

Questions Hidden in Schoolchildren's Responses – Structure and Didactic Functions

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Abstract

The aim of the study was to determine the role of structure and functions of 'hidden' questions in schoolchildren's responses to questions posed to them by teachers during lessons. The study sample consisted of 1154 answers of elementary school-age children related to questions formulated by teachers. Observation as well as qualitative and quantitative analysis of data was used. The structure and functions of both answers and questions were determined. The obtained data allowed for specifying the status of a significant part of primary education. The study revealed an important new area of research associated with the fact of what is happening between the phase of creating and formulating questions by the teacher and the phase of understanding and creating responses by the schoolchild.

Keywords: question, 'hidden' question, operator and object of question, structure and functions of question, primary education

Introduction

The basis of education is constituted by events and processes that are taken into account while talking about interpersonal communication. Dialogues, monologues, rhetoric that were taught by the ancient philosophers are the subject of interest to all teachers. Communication is considered as a major factor of educational situations and a subject causing changes in its participants. Without communication,

no educational purpose can be achieved. Major elements in such communication are comprised of questions and associated answers. Considerations regarding the idea, structure and functions of questions and answers are investigated by research representatives of such disciplines as philosophy, in particular, the logic of questions, semiotics, psychology and pedagogy (specifically didactics). In the accepted perception, questions are statements (messages), sentences directed to an interlocutor or reflexively – to an addresser. They are requests, wishes, commands, or demands of providing answers. They are composed of interrogative pronouns (what, who, why, etc.) that are called *operators* (of actions) containing an aspect of wish (recommending) and an aspect of action that indicates the category of tasks to be performed in relation to this element of the question – the *object* of operation. Questions usually occur with an interrogative pronoun, but they can also appear as statements bearing a question mark. Imperative sentences may occur as questions (vicariously). A developed form of question, which defines its addressee, contains a command (say, evaluate, etc.), as well as a question (who, what, how, etc.).

In the available teaching and psychological literature (Racinowski, 1967; Kojs, 1988/1994; Parafiniuk-Soińska, 1988/89; Pęczkowski, 1998; Kochanowska, 2007; Gabzdyl, 2012), mainly questions formulated by teachers are taken into account. Questions posed by learners are disregarded. Research studies conducted by J. Piaget (1992), S. Szuman (1939), R. Radwiłowicz et al. (1969), K.J. Szmidt (2004), M. Szczepska-Pustkowska (2004) and B. Oelszlaeger (2009), which pertain to schoolchildren's or learners' questions, are an exception here. The pupils' *hidden* questions (i.e. directed to themselves during the learning process), have not been considered as the subject of empirical research thus far. However, it is impossible not to mention S. Szuman (1968) in this place, who drew attention to an 'implied subject-matter of children's utterances', or to an attempt at determining the characteristics of 'implied' questions posed by pupils (at the younger school-age) themselves while answering teachers' questions (J. Gabzdyl, 2009). Hidden (implied) questions in the pupil's response are an additional content that goes beyond the direct correct answer to the teacher's question. This additional content takes the form of sentences into which neither the teacher nor the schoolchild formulates questions. In the process of formulating responses, the pupil compares them either consciously or subconsciously, as well as categorizes elements and connections instantly (Kövecses, 2011; Kojs, 2016).

In contrast to achievements of the already mentioned disciplines, in the logic of questions field (Ajdukiewicz, 1985; Kubiński, 1970; Giedymin, 1964) there were the so-called direct answers isolated and extensively characterized that have

a specific schema (range) though some of them are true and false, or the ones that have an unspecified schema – for ‘open’ questions, including a ‘narration request’ (particularly engaging a wide range of possible answers). It is also important to draw attention by logicians to answering questions related to certain relationships that occur between questions or their operators, e.g., the so-called ‘equivalent’ questions or operators (Kubiński, 1970); ‘incorporation (English : *containment*) of question by question’ (CL Hamblin – as cited in Kubiński, 1970). From the point of view of interpreting a response as a ‘message’, A. Brożek (2007) characterized various types of responses, including the ones ‘in general’. In practice (e.g. teaching), what was already noted by J. Giedymin (1964), in addition to answering decision questions (with the particle ‘or’; the so-called closed) also partial and intermediate (indirect) answers were distinguished (to open questions, including narratives), comprising answers to some (unspecified) relation to direct responses, as well as incorrect answers.

Ranges of unknown included in structures of natural language questions (*datum quaestionis* – which are also schemes of answers to these questions) were widely introduced in the deliberations by A. Brożek (2007). A similar issue was presented, in empirical research, by W. Kojs (1988, 2007) in relation to characteristics of typical structures and functions of questions (including answers) ‘such as: What; What/Which/What kind/What kind of/What sort of; How; Why, etc.’ – formulated by teachers in primary education. The issue regarding the properties of pupils’ answers to questions such as ‘why’ has been investigated by E. Kochanowska (2007); and, the so-called pupils’ adequate and inadequate responses, from the teaching point of view, were made the subject-matter of discussion by J. Gabzdyl (2009).

Research Methodology

Research General Background

The object of the study were teachers’ questions, pupils’ responses and hidden questions ‘extracted’ from these responses as the fact of co-created dialogue situations in the teaching communication process (for understanding and reference to schoolchildren’s thoughts). Therefore, the main aim was to determine the role of hidden questions in pupils’ responses to questions posed by teachers during lessons. The basis for research in this area were the issues covered in questions: What is the structure and functions that meet the questions hidden in the pupils’

answers to their teachers' questions? What is the relation of: hidden questions posed by pupils 'themselves' and questions directed to them by teachers?

Research Sample

In the study, 629 teachers' questions were used, only 'What?' along with the associated answers provided by pupils at the primary school-age, where 264 (42.0%) were related to the first grade class, 365 (58.0%) regarded the third grade class. Moreover, hidden questions 'extracted' from the pupils' responses were used in the study, with a total number of 525, out of which 161 (30.7%) were accounted for the first grade classes and 364 (69.3%) for the third grade classes.

A total of 1154 pupils' utterances were used in the study, including hidden questions, out of which 425 (36.8%) concerned the first grade schoolchildren and 729 (63.2%) the third grade pupils. All the statistical data relate to 60 lessons (30 in each class).

Instrument and Procedures

At the stage of: (A) empirical data collection (collecting and registering raw quality data), observation was adopted – the so-called 'qualitative' method (Konarzewski, 2000); (B) empirical data development – the qualitative and quantitative analysis by means of descriptive statistics measures was performed.

Observations were carried out from 2012 to 2014 during lessons in grades 1 and 3 of elementary schools. Each observed lesson was conducted by a different teacher, it took about 35–45 minutes, and basically, it was connected with the Polish language education. The applied method of observation allowed for noticing, collection and preservation (in writing) of teaching facts 'in their natural course', i.e. in the context of the communication process between the teacher and pupils during lessons (dialogues, monologues of teachers and schoolchildren). At the stage of perception and collection of already listed facts their categorization was not undertaken. It was moved to the stage of their development, which took place in 2015.

As a result of observation, transcripts were prepared, which contain the lessons records (reproduced from tape recorders), which contain all the teachers' and pupils' literal utterances (including questions and answers); supplemented by a description of their non-verbal actions (including responses; teaching aids used during classes, etc.); stated in the order of their occurrence, without skipping teachers' or pupils' talks, even in the case of their repetitions.

Data Analysis

As units of transcripts analyses, the teachers' questions were taken into account – their operators (actions) and objects (content types) – 'such as: *What?*' (i.e., questions with the pronoun 'what' and their declension forms combined with appropriate prepositions: what, whereof, with which, to what, for what, etc.), together with the pupils' associated answers. As a categorization tool, seven ranges of answer models to those questions were adopted (cf., Kojs, 1988). The pupils' remaining (optional) statements (to the teachers' questions) were analyzed in order to 'extract' from them 'hidden':

- types of question operators; it was determined that in the framework of data regarding the fragments of the pupil's responses apart from the extracted (appointed) operators, other types may be pointed out: 'equivalent' (particular types of operators – cf., Table 1 and Legend);
- twenty types of content that defines functions of questions; a typology of questions was adopted based on their content, highlighted by S. Racinowski (1967) and W. Kojs (2007); a comprehensive list of questions content (functions) types – cf., Table 1 and Legend.

As part of applied descriptive statistics, all statistical calculations were conducted by means of the statistical package StatSoft Inc. (2014), STATISTICA (data analysis software system) version 12.0 and Excel spreadsheet. Qualitative variables are presented by frequencies and percentages (per cent value). Chi-square tests of independence were used for categorical variables (the Yates correction factor according to the number of cells below 10, the conditions for Cochran's theorem, Fisher's exact test). In all calculations, as the level of significance $p = 0.05$ was set.

Research Results

The study included 629 teachers' questions with the associated pupils' answers and hidden questions extracted from those answers, in the number of 525. The percentage of teachers' questions/pupils' answers of the third grade class was significantly higher compared to the percentage of teachers' questions/pupils' responses of the first grade class (respectively: 365 / 58.0% vs. 264 / 42.0%; $p = 0.0001$). Similarly, the percentage of 'hidden' questions among schoolchildren of the third grade was significantly higher compared to the percentage of 'hidden' questions of the first grade pupils (364 / 69.3% vs. 161 / 30.7%; $p = 0.0001$).

Seeking answers to the research problem concerning the hidden structures of the pupils' questions operators, a summary was prepared in Table 1. It contains the incidence data of distinguished hidden operators of the pupils' questions in grades 1 and 3, resulting from the responses to the teachers' 'open', including open 'narrative' questions.

Table 1. Types of operators in hidden questions of pupils at the elementary school-age (1st and 3rd grade) extracted from their responses to the teacher's 'open' and 'narrative' – such as: *What?* questions

No	Types of operators in pupils' hidden questions	Pupils' responses to the teacher's questions 'such as: <i>What?</i> '							
		'open'				open: 'narrative'			
		Kl 1 n %	Kl 3 n %	Total n %	P-value	Kl 1 n %	Kl 3 n %	Total n %	P-value
1.	What?	61 48.8	124 44.1	185 45.6	0.0092	17 47.2	40 47.6	57 47.5	0.3896
2.	Who?	12 9.6	27 9.6	39 9.6	0.1440	4 11.1	10 11.9	14 11.7	0.6251
3.	Which / What / What kind / What kind of / What sort of?	33 26.4	53 18.9	86 21.2	0.4590	7 19.4	15 17.9	22 18.3	0.7732
4.	How?	3 2.4	21 7.5	24 5.9	0.0031	2 5.6	6 7.1	8 6.7	0.5615
5.	Why?	5 4.0	20 7.1	25 6.2	0.0238	0 0.0	5 6.0	5 4.2	0.1004
6.	Where / When?	6 4.8	16 5.7	22 5.4	0.1532	4 11.1	5 6.0	9 7.5	0.5282
7.	Other types	5 4.0	19 6.7	24 6.2	0.2277	2 5.6	3 3.6	5 4.2	0.6182
	Total	125 100.0	280 100.0	405 100.0		36 100.0	84 100.0	120 100.0	

Legend: Other types: 'If/Whether?', 'Which?', 'In what way?', 'Where... from / Where?' and other.

Nos. 1–4 and 6–7 – embrace a group of question operators, i.e. a given type of pronoun and its declension forms combined with appropriate prepositions: 1 – what, for what, etc.; 2 – who, for/to whom, etc.; 3 – what, to what, from what, etc.; 4 – how, how long; 6 – where, when, from when; 7 – which, of which, from which, etc.

The summary of data presented in Table 1 reveals the fact that in the group of pupils' responses to teachers' questions, operators of the pupils' hidden questions

‘such as: *What?*’ more frequently appeared in the first grade in comparison to the third grade ($p = 0.0092$), whereas operators such as: ‘*How?*’ ($p = 0.0031$) and ‘*Why?*’ ($p = 0.0238$) were more frequent in the third grade classes in comparison to the first grade classes. In the group of answers to narrative questions, no statistically significant dependencies of hidden operator types were verified from the pupils’ responses according to the level of education (grades 1 and 3). In the first grade subgroup, operators of the pupils’ hidden questions ‘such as: *What?*’ were significantly frequent in their replies to open questions as compared to narrative question answers ($p = 0.0001$). Similar value was obtained for operators ‘*What / What type?*’ ($p = 0.0001$). On the other hand, operators: ‘*How?*’ ($p = 0.0001$) and ‘*Where / When?*’ ($p = 0.0001$) were more frequent in their replies to narrative questions as opposed to open questions. In the third grade subgroup, the following ‘hidden’ operators were significantly more frequent in answers to the teacher’s narrative questions in comparison to open question answers – such as: ‘*What?*’ ($p = 0.0001$), ‘*Who?*’ ($p = 0, 0001$), ‘*Where / When?*’ ($p = 0.0001$). Moreover, operators such as: ‘*What?*’ ($p = 0.0001$) and ‘*How?*’ ($p = 0.0001$) were more frequent in their replies to open questions than answers to narrative questions.

Seeking answers to the research problem on the content shaping features of the pupils’ hidden questions, the following systematization was prepared in Table 2.

Table 2. Types of the content shaping features of pupils’ hidden questions extracted from the answers to teachers’ questions: ‘open’ and ‘narrative’– ‘such as: *What?*’

Types of the content shaping features of pupils’ hidden questions about...	Pupils’ answers to teachers’ questions ‘such as: <i>What?</i> ’							
	‘open’				open: ‘narrative’			
	Kl 1 n %	Kl 3 n %	Total n %	P-val- ue	Kl 1 n %	Kl 3 n %	Total n %	P-val- ue
the content, the meaning of words / names / the essence of things	15 12.0	43 15.4	58 14.3	0.3730	6 16.7	20 23.8	26 21.7	0.3841
belonging / location in time and space	9 7.2	36 12.9	45 11.1	0.0943	6 16.7	13 15.5	19 15.8	0.8700
quality, particulars, characteristics	30 24.0	35 12.5	65 16.0	0.0036	5 13.9	7 8.3	12 10.0	0.3526
mode of action	4 3.2	13 4.6	17 4.2	0.5036	2 5.6	1 1.2	3 2.5	0.1605

Types of the content shaping features of pupils' hidden questions about...	Pupils' answers to teachers' questions 'such as: <i>What?</i> '							
	'open'				open; 'narrative'			
	Kl 1 n %	Kl 3 n %	Total n %	P- <i>val- ue</i>	Kl 1 n %	Kl 3 n %	Total n %	P- <i>val- ue</i>
subject and object of action	50 40.0	84 30.0	134 33.1	0.0482	13 36.1	25 29.8	38 31.7	0.4932
cause	5 4.0	20 7.1	25 6.2	0.2248	1 2.8	5 6.0	6 5.0	0.4647
other types	12 9.6	49 17.5	61 15.0	0.0401	3 8.3	13 15.5	16 13.3	0.2915
Total	125 100.0	280 100.0	405 100.0		36 100.0	84 100.0	120 100.0	

Legend: Other types pertain to: the existence of things, phenomena, processes, events; the origin, the formation of the indicated objects; the purpose of action; the conditions, circumstances; the principle, standard action; material and tool operation; the course of development, variability; to assess the role, relevance and application; the effects, consequences; about relationships, codependences, relations; a comparison / similarity and differences / identity and contradiction; of quantity, value / variety of questions about the comparison (by legal units of measurement); the construction; other, i.e. composed of at least two of the abovementioned types.

Table 2 contains frequency data regarding the distinguished types of content shaping features in the 1st and 3rd grade pupils' hidden questions that arise from answers to the teachers' open and narrative questions. Concerning the pupils' answers to the teachers' open questions, the content shaping features of the pupils' hidden questions about 'the quality, properties ...' and 'the subject and object ...' were significantly more frequent in the first grade than in the third grade (respectively: $p = 0.0036$ and $p = 0.0482$). In the group of learners' answers to the teachers' narrative questions, no statistically significant relationship was confirmed in relation to the content (functions) of the pupils' hidden questions. In addition, no statistically significant relationship was confirmed in relation to the content (functions) of the first grade and the third grade pupils' hidden questions with regard to the kind of teacher's questions (open; narrative).

In seeking answers to the research problem concerning the relationship between the hidden questions formulated by the pupils 'themselves' and the questions posed by the teachers, the following summary was prepared in Table 3.

Table 3. Types of content (functions) in hidden questions and teachers' questions 'such as: *What?*'

Types of questions content (functions) about...	Grade 1			Grade 3		
	U	N	P-value	U 3	N 3	P-value
	n %	n %		n %	n %	
the existence of things, phenomena, processes, events	0 0.0	19 7.2	0.0005	4 1.1	25 6.8	0.0001
the content, the meaning of words / names / the essence of things	21 13.0	58 22.0	0.0218	63 17.3	154 42.2	0.0001
belonging / location in time and space	15 9.3	27 10.2	0.7603	49 13.5	22 6.0	0.0007
quality, particulars, characteristics	35 21.7	0 0.0	0.0001	42 11.5	1 0.3	0.0001
mode of action	6 3.7	33 12.5	0.0024	14 3.8	1 0.3	0.0007
subject and object of action	63 39.1	83 31.4	0.1053	109 29.9	69 18.9	0.0005
cause	6 3.7	2 0.8	0.0692	25 6.9	3 0.8	0.0001
effects, consequences	1 0.6	5 1.9	0.2806	0 0.0	17 4.8	0.0001
other types	14 8.7	37 14.0	0.1016	58 15.9	73 20.0	0.1528
Total	161 100.0	264 100.0		364 100.0	365 100.0	

Legend: U – pertains to: different types of pupils' hidden questions; N – teachers' questions 'such as: *What?*'.

Table 3 contains data pertaining to the frequency of distinguished content specifying functions for different types of the pupils' hidden questions and the teachers' questions such as: '*What?*' The percentages of content (functions) questions formulated by the teachers were significantly higher in comparison to implied questions of the first grade pupils for the teachers' content (function) questions: 'the existence ...' ($p = 0.0005$), 'the content, meaning ...' ($p = 0.0218$) and 'the method of ...' ($p = 0.0024$). Whereas, the content (function) 'of quality properties ...' was significantly higher in percentage in the pupils' hidden questions ($p = 0.0001$).

The percentage values of the content (function) of the teachers' questions were significantly higher in relations to the third grade pupils' hidden questions for the teachers' content (function) questions: 'the existence ...' ($p = 0.0001$), 'the content, meaning ...' ($p = 0.0001$) and 'for the effects ...' ($p = 0.0001$). For the following content, higher percentage was determined for the pupils' hidden questions: 'the quality, the properties ...' significantly ($p = 0.0001$), 'manner of ...' ($p = 0.0007$), 'on the subject and object of ...' ($p = 0.0005$) and 'the cause' ($p = 0.0001$).

Conclusions

Various questions and associated answers co-create the teaching-learning proces; they constitute its structure and didactic functions. In analysing the pupils' answers to the teachers' questions along with the questions hidden in these responses, an important issue was raised - not only for the educational process, but also for an interaction and value of the entire communication - aimed to explain what is going on between the phase of creating and formulating questions (by teachers) as opposed to the phase of understanding and creating responses (by schoolchildren).

Analyses of the pupils' hidden questions, in the context of questions posed by the teachers (Tables 1–3), allowed for deepening the understanding of the teachers' didactic activities and their pupils. They account for an attempt to understand and identify values of created didactic processes, as well as to perceive occurring dysfunctions. The disturbance of mandatory balance, by maintaining disparities of certain types of operators and types of question contents (functions), is a clear sign of such a dysfunction.

The results document the upward trend of the pupils' hidden questions role in relation to the level of education (their number has increased significantly in grade 3). They reveal the pupils' intellectual potential at the elementary school-age, their capability of independent intellectual work, going 'beyond the teachers' questions'-formulating their own questions.

Question operators define the categories of mental activities. Among 525 operators in the pupils' hidden questions, the domination of the following was noticed: what, who, what, how. To a lesser extent, the following operators occurred: how, why, where / when; the other to a slight extent. In general, the increased role of operators was highlighted along with the increased level of education. The listed categories of operators shape different mental dispositions; therefore, the question of overlapping proportions between them was very important. Determining the

right balance requires separate analyses. Looking at the juxtaposition, in the context of related content (functions) in hidden questions, it can be stated that they are heavily imbalanced.

The value of operators is codetermined by the question content to which they are related. For this reason, an important part of the research results was to determine types of content (functions), which the pupil has to deal with. Among 20 chosen pupils, an imbalance of values occurred – a lack of balance between individual types of functions in hidden questions. The following notions dominated: 'the content, meaning ...' (especially 'names' of activities and their objects), 'the subject and object ...', 'the quality of ...', 'belonging to ...' (mainly 'location in space'). The insignificant range was included as 'other', especially important for the development of the pupils' brainpower, such as: 'the origins of ...', 'target ...', 'connections', 'effects', 'assessment of ...', 'comparison ...'. Determination of the observed disparities value in the content (functions) of the pupils' hidden questions requires further, in-depth analyses – especially in the context of other types of teachers' questions.

Indeed, despite the fact that the special educational role of the teachers' analysed questions (only: 'What?') involves a kind of 'universality', i.e. a possible determination of different types (in the study 20 were assumed) and ranges of responses (open, including narrative) – it is insufficient in the proper education (including assessment, diagnosis) of pupils' mentality.

The analysis of functions regarding the teacher's questions, 'such as, *What?*' (Table 3, column N), allowed, however, for revealing disparities that indicate an imbalanced equilibrium in teaching and individual mental features of pupils at the primary school age.

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