

Redundancy in the verbal communication of teachers in primary education

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Abstract

On a theoretical level with the support of literature, we offer some definitions of the concept of redundancy, point to the similarities and differences in the perception of this phenomenon in technical, social and pedagogical communication. We point out the positive and negative aspects of redundancy in the teacher's language. The research part is aimed at mapping the presence of redundancy in the language of primary education teachers. We were interested in which grade in the subject of mathematics is redundancy the most represented and whether it may be considered positive or unnecessary. The research was conducted at five primary schools on a sample of twenty teachers. The method of the research was the direct observation of lessons. The accuracy of the observation was ensured by audio recording and its analysis. We have found that redundancy is most often present in the third grade.

Key words: communication, verbal communication, redundancy, forms of redundancy, primary education

1 Redundancy in the process of information transfer

The word redundancy comes from the Latin word *redundare* (compete, increase) and means information surplus, for example, more information than necessary (Bakos, 2002). A short dictionary of defines redundancy as superfluity. It means overcoming the normal or necessary degree of something. Redundancy is such a state or property where a greater number of elements are used than is usual or necessary. Labelling can be used in the negative sense of the word as unnecessary or superfluous, even in the positive sense of the word as a sign of multiple uses for greater system stability and clarity. It is mainly used in connection with information. Redundant information is information that contains more space, resources than it is necessary. The advantage of redundant information is that even if part of the information is damaged, it is possible to reconstruct its original form (Grüner, Georg, & Kahl, 1974). The word redundancy has its meaning in several scientific fields.

For example, in technology, informatics, robotics, mechanics, redundancy is a useful technique for security systems. Redundancy is the duplication of certain critical parts of the system (technology, management process, etc.) to increase the reliability of the whole system (Ali & Hardie, 2017; Doan & Lin, 2017).

The term redundancy is also used in literature, especially in the perception and interpretation of the literary text. In this context, according to Šenkár (2016), it is very important to return to the strands that conceal the nucleus of a nation, from which individual consciousness grew, formed feelings and influenced (cultural) actions. This problem also corresponds with the need to develop the pupils' evaluative thinking, which is often forgotten in practice (Pisoňová, 2014). Redundancy in a literary work appears in the repetition of characteristic, thematic and linguistic-stylistic components in the literary work. From the recipient's point of view, redundancy in the text may be desirable or unnecessary. It usually performs an important function if the message within literary communication goes through a channel that contains a lot of noise (Žilka, 1984). Sometimes there is an excess of redundancy in the text, which may also have an aesthetic function. It occurs in texts that are more focused on shape, form, e.g. in abstract poetry or calligram. It is because a substantial part of the expressive tools of the artistic text (verse, rhythm, metric, rhyme, refrain, composition) is based on repetitions. There is repetition of information everywhere, even if it does not bring anything new from the point of view of the topic, it does not act superfluously, but on the contrary, it increases the recipient's information (for example, in teenage culture, within the archetypical association to ancient rituals of natural nations, techno-party performances are typical, where the participants get into the state of cathartic ecstasy by the constant, in terms of "novelty information" the most redundant, repetition of simple movement, rhythm or melodic figures) (Plesník & Mikuláš, 2012). In literature, redundancy is also the base of the stylistic figure pleonasmus (from Greek pleonasmos, surplus), which means emphasizing some fact or motif by repeating words of the same or close meaning. Normally this is the accumulation of synonyms, with the function of strengthening an image or poetic testimony.

The concept of redundancy also appears in visual arts, specifically by the law of negative redundancy in the self-expression of children's drawing. This law expresses that children's drawing does not develop towards the realistic representation of reality. The child just needs a simplified or hintful display of factual reality. The child draws on his/her memories which s/he does not fully use, because his/her drawing is economical. S/he reduces plenty of details in the drawing to the most important. At the same time, s/he preserves and emphasizes certain details based on his/her own logic and interest. The child uses simplified artistic symbolism (ŠPÚ, 2015).

Róka has an interesting understanding and explanation of redundancy in social communication (Róka, 2002): redundancy is what is conventional and predetermined in the message. Which means that he does not understand redundancy only as a repetition of words and information, but also as the use of certain template expressions and conventional forms of behavior in social communication, as redundancy is the result of a high degree of predictability. Such a manifestation of a high degree of redundancy can be, when we say 'Bless you!' if someone sneezes.

In social communication, we often use words and statements that are not the carriers of new information, they are repeated in statements. It is not even rare that a message, information or word is repeated to amplify the effect or its synonyms are used for better understanding. Redundancy is not an expressive means of purely verbal communication; it is also a non-verbal form. Its manifestations are the most typical in pedagogical communication and are implemented via the use of illustrating teaching aids. For a better understanding of verbal information, the teacher often uses visual material to visualize the content of verbal information, but also repeats what s/he has said verbally, for example, with pictures. There are situations in which visual perception does not need to be multiplied by verbal expression. This is particularly the case for codified manifestations and expressions used in communication. For example, the red traffic light for each traffic participant means the same information, it is not necessary for this colour information to be supplemented with the word 'stop'.

It can be concluded that during the transmission of information through information channels there are often certain disorders, which are caused by various factors, such as incorrect speech pronunciation, print errors, inattention of listeners, etc. These disorders are collectively referred to as noise. If only the economic point of view and no redundancy were observed in the language, even at the slightest disturbance in the transmission channel, the information would be impaired to such an extent that it would become incomprehensible (Kraviarová, 2012).

2 Empirical investigations of redundancy

In this section, with the examples of six studies, we will point out the possibilities of expressing the quantitative characteristics applied in linguistics, social and pedagogical communication. The main focus of research in the field of linguistics, which focuses on the research of artistic texts, is the frequency analysis of the elements, but their temporal succession is also studied (Štefánik, Rusko, Považanec, 1999). In these studies, information is based on theory, which mainly uses analytical and probabilistic methods. Basic theories of information theory include entropy. The calculation of entropy or redundancy can be applied to any

phenomenon that uses its probability of occurrence. The effect of entropy on the system, for example on a literary work, can be observed by a change in its value, while lower entropy points to a tendency to system stability, higher entropy value points to the looseness of relationships between the elements of the system, to a certain degree of system misconduct (Kraviarová, 2012; Král & Sabol, 1989).

Published statistical results mostly capture the situation in written communication. In literature, for example, it is possible to examine the occurrence of vowels and consonants in prose, poems and scholarly texts. Research has confirmed that:

- there are less vowels in poetry than in prose or in scholarly texts (Štefánik, Rusko, Považanec, 1999);
- the number of vowels (Kraviarová, 2012) as well as the length of syllables in words (Štefánik, Rusko, Považanec, 1999) rises from bound verse through free verse to prose, which is given by the low redundancy value that increases from poetry to prose (Štefánik, Rusko, Považanec, 1999).

However, there are also studies aimed at analysing verbal/oral expression. From this area of research, we were most attracted by the research that focused characterising the prototype of the vocabulary of the mother's speech oriented at the child at the early stage of his/her development (Brestovičová, 2011). The language of three mothers speaking to infants was analysed during eight hours during the day. From the mother-to-child speech, a frequency dictionary was created, in which words were sorted according to word types (Brestovičová, 2011). The first twenty most frequently occurring words were analysed:

- the highest communication load was received by lexemes "yes" and "good",
- the order and communication load of the first five words (be, go, give, have, want) is almost identical in all three mother frequency dictionaries,
- the first most frequented substantive used was the child's name, and the second most common was "mum".

Adult speech in communication with a child of pre-school age is characterized by a specific simplified register with high redundancy and enhanced expressive component (Brestovičová & Striešková, 2015). In the case of a comparative study of the mother and her child's speech (Brestovičová & Striešková, 2015), quantitative and qualitative parallels were also revealed in the adjective vocabulary of the mother and her child, such as consensus in adjectives, the prevalence of quality adjectives naming the colour and size, and identical prototype lexemes.

From the pedagogical communication environment, we have been inspired by two researches. Lyddon (Lyddon, 2011) examines college students learning

foreign (French) language and investigates how teachers react to students' mistakes. He examines which form of correction (the teacher's response to the students' errors) is the most effective. He comes to the conclusion that it is not true that we learn from our own mistakes. He disagrees with the need to correct all the mistakes of the student. He believes that there is no need to point out students' mistakes by redundancy. He argues that students learn much more effectively through interactive verbal communication in which they practice different grammatical phenomena rather than by formalizing grammatical rules or constantly highlighting and thoroughly correcting students' mistakes. In the teaching of foreign languages, Petrová and Kozárová (Petrová & Kozárová, 2016) highlight the work with a map of expressions, which allows a different – innovative approach in the teaching of foreign languages as well, when structuring terms used by the student is put in the foreground. Knowing each person is based on a firm semantic network that connects various terms into bushy mental concepts. These concepts are created by linking individual terms (a term represents an idea of its contents) that can already be found in the semantic network with new terms. Karp (1972) attempts to create a numerical model of communication in the classroom. Depending on variables such as student IQ, time devoted to learning, ineffective lesson time, teacher's length of practice, redundancy rates, he determines the optimal model of class communication. He states that the level of understanding the subject is determined by the length of the teacher's practice and the IQ of the pupil.

3 Redundancy in teacher-pupil interaction

In this chapter we will focus on communication between teachers and pupils, so we will focus on pedagogical communication. Obdržálek (2000) understands pedagogical communication as an exchange of information between the teacher and the pupils the aim of which is the formation of pupils' personality. In the education process, it is necessary to pay attention not only to cognitive information but also to affective information, which represent the emotional aspect of a human being. The signal essence of non-verbal information is often unrecognized in teaching (Pokrivčáková, 2005). It appears in the form of looks, mimics, gestures, etc. An important role in non-verbal communications is played by representations and symbolic images, which may also have the nature of redundancy. We talk about redundancy if more signs are used in communication than needed to express the idea. In human communication, redundancy is sometimes useful because it provides better the understanding and remembering of some information. Pupils do not understand brief explanation easily. It is advisable for the teacher to develop the information and repeat it in a paraphrased form. However, too much redundancy in teaching is harmful. The teacher talks a

lot, but s/he says little about the content. This way of communication makes pupils tired and demotivated (Tomková, 2010). In connection with redundancy in pedagogical communication, Szőköl (2016) emphasizes its importance especially in the positive reinforcement of the pupil's personality. Puskás points out that redundancy is especially important when teaching young learners (Puskás, 2016). She even claims that the proper usage of redundancy can contribute to the improvement of the creativity, the creative thinking of primary school learners (Puskás, 2017).

3.1 Research aim

The aim of the research was to find out the extent of redundancy in the teacher's communication. We examined its occurrence, extent and frequency.

3.2 Research questions

- Is the level of redundancy in the teacher's speech caused by an effort to make the information more understandable?
- In which grade is the level of redundancy the highest in the subject of mathematics?

3.3 Research sample, methods and methodology

The research sample consisted of 20 teachers in five primary schools in Slovakia. The method of the research was the direct observation of lessons. The accuracy of observation was ensured by audio recording and its analysis. Our goal was to characterize the degree and purpose of redundancy in the teacher's speech through qualitative analysis. In quantitative terms, it was a set of 4x5x45 minutes. Research material originates in 2014 (Hívešová, 2014) and was obtained by the transcription of audio-visual recordings on DVDs, implemented on mathematics lessons in each grade of five primary schools. Transcription is done by verbal description and it also records the descriptions of situations and activities. All words, sentences, but also the signs of non-verbal communication that appeared in the 45 minute record as the teacher's communication towards the pupils, were decisive for us from a qualitative aspect. We formulated 13 categories of redundancy occurrence. Each time the occurrence of redundancy was observed, it was added to the given category.

3.4 Research results

In the research results, we present the three most frequent categories of redundancy in the teachers' language in each grade. We will also give an example to each. The frequency of redundancy in each of the monitored categories was recorded in a table for each grade.

The rate of redundancy occurrence in the teacher's manifestation in the first grades can be found in Table 1.

Table 1: The rate of redundancy occurrence in the teacher's manifestation in the first grades

	PS 1	PS 2	PS 3	PS 4	PS 5	average
Repetition of words, expressions when giving instructions at doing tasks	5	5	6	8	9	6.6
Repetition of words, expressions when explaining new study material/mediating new information	8	8	7	8	7	7.6
Repetition of words, expressions when fixing study material	8	7	7	8	7	7.4
As a complement to verbal expression/visual aid during the fixation of study material	4	4	2	1	1	2.4
As a complement to verbal expression/visual aid when explaining new study material/mediating new information	8	7	14	12	4	9
As a complement to verbal expression/visual aid when giving instructions at doing tasks	8	7	5	7	5	6.4
As the form of positive pupil assessment	5	4	1	2	3	3
As the form of negative pupil assessment	2	1	1	1	0	1
Reformulated question	9	15	8	14	10	11.2
Reformulated sentence	15	18	12	14	5	12.8
Repeated question	2	2	2	1	1	1.6
Repeated sentence	1	0	1	0	2	0.8
Unnecessary redundancy	0	0	0	0	0	0
Average						5.36

In the first grade, redundancy occurs most often in the form of a reformulated sentence. Here is an example of such a redundancy category.

T: "Count the number of pictures and write the correct number below each. So let us count what is in the picture. We can see 13 peas and 5 carrots. Below the pictures write the numbers we have calculated. So you will write number 13 under the peas and write number 5 below the carrots."

The second most frequent redundancy category in the first grade is reformulated question.

T: "Write the correct missing number in the blank space on the numerical axis. Can you see in the picture, that there are some missing numbers in the ruler? So there is a missing number after 3, which is followed by number 5. Which number is the missing one between number 3 and number 5?"

The third most frequent redundancy category is when explaining new study material/mediating new information the teacher uses a teaching aid for the purpose of emphasis. They were mostly cards with numbers, multiplicities and signs of inequality.

Redundancy, as an example of positive student assessment, appeared in teacher communication in the first grade three times on average. Here is an example of such a statement.

T: What number is immediately ahead of number 5, Karol?

K: Four.

T: Four, right Karol.

For interest, we will mention a teacher's statement, in which we noted two categories of redundancy. It is reformulated sentence and redundancy indicating the negative assessment of the pupil.

T: I will write several numbers on the board. Write down these numbers into your exercise books. Everyone is writing down these numbers from the board. Evička is also writing down these numbers from the board into her exercise book, isn't she?

In the first grade, we did not notice the case of unnecessary redundancy, which would be caused by the teacher's inappropriate expression.

The rate of redundancy occurrence in the teacher's manifestation in the second grades can be found in Table 2.

In the second grade, the most frequently occurring redundancy in the teacher's verbal expression is the repetition of words, expressions when giving instructions at doing tasks. Here are some examples.

T: The task says that the width of the football pitch is 9 meters shorter than its length. We have to find out the length of the football pitch. So. The width is 9 meters shorter than the length (the teacher demonstrates on the board). This is 9 meters

shorter than this one. If this is 9 meters shorter than this, then what do you think, how long is this one?

Table 2: The rate of redundancy occurrence in the teacher's manifestation in the second grades

	PS 1	PS 2	PS 3	PS 4	PS 5	average
Repetition of words, expressions when giving instructions at doing tasks	15	21	14	17	15	16.4
Repetition of words, expressions when explaining new study material/mediating new information	7	7	6	8	9	7.4
Repetition of words, expressions when fixing study material	4	22	9	9	8	10.4
As a complement to verbal expression/visual aid during the fixation of study material	1	2	2	1	5	2.2
As a complement to verbal expression/visual aid when explaining new study material/mediating new information	6	8	5	6	8	6.6
As a complement to verbal expression/visual aid when giving instructions at doing tasks	5	7	9	10	6	7.4
As the form of positive pupil assessment	2	1	4	3	5	3
As the form of negative pupil assessment	2	1	1	1	0	1
Reformulated question	5	4	0	1	6	3.2
Reformulated sentence	12	17	15	15	13	14.4
Repeated question	2	2	2	1	1	1.6
Repeated sentence	1	2	1	1	1	1.2
Unnecessary redundancy	0	0	0	0	0	0
average						5.75

The second most frequent category of teacher redundancy in the second grade is reformulated sentence. In the first grade, this category of redundant expression was the second most frequent one. Let us give an example of this kind of redundant teacher's speech.

T: Calculate the examples I will write on the board. Your job will be to solve the tasks that I write on the board.

The third most frequent category of teacher redundancy in the second grade is the repetition of words and expressions when fixing new study material. Here we would like to point at not keeping waiting time limit. 1. Waiting time 1 is the time elapsed between the teacher's question and the pupil's answer (Gavora, 2007). This is the time of intra-communication for pupils, when they are considering an answer, thinking, looking for a connection, arguing and expressing judgment.

T: This is how much? (The teacher has an enumeration of addition and subtraction within 100).

T: And this is how much?

T: And this?

It should be noted that by shortening waiting time 1 the teacher favours faster, more rapid pupils but who may have superficial thinking. On the other hand, pupils who are shy, less assertive and have analytical thinking are disadvantaged.

The rate of redundancy occurrence in the teacher's manifestation in the third grades can be found in Table 3.

In the third grade, the most frequently occurring redundancy is positive pupil assessment. It appeared most often in connection with fixing the multiplication of natural numbers in the small multiplication field to 100 spam.

T: How much is five times five? Evička?

E: 25.

U: Right, Evička, 25.

The second most frequent category of teacher redundancy is the repetition of words, expressions when fixing new study material.

T: Today we have learned that when solving equations we must always do... What do we always need to do with equations? Betka answers. If we solve the equation and we have the result, what do we need to do Betka?

The third most frequent category of teacher redundancy is the repetition of words, expressions when giving instructions at doing tasks.

T: Everyone reads this task quietly. Then you take a ruler into your hand and measure the length of section AB. Then you measure the length of section CD. What you have measured you write in your exercise book. Did everyone understand? So what do you have to do? Read the task, measure the lengths of the sections, and write it in the exercise book.

Table 3: The rate of redundancy occurrence in the teacher's manifestation in the third grades

	PS 1	PS 2	PS 3	PS 4	PS 5	average
Repetition of words, expressions when giving instructions at doing tasks	10	11	9	14	12	11.2
Repetition of words, expressions when explaining new study material/mediating new information	9	8	12	14	10	10.6
Repetition of words, expressions when fixing study material	14	11	10	13	10	11.6
As a complement to verbal expression/visual aid during the fixation of study material	10	9	8	10	5	8.4
As a complement to verbal expression/visual aid when explaining new study material/ mediating new information	5	4	4	4	5	4.4
As a complement to verbal expression/visual aid when giving instructions at doing tasks	8	7	5	10	8	7.6
As the form of positive pupil assessment	13	15	12	9	12	12.2
As the form of negative pupil assessment	0	0	0	2	2	0.8
Reformulated question	5	7	4	3	8	5.4
Reformulated sentence	3	3	4	5	4	3.8
Repeated question	2	3	2	3	3	2.6
Repeated sentence	2	1	5	4	2	2.8
Unnecessary redundancy	5	5	3	1	6	4
average						6.56

In the third grade we have noted examples of unnecessary redundancy. In this category we included redundant expressions of teachers that were caused by the improper expressing of the teacher. We provide an example of unnecessary redundancy that is caused by the teacher neglecting mathematical terminology.

T: For your homework you had to learn the multiples of number 6. Now I am going to check you. Everyone will answer. I will say examples of multiplication and

you will say the result. Let's say aloud the multiples of numbers 6 and then I will examine each of you individually from these numbers.

The rate of redundancy occurrence in the teacher's manifestation in the fourth grades can be found in Table 4.

Table 4: The rate of redundancy occurrence in the teacher's manifestation in the fourth grades

	PS 1	PS 2	PS 3	PS 4	PS 5	average
Repetition of words, expressions when giving instructions at doing tasks	4	4	5	7	8	5.6
Repetition of words, expressions when explaining new study material/mediating new information	7	8	5	4	5	5.8
Repetition of words, expressions when fixing study material	14	11	10	13	10	11.6
As a complement to verbal expression/visual aid during the fixation of study material	10	9	8	10	5	8.4
As a complement to verbal expression/visual aid when explaining new study material/mediating new information	5	4	4	4	5	4.4
As a complement to verbal expression/visual aid when giving instructions at doing tasks	1	4	3	5	2	3
As the form of positive pupil assessment	5	4	5	3	1	3.6
As the form of negative pupil assessment	0	0	0	2	2	0.8
Reformulated question	1	1	0	0	1	0.6
Reformulated sentence	3	3	4	5	4	3.8
Repeated question	2	3	2	3	3	2.6
Repeated sentence	2	1	1	1	1	1.2
Unnecessary redundancy	1	5	3	1	1	2.2
average						4.12

In the fourth grade, the most frequently occurring redundancy is the repetition of words, expressions when fixing new study material.

T: We will draw the ABC triangle. First, section AB, then you select point C outside the AB section and join them. You connect point A with point C and point B with point C. Thus we get the ABC triangle. We will also mark its vertices A, B, C. So we first draw a section, then a point and then we join them.

The second category is redundancy as a complement to verbal expression/visual aid during the fixation of study material. The teacher demonstrates by drawing on the board, draws and demonstrates.

The third most frequent category of teacher redundancy is the repetition of words, expressions when explaining new study material/mediating new information.

T: Today we will learn to scribe a circle using a compass. In order to be able to draw a circle we need point A. Everyone draws point A in his/her exercise-book. Measure the distance of 3 cm with the compass. 3 cm with the compass. Where do we stick the needle of the compass? Into point A. We draw a circle around point A. And then we have a circle with the radius of 3 cm. What you have in the compass is the radius of the circle.

We will also give an example of unnecessary redundancy arising in a rapid series of questions, in the accumulation of questions that eventually divert the pupil's attention from the original assignment.

T: If the minuend is 15 and the difference is 7, which number is the subtrahend? What mathematical operation do we have to do? In which mathematical operation are Minuend, subtrahend and difference used? Which mathematical operation do we define with these words? Where do we use these words?

3.5 Conclusion of research results

At the end of this paper, we summarize the results of research and respond to research questions. The three most numerous categories of redundancy in each grade served as the basis of drawing conclusions from the research. Redundancy in the form of a reformulated sentence or question is most often present in the speech of first and second grade teachers. For teachers of third and fourth grades it is less typical that they repeat or reformulate sentences in their speech. In the third grade, the most frequently occurring category is redundancy as a form of positive pupil assessment. Redundancy in the form of repeating words, expressions when giving instructions at doing tasks is most often found in the second grade and the third grade. When explaining new study material, the teacher most often repeats words and expressions in the fourth grade. Redundancy as a complement to verbal expression/visual aid when explaining new study material/mediating new information appears in the fourth grade the most frequently. The category of Repetition of words, expressions when fixing new study material often occurred in the second, third and fourth grades. On the basis

of the above it can be concluded that redundancy in the teacher's speech is due to the effort of trying to make the information more understandable. In our surveyed sample, redundancy in teacher's speech was most represented in the third grade.

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