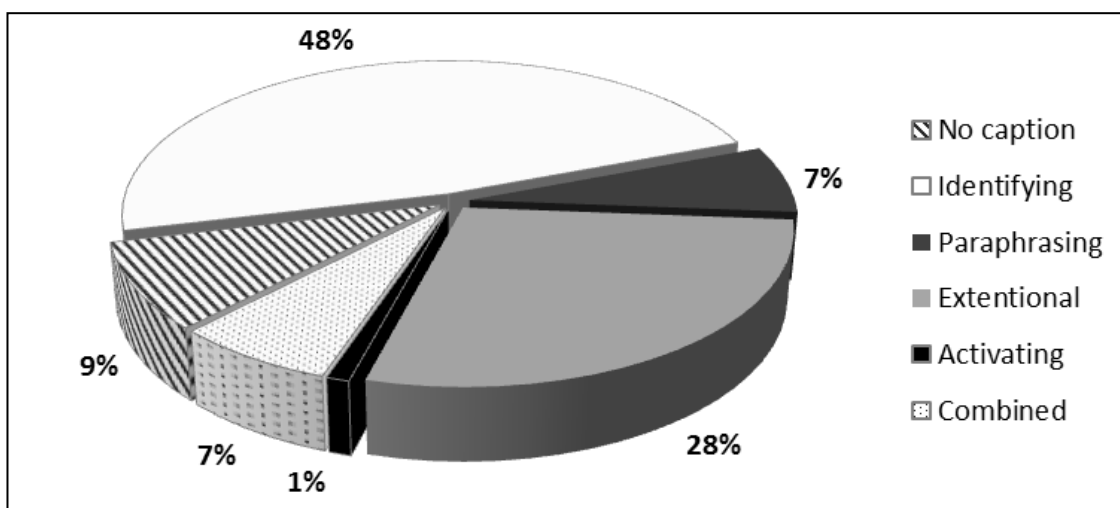


Figure 4.

Overall representation of visuals according to the caption aptness in the analysed geography textbooks ($n = 963$).

An additional consequential conclusion drawn from our analysis is that the analysed geography textbooks differ significantly in terms of representation of visuals

characterised by various instructional quality. There is a difference in the way particular geography textbooks are equipped to facilitate the learning process for learners. More detailed results of the presented research, e.g. about the distribution concerning the five textbooks, have been published elsewhere (see Janko, 2013).

Discussion and Educational Implications

Particular types of visuals are processed cognitively in different ways (e.g. Schnotz, 2002) therefore certain types of cognition related to various educational goals of different school subjects can be sustained. For these reasons abstract visuals such as map drafts, graphs or cartodiagrams may be regarded as specific for geography (cf. Stonjek, 1997; McDermott, 1969). From this perspective it is rather unanticipated that the most used visual to facilitate learning in current Czech geography textbooks is a photograph (58.4%). Dominant representation of photographs in geography textbooks is drawn attention to in studies previously conducted in other countries (e.g. Yasar & Seremet, 2007). The fact that photographs are also a dominant type of visuals in the textbooks in subjects other than geography was verified in several studies such as in Tang (1994), Kleppe (2010) etc. In this context, readers' attention should be drawn to Marschinke's research (1997). Based on the experiment conducted on a sample of 231 learners she concluded that excessive complexity and detail of a photograph distracts learners' attention and prevents them from concentrating on essential facts. Similarly, Coulter, Coulter and Glover (1984) also draw a conclusion from the results of a comparable research stating that increased literalism of visuals does not result in better acquisition of the facts presented in the text even if such complex realistic depictions are complemented by related captions. It is disputable whether the majority share of photographs in the visual component of textbooks has a positive impact on pupils' learning, especially when and if they only fulfil a decorative or representative function.

Our results show that text related visuals and text elaborating visuals are represented more or less equally in Czech geography textbooks. These findings prove to be more favourable than those of the research by Woodward (1993) and Mikk (2000, pp. 290–292). Their studies came to a conclusion that content related visuals, i.e. visuals related to the text however not elaborating on it, are distinctively dominant.

Visuals present in the geography textbooks analysed in our study are mostly complemented by identifying captions. Nonetheless, their contribution to the learning process is limited. On a positive note, the second most frequent type of caption in the analysed textbooks is the extensional caption. A study aimed at the analysis of visuals' captions and their aptness was also conducted by Woodward (1993, pp. 126–127), however, his results showed minimum representation of extensional captions in the textbooks.

The question remains, however, to what extent the recommendations stemming from educational and psychological research may be followed by textbook publishers as well as by teachers considering the fact that the development of teaching materials is influenced by numerous other factors such as the authors themselves, publishers' requirements, finances, time limits, etc. Not only does visual material in textbooks serve as a tool enhancing learning, but it also strongly influences teachers' and pupils'

evaluation of textbooks (Knecht & Najvarová, 2009), which is a fact closely observed by publishers.

On the basis of our results, we would like to draw implications for researchers, textbook authors and publishers as well as teachers:

- (Czech) geography textbooks should include more abstract types of visuals (e.g. maps, geographical cross-sections), 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 geographical phenomena.
- The amount of visuals that show unclear text relatedness should be reduced in (Czech) geography textbooks, because these may cause extraneous processing and thus hinder pupils' cognitive attention. On the contrary, the amount of visuals that elaborate explanatory text should be increased.
- Visuals in (Czech) geography textbooks should be accompanied by captions which create strong text-visual link and thus allow for stimulating pupils' cognitive elaboration of the educational content more frequently – especially by extensional and activating captions.

Conclusion

This paper was focused on visuals in current Czech lower secondary human geography textbooks in terms of its potential to facilitate pupils' learning. For this reason a system of categories was developed in order to categorise the types of visuals in geography textbooks and to assess their particular qualities – their abstractness, text relatedness and caption aptness (see Janko, 2013).

The system of categories was utilised as a research instrument for the analysis of 963 visuals in five Czech human geography textbooks. The research findings showed that realistic visuals, mainly photographs (58.4%), predominate in the analyzed textbooks. Abstract visuals (graphs, schemes etc.) represent approximately one third of the total number. The assessment of visuals' relatedness to the expository text showed that the analysed textbooks only contain 45% of text elaborating visuals. As far as the caption aptness is concerned, less than one third (28%) of captions for the visuals in the textbooks extend beyond the presented educational content.

The results of our study lead to a conclusion that recommendations stemming from educational and psychological research focused on the qualities of visuals in textbooks are neglected considerably. The deficits detected in the textbooks provide opportunities for applied research into this area as well as for textbook production.

The content analysis does not enable us to grasp the issue of visuals in textbooks to a greater extent. However, from the results of this study further research questions arise. The focus of textbook research has recently expanded from product-oriented research (e.g. content analyses) to process-oriented research investigating e.g. the use of textbooks by students and teachers, or teacher and pupil perspectives on textbooks (cf. Niehaus et al., 2011; Sikorova, 2011). Therefore our future intent is to utilise different methods (observation, interview, projective techniques) to conduct research into the

relation of visuals' occurrence to various educational situations in geography classwork as well as the ways learners interact with visuals in geography classes.

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