

Student questions as significant potential for student learning

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Abstract

The purpose of this study is to discuss the student question as significant potential for supporting student learning. Student questions were investigated using the direct observation method during mathematics lessons. The research sample consisted of six mathematics lessons. The results demonstrate that if a student asks questions about the information he requires to resolve a learning assignment actively in the context of tuition, he also comes up with ideas on how to proceed in the context of resolving the learning assignment. We created a student question typology which points out how students might involve in their learning process by asking questions and thereby better understanding what they know and what is new to them from the lesson content. We consider creation of this typology to be the pilot part of actual research of student questions at the beginning of school attendance.

Keywords: Student questions, students learning, typology.

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1. Research of student questions

This study focuses on student questions appearing during a lesson, which are part of verbal pedagogic communication. On the basis of this communication, we established that asking questions is not as automatic as it seems. We feel the need for a person to be able to ask about what interests him. Zagasev (2001, p. 1) speaks of questions as an act that begins 'a cognitive activity focusing on resolving an issue and clarifying specific doubts. However, the question also helps define and formulate the problem'. We were interested in whether first-level primary school students are capable of asking questions during lessons. Czech publications focusing on student questions state that students only ask questions 'when they find themselves on their own with classwork' and also when they find themselves in the role of 'solver, observer and assessor of their own learning activities'. Questions also appear during 'group tuition' when students share a common goal, and the last situation is the presence of student questions in normal frontal teaching methods (Mares & Krivohlav, 1995, p. 91). The authors of this important publication present a number of research projects which give partial results in relation to the presence of student questions present during lessons. Researchers have endeavoured to find out whether students ask questions, at what frequency students ask questions and also what percentage of pedagogic communication the student questions is. In his research, Fisher (2004) established the thought processes of pre-school age children and how they learn from their mothers, and informs that these small children are partners to their mothers in a dialogue. The children started discussions with their mothers at a frequency of 27 times an hour and children engaged in conversations in 16 cases. The finding that children asked an average of 26 questions an hour is very interesting in relation to the presented study. When children start the first year of school the frequency at which they ask questions falls. Morgan & Saxon (1991) found that the number of student questions asked by children starting the first year of school falls from the percentage of 50% to 5%. Gavora (2005) also focused on the frequency at which students ask questions and his conclusions show that students ask questions very infrequently on starting primary school. This type of question makes up on average only 0.5–2% of all questions asked during lessons (Gavora, 2005). Another interesting finding is, as Psruzinova (1992) states, that within the scope of 17 lessons during the fourth to eighth year, students only asked eight questions an hour, whereas the teacher asked 1,759 questions. In relation to this finding, we should consider what the students' participation is in the learning process if the teacher asks questions and the student answers, and we find that the frequency of involvement by students (asking questions) is significant in relation to activation of the student in the teaching process. Current literature provides more detailed information about student questions present during lessons. Havigerova, Buresova, Smetanova and Haviger (2013), who focused on the informational behaviour of children in the first and fifth years, realised interesting research. They particularly focused on the children's quickness to ask questions^a. Quantitatively, focused research established the reactions to impulses by children in the first years and also in children in the fifth years of school, and the researchers were interested in how many questions students asked. It was established that the teacher asks an average of 81 questions during a lesson and the class asks 19 questions (Havigerova et al., 2013, p. 115). Also, as per the authors, this finding is alarming, when converting these results into one question per student. Another interesting finding is that the number of students who ask something falls as they grow older. This extensive research was conducted on talented children and children from normal classes. However, our goal is to focus on student questions that are part of pedagogic communication and whereas these questions are targeted and decisive. We are interested in the type of questions by means of which the teacher, together with the student, is able to find a common purpose in sharing ideas when solving assignments^b during lessons and students are subsequently able to critically consider problems on the

^a Havigerova et al. (2013) published a text titled 'The expressions of children's curiosity' and present the quickness to ask questions in talented pre-school age children using the Ready2ask method.

^b A learning assignment is therefore part of a person's life, it is an assignment that is submitted to the solver, it may not only just be a written assignment but also an oral one. A learning assignment is also a situation in which a person encounters a problem face to face, has to solve it and this provides the individual with new information. The authors also state that

basis of their questions^c, create a considerate and assessing approach to reality and thereby get to the essence of the problem by revealing the context and stating their own conclusions with the goal of creating potential new solutions (Chin & Osborne, 2008; Gavora, 2015). A question asked by a student may be an important impulse for teaching dialogue, because, as Vygotskij (2004) stated, internal mental processes have an external origin. The method and form of speech which a child is capable of is subsequently reflected in the child's thought processes and the ability to ask for and also provide essential information important for realisation of learning activities. A team of researchers from Brno also conducted fundamental research in relation to student questions. The author team Sedova, Svaricek, Salamounova from the Institute of Pedagogic Sciences of the Philosophic Faculty at Masaryk University published a text regarding this research (Svaricek, Sedova & Salamounova, 2012), which presents well-thought out and original research, including long-term observation and video-recordings of lessons on the second level of primary school. Their chief platform was dialogue teaching. This research is concerned with the nature of the teacher's and the students' questions. The research team created a typology, which served as an inspiration for our research. The authors specify types of student questions by attempting to find answers to the following questions about the context in which the student question appeared:

- i. Establishing essential information or 'I need to know'. Student Marek asks: *How do you read my name?*
- ii. Questions based on curiosity or 'I would like to know this'. Marek asks: *And did he buy it with his money?*
- iii. 'I don't understand' or questions requiring an explanation, that is, a type of questions, which, as the authors state, is autonomous, whereas the questioner wants to find out the details of the problem. Adéla asks: *Was that impolite or something?*
- iv. Disputation of the problem is expressed by questions such as 'But could it be otherwise' or confrontation of understanding. Antonín asks: *Sir, so 'which I have never seen before' is the first sentence?* (Svaricek et al., 2012, p. 139)

The authors consider these types of questions to be the most frequently asked questions during the teacher–student-teaching dialogue on the second level of primary school. This research focused on the subjects of Czech language, history and literature. However, student questions, but most importantly student responses, play an important role here, because they are one of the characteristic elements of dialogue teaching.

We focus our research on student questions during lessons on the first level of primary school during maths lessons. Because we know that mathematics is specific in regard to the form and method of solving the learning assignments, we will speak of the teacher's dialogue strategy in our case. The characteristics of the teacher's dialogue strategy are distinguished by the fact that the teacher allows opportunity for dialogue, which he/she endeavours to guide by asking questions, which he/she builds like scaffolding. In relation to mathematical education, we would call this escalating learning assignments^d. Questions are asked so that they promote questions by the children and so that the students feel that their question is welcome. The teacher provides opportunity for student questions and devotes sufficient time to these questions with the students. Purposefully, because the in-depth resolution of the problem is perceived as being important and not the quantity of the solved

learning assignments are 'practice typical for the teaching professions' Slavik et al. (2017, p. 149). The chosen learning assignment characterises the typical habitus of the teacher, his teaching role. Each learning assignment has a content and leads to achievement of a learning goal (Slavik et al., 2017, p. 150), which may also be focused on creation of student questions.

^c This concerns use of mental activities for work on special cognitive tasks. This may include solving problems, formulation of conclusions, establishment of probabilities and making decisions. Critical thinking also incites creation of questions and these questions start a dialogue, which the questions stir to encourage the student to carry out deeper cognitive activities and subsequently help the student define and formulate the problem (Havigerova et al., 2013)

^d Learning assignments of the required is difficult for teaching in an organised individual manner.

learning assignments. The teacher accepts student questions as an indicator of their current familiarity with the issue and a method for establishing student pre-concepts and possibly misconcepts^e.

2. Student question in relation to student learning

The student question is a general concept for a question that a student asks during a lesson within the context of the lesson content. This therefore concerns questions that students ask when solving a learning assignment. As we presented above, questions not concerning the lesson content are also asked during the lesson. We focus on questions related to the educational content and so, as Svaricek et al. (2012) state, these questions are questions in the true sense of the word. Authors concerned with pedagogic communication agree that we do not know much about student questions (Gavora, 2005; Mares & Krivohlavy, 1995). The frequency at which questions are asked by a student is not evidence of how much the student understands the currently discussed material. It is important for us to devote time to the nature of student questions at the beginning of school attendance for multiple reasons. The first is that questions asked by students may be an indicator of what the student knows about the current material and how familiar he/she is with the issue. The second aspect is that if a student is capable of asking a question, he is automatically drawn into the specific issue, which also increases the probability that this student will remember this new information for longer. The third aspect is that, by asking questions, students request specific information from their teacher and explanation of something they do not yet know and wish to find out about, and they subsequently interact with the teacher (or with another student) and can actively influence their relationship, the atmosphere in the lesson and their learning process (Havigerova et al., 2013; Svaricek et al., 2012). However, current Czech and foreign studies show that the teacher's monologue continues to dominate lessons and emphasise that the school should be a place for dialogue (Mercer & Howe, 2012; Roy & Swaminathan, 2002; Sedova, 2011). Research endeavours to show what degree student questions are represented in dialogue, which is realised during teaching at the first level of primary school.

We agree with the opinions of Svaricek et al. (2012, p. 138) that 'questions, which the student ask their teachers have significant potential in relation to student learning' because if the student becomes involved in dialogue during lessons by asking questions, this stimulates the student's thought processes and also the student's spontaneous cognitive activities (Lukasova, 2010). Student learning is a process in which the student himself is the learner, but the teacher is not the one who teaches, but rather the one who creates a suitable environment, conditions, situations and facilities for supporting the student's learning process. Kolar (1971, p. 241) and Saban (2014) understand learning as an internal process, an individual activity and mental process, which is affected by many agents and only one of these is the teacher and the content he/she presents. Learning is a method for creating understanding by means of explicit communication with the goal of remaining within the context of the instrumental practice of the specific field (Slavik, Janik, Najvar & Knecht, 2017). Active creation of questions by students may lead to the student's active participation in the learning process and also to development of cognitive motivational structures (Psruzinova, 1992), critical thinking and effective communication. During the learning process, students change sets of findings, change their behaviour and methods of activities, the traits of their personalities and themselves (Kulic, 1992, p. 32). Students may realise the learning process automatically in relation to learned or memorised knowledge, which has not been thought through. They respond immediately on the basis of association. An automatic connection such as $3 \times 3 = 9$ can serve as an example. The student is capable of giving the result

^e Doulik & Skoda (2003) state that pre-concepts may be the personal traits of a student and are created by all the influences which have affected the individual to date and the experiences of this individual throughout his/her entire previous life. They are very frequently emotionally coloured, and of the nature of an experience or activity. This concerns school influences and out-of-school influences. A range of aspects play a role in creation of a pre-concept. Exogenic factors such as social, economic, cultural, religious, ethnical and other influences, and also endogenic factors arising from the psychological and psychosocial traits of each student play an important role here. Another important term is misconception or 'misconception', with reference to Bertrand.

without having to think about it. This automatic connection simplifies the solving of tasks and is anchored in the student's memory for a long term. It is a reproduction of what the student has heard or seen and has inserted into his memory without thinking about it. There is no need to ask questions because this knowledge is not anchored in the broader lesson content. This knowledge is burdened by formalism, and this formality and its risk will manifest when memory fails or if a signal is incorrectly interpreted (Hejný & Kuřina, 2009). The procedure for anchoring mathematical knowledge so that a connection is made to instrumental practice, leading to objective mathematical knowledge, is explained by Genetic Constructivism (Kvasz, 2016). This concerns a genetic approach to teaching mathematics with the goal of becoming familiar with historic development in the field of mathematics and respecting its historic genesis. Genesis in this field considers the dialogue, which is present during lessons, to play a fundamental role. When teaching students, dialogue is the basis for defining problems or hypotheses. During the gradual solving of problems with pedagogic interaction, the dialogue subsequently transforms into factual argumentation of the discussed solution. If we take notice of just creation of knowledge by the student during the learning process at this time, we can state that the 'question' is fundamental for creation of the problem, hypothesis or paradox. Because these are the basis for starting a 'constructive learning process in the student, who creates his own concepts and establishes his own knowledge structure' (Hejny & Kurina, 2009, p. 193).

The student discovers mathematics, but the teacher plays a fundamental role in this. The teacher creates the environment in the classroom and prepares the environment so that during 'construction of mathematic knowledge, the student reconstructs the process of historic genesis' (Kvasz, 2016, p. 17). As mentioned above, research demonstrates a fall in the number of questions asked by students when they start primary school. We believe that this situation is caused by the teacher's approach, which he decides to take when teaching the lesson. When teaching the educational unit, the teacher chooses steps that are subject to his personal conviction of how the lesson content will be accepted by the student. A socio-constructivist approach, which is currently under intensive discussion in the humanities and accepted for its fundamental importance in relation to human knowledge, demonstrates the need to activate the student in his participation in creation during education. The methods the teacher chooses are fundamentally different to traditional methods, which pre-determine the passing on of complete knowledge to students without the need to construct their own understanding of the world. In relation to student questions, we are aware of the importance of dialogue and the art of asking questions, as stated by Lukasova (2010), a teacher who asks suitable questions starts a dialogue during tuition, which students frequently imitate. Students can ask questions here, which stimulates their learning activities.

3. Dialogue during tuition in relation to the student question

During the dialogue that takes place during tuition, positions change and are alternately accepted by the questioner, or the person asking the question, and another person who responds. Good dialogue teaching is teaching that incites students to be actively involved in the dialogue (Sedova, Svaricek, Sedlacek & Salamounova, 2016). However, a student question does not always have to have a clear answer, but may lead to a discussion. What is decisive for dialogue teaching is student discourse and the student question is also essentially part of and initiation of this student discourse. However, dialogue-teaching strategy sets clear limits to the student's alternative thinking so that this phase does not transform into disorganised guessing of a solution or the result. The teacher is perceptive to impulses that are of interest to the student (Hejny & Kurina, 2009). But, how can we plainly differentiate dialogue teaching from traditional teaching with dialogue present. An important element is the teacher's question. The teacher's questions help students construct new ideas and work as a sort of 'scaffolding', which, according to Vygotski's reference, forms a concept in the zone of nearest development. However, student discourse, which is longer and more widespread, is fundamental for our research. The authors specify this discourse as (1) without an answer, (2) an isolated word or phrase, (3) a complete concept and (4) discourse with an argument (Pimentela and McNeilla, 2013 in Sedova et al., 2016). In relation to mathematics, this discourse dominates when the

teacher creates opportunity for dialogue, which transforms into logical argumentation at a specific moment (Kvasz, 2016).

We give examples from our own observations of lessons below:

Example 1:

At the beginning of the lesson the teacher plays the 'I'm thinking of a number' game with the children.

Student → teacher: Is it an even number?

Student → student: It can't be one, can it?

Student → student: He said it was divisible by five?

Teacher: Yes, it's an even number.

Student: Is it a multiple of six?

Teacher: No.

Student: Is it a multiple of three?

Student→student: Could it be 18?

Teacher: A multiple of three? No.

Student→student: Could it be 79 if it was a double-digit number?

Student: Is it a double-digit number?

Student→teacher: could it be 32?

Teacher: It's not a double-digit number.

Student: Is it a multiple of four?

Teacher: Yes.

Student: Is it divisible by eight?

Teacher: Yes.

Student: I know, is the number 32?

The teacher writes all the results that the children give on the board: 16, 32 66, and they continue to discuss the problem

Teacher: Not one of the results we have at present is correct. *(the teacher states)*

Student: What? Where did I make a mistake?

Teacher: You can ask more questions.

We can see an active dialogue in this example. On the basis of this activity, the students are taught to ask questions under conditions that are democratically set by the teacher, which is typical of the teacher's dialogue strategy. We abandon the position-based teaching strategy, which is specified by authors as (1) 'perceptiveness particularly of impulses, which disrupt the standard progress of teaching', (2) 'contact monitoring' the teacher does not establish the causes of the student's behaviour, (3) 'thesis-based decision-making' if the student is weak, then he surely copied the results if his test results were good and (4) 'power-based realisation' the teacher benefits from his position as teacher (Hejny & Kurina, 2009, p. 178).

Researches devoted to power situations in teaching state that power is 'the essence of teaching', and the essence of a teacher's work is to influence students and guide their behaviour (Sedova, 2011). However, power relations can also be reflected in the student question, in the sense that if the power relations in teaching are set in the traditional IRF^f structure, we can only assume that situations such as 'at school students should be quiet until the teacher examines them, then they should present the

^f I—initiation; R—reaction; F—feedback.

most accurately formulated response and subsequently listen to the teacher's assessment, without interfering or negotiating, and then be quiet again (while carefully observing the progress of communication between the teacher and other students) until they are invited to present another response' (the same, 93) will occur. This dominant feature of power also enters teaching on the first level of primary school. Research shows that students ask fewer questions regarding attention in relation to the currently discussed learning assignment 'whereas most of the questions are factual, procedural and closed-ended' (Chin & Osborne, 2008, p. 1).

4. Data compilation methodology

Research is conducted by means of direct observation during maths lessons. These lessons took place during the school year 2017–2018. The observer was present in the classroom and was introduced to the children who attended the lessons. These classes were specified as traditional classes. However, the teacher applied the dialogue-teaching methodology to the maths lessons. This teaching strategy is typical for creation of dialogue in maths together with the students. The goal was to eliminate the possibility of the children's potential shyness in asking questions. The children knew that the researcher would be observing how they learn and it is not evident from the recording that the researcher influenced the children's behaviour by his presence. The research was conducted during six lessons and student questions, which applied to the lesson content, were registered during these lessons. A total of 56 children from the fourth year of primary school at two schools in the Zlín Region, took part in the research.

This concerns data that is the result of the pilot part of research in the author's long-term project, which focuses on student questions by students on the first level of primary school during maths lessons. Our goal was to describe the field of student questions from the aspect of pedagogic research and to provide information about how a question asked by a student can support the learning process. *We ask a crucial research question, this being—what is the characteristic trait of student questions at the beginning of their school attendance during maths classes conducted using a dialogue teaching strategy?*

We will intentionally focus on maths lessons which are conducted on the basis of the dialogue-teaching strategy (Hejny & Kurina, 2009).

At the beginning of our research we asked the question—to *what degree is the student question represented in the dialogue realised during lessons on the first level of primary school*. We intentionally chose maths classes which declared the presence of dialogue-teaching methods. The teacher who conducted the maths classes was inclined to observe during the lesson and she herself was interested in which student questions we would register from the children during the maths lessons. The dialogue-teaching method that the teacher applies was typical for the philosophy of genetic constructivism, which the teacher is familiar with.

5. Discussion and research results

The results that we endeavour to present demonstrate crucial findings, these being that students of a younger school age produce student questions when the dialogue-teaching strategy is applied, particularly in relation to questions that apply to the lesson content. We compared with research by Havigerova et al. (2013), during which the authors registered 19.36 questions asked by a student during one lesson. The study by Lukasova & Pavelkova (2017) also focused on the number of student questions asked during maths lessons during which both the dialogue-teaching strategy and the position-based teaching strategy were applied⁸. Thirty-eight student questions were registered during

⁸ The dialogue-teaching strategy is defined by Hejny and Kurina (2009) as a permanent dialogue between the teacher and the students in a democratic climate. The position-based teaching strategy is the opposite approach by the teacher, in the sense

a total of 10 lessons. Five maths lessons applying the dialogue-teaching approach were analysed and students asked 29 questions here. Another five maths lessons were conducted using the position-based teaching strategy and nine student questions were registered during these lessons.

In relation to our findings, we must state that the teachers in our sample conducted six lessons and a total of 520 student questions appeared during these lessons. The students asked questions actively within the context of the lesson, in which they requested the necessary information for completing the learning assignments. They also came up with ideas on how to proceed in the context of completing the learning assignment. We created a student question typology, which shows how students could become involved in the learning process by means of their questions and thereby understand more about what they know and what is new to them in the lesson content.

Table 1. Typology of student questions during application of the dialogue-teaching strategy

Question type	Number of questions	Example
Motivating	50	How many passengers will there be? Why will the goal be above? Why are there two competitors?
Isolated questions	320	Is it 16? Is it 3×3 ? Twenty minus how much? Is it a multiple of 50? Is it a two-digit number? Is it divisible by 10? Total 13?
Aha questions	125	Miss, is it possible to calculate where the competitor Is if the distance is not given? So you understand, don't you? But it's a spatial form isn't it?
Verification questions	25	Can I verify that? I have a question, what about the zero? Could it be otherwise?

The number of questions asked by students during three lessons is 530 student questions which applies to the lesson content. We consider the most important finding to be the increase in the number of questions asked by students in relation to previous research and also in relation to our estimate. We assumed that the students would only ask questions in relation to maths in regard to organisation of the learning assignment. It could be assumed that the student needs information only for realisation. But, we can see from the results that we classified most student questions in the isolated question category.

Student questions, which we call motivating, play an irreplaceable role here. When solving learning assignments the student needs to feel the importance of solving this task and the desire to solve it. As a result of sufficiently powerful motivation the student can create a knowledge structure that is the basis for starting the learning process. It may seem that these questions are not related to the lesson content, but they are basically an important basis for the student and his path towards knowledge and even more important for students of a younger school age. Each student comes to school with different knowledge, but also with different experience and practice. The learning assignments the student encounters here are practice with a purpose^h. They should basically produce student

that this concerns the teacher's rigid position in regard to his students. The climate during application of the position-based teaching strategy is very authoritative.

^h If the learning assignment has intent, it is an 'intentional phenomenon' which is an implicit or explicit challenge or also an explicit instruction to fulfil certain conditions of satisfaction. The concept of the 'conditions of satisfaction' is used here in the line of: what is the content of the specific learning assignment, or what is the lesson content and what does it apply to. The authors simply specify: 'What is the assignment about' (Slavik et al., 2017).

questions because dialogue is the basis for creation of mathematical knowledge (Kvasz, 2016) and, during the phase of motivation, the student should be capable of naming what he finds out or be capable of asking what a classmate is solving at that moment. This is a step towards understanding what I am learning. The inner interest in finding out something new and use student questions to show areas that do are new to me and attractive to me. During the younger school age, it is important to support sufficient understanding of the lesson content for a good start, cause this is the basis of success during this long phase of education.

Another type of question we are interested in is the *isolated question*. These questions are asked due to the need to understand how to solve the learning assignment. As a result, these questions appear when students are capable of completing this current exercise themselves, separately from others, at this specific time and we do not register any connection to the abstraction, which should follow if the learning assignment has been worked on sufficiently in-depth. This could be the student's first experience in manipulating items, the number 2 is represented by two children, so they are capable of counting two children and two parents and understanding that this concerns four people, but they are unable to apply this knowledge to other items with the same solution algorithm. This type made up 320 questions in our pilot research. When solving a dramatised verbal assignment, these questions were asked by students most frequently. Each student individually worked on the learning assignment on the basis of interaction with others. The student listened to student commentary, student questions and also responded to the teacher's comments and questions. However, this type of question was also asked mostly during maths lessons, because the teacher included these dramatised learning assignments, which basically produce and expect student questions, in the lesson. However, we must state that if we specify analysis of student questions, then individual isolated questions were asked by students basically multiple times. This means that students asked similar questions individually, each on their own behalf. The student asked the teacher a question and another student asked the teacher the same question. This situation significantly increased the number of student questions asked.

Example:

Student: *It has a total of 11? Is it 11? 11 in total?*

This is how representatives of groups reacted at one point when working on a learning assignment. This demonstrates that the need to receive confirmation of the correct solution from the teacher is important to the student from several aspects. The first is to find out whether the strategy for solving the learning assignment was correct. The second is whether questions asked by a classmate contributed to the successful solution of the assignment. The third is that opportunity for student questions contributed to more objective solution of the problem. As Hejny and Kurina (2009, p. 131) state, during the phase of isolated knowledge, students may pass through four stages, that are: (1) 'the germ of creation of a concept', (2) 'acquaintance with additional isolated concepts', (3) 'recognition of mutual connections between some models' and (4) 'creation of a conscious basis'. On the basis of this classification, we can say that the questions classified as isolated questions cannot be objectively evaluated and these questions must be descriptively assessed during future research in relation to the context in which the problem was solved.

The third type of question which we registered from students during maths lessons was the *'aha' question*. These questions, which younger school age students ask, show progress in the child's cognitive area into the form of stabilisation and finding a common basis and the connection between mutual relations. Interesting examples may be questions such as: 'So if it is a multiple of six then it has to be a double digit number?' The student is capable of consistently assessing information and the question reflects this ability and the advancement of the student's thought processes. In all, 125 questions of this type appeared in our research. We also consider this number very high and the student is now capable of assessing the problem being solved in relation to identification of a common phenomenon.

Verification questions appear when the student finds the solution to the learning assignment in contexts other than those that are assumed by the teacher. The student uses these to verify the function of the specific learned algorithm. Jirotkova (2012) calls this phase as the phase of crystallisation and the child asks questions in relation to learning assignments concerning an example other than the presented example, escalated tasks, asks alternative questions, open and curious. The child's question shows good orientation in the specific issue and the desire to discuss the specific topic. Example: Student: 'I have a question, what about the zero Miss?' The child has learned to work with zero. It seeks and desires supplementation or specification of information. These questions are caused by situations that require the student's creative solution and application of knowledge, which is inserted in different concepts. In all, 25 of these questions appeared in our pilot research. The most frequent type of question to appear was: 'Is this also possible if the number is a multiple?' These questions are more confident that they place the learning assignment in the position of an escalating assignment and motivate other students to come up with alternative solutions. As Hejny & Kurina (2009, p. 136) state, during this phase of creation of knowledge 'conflict or disharmony often appear and it is necessary to seek a new balance for the entire structure'.

6. Conclusion

The purpose of this study was to find out whether students of the first level of primary school ask questions during maths lessons. On the basis of the established results, we can state that students ask questions and formulate them naturally in relation to the assignment currently being solved. On the basis of their question, they become involved in communication and thereby create the dialogue-teaching strategy together with the teacher (Sedova, 2015). The number of registered questions shows that students of the first level of primary school are willing to actively become involved in solving a problem by asking questions and that their questions contribute to support the student learning at school. In this sense, we perceive learning as a sort of research activity by the student, which is realised collectively, with the goal of understanding a comprehensive system of mathematic sentences and the overall axiomatic system. This system must comply with individual formation of knowledge by the student. This concerns a combination of ontodidactic and psychodidactic dimensions (Slavik et al., 2017) and this demonstrates that the student question can be considered significant potential in relation to student learning because by identifying the student question the teacher can establish which phase of the learning processⁱ the student is currently in.

We can consider the most interesting research result to be the number of verification-type questions. This type of question appeared 25 times out of the total number of questions asked. The above-mentioned typology indicated that this concerns the smallest number of questions. However, for us it is crucial information that during this phase the student uses his question to show whether the new knowledge is starting to be connected to knowledge that has already been learned and is present in the cognitive structure. The student adapts the new knowledge to previous knowledge and new knowledge crystallises. There may be chaos, disharmony and inner conflict in the student's consciousness and he may formulate the question: 'So what is the answer then?' This is how we reach the beginning of the process of creation of another piece of new knowledge and the student again answers the question 'What is the answer then?' On the basis of our typology, we can present student questions such as: 'Can I verify that?', 'I have a question, what about the zero?' and 'Could it be otherwise?' All these questions lead to discussion of the specific solution and the search for alternative paths. This is followed by establishment of the rules that we have to adhere to in maths, which are unchanging and the student endeavours to adapt his knowledge to these rules. The questions that the student asked contributed to the development of communication between the teacher and the students and between the students themselves. It motivated students to start a

ⁱ Hejny & Kurina (2009) define the learning process as a phase that the student passes through and these phases can help the teacher identify the formation or level of the student's knowledge.

discussion and students who previously did not wish to analyse the problem also became involved in the discussion.

The student question typology presented above provides an insight into communication during maths lessons. It shows moments when it is important for the student to be involved in a discussion because this means that the student is focused on solving a problem that interests him. As an individual he is in a position where he needs confirmation that his procedure is correct in order to solve the problem. This situation is followed by crystallisation of specific knowledge in compliance with the individual connections between pieces of knowledge from the student's individual experiences. The need for dependence on the tangible world fades from the student's consciousness and knowledge is created (Hejny & Kurina, 2009).

The created student question typology refers to how a student question can support student learning. However, we feel the need to descriptively describe student questions in the context of communication. The conducted research identifies student questions asked during maths lessons, but does not delve into the context of the communication. A question asked by a student within the context of communication may present a deeper connection between the asked questions and creation of knowledge by the student.

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