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APPROACHES TO INTERNAL TESTING AND ASSESSMENT OF KNOWLEDGE IN RELATION TO THE PUPILS' ACHIEVEMENTS IN NATIONAL ASSESSMENT OF KNOWLEDGE

Abstract

In this article we are presenting the results of the research "The Connection between the Results in the National Assessment of Knowledge and the Pupils' Socio-cultural Environment, Instruction and Homework", taking place at the National Education Institute, Slovenia, in the years 2008/2009. In the introduction we are writing the importance of national assessment of knowledge in the primary school and presenting its significance in certain European countries. External knowledge assessment at the end of the primary school, being at present in Slovenia called *national assessment of knowledge,* has got since 2005/2006 an information and formation significance. The achievements in the *national assessment of knowledge* are not a part of the school mark, but additional information on pupils' knowledge.

In the central part of the article we are presenting the findings of the study on the interconnectedness of approaches to internal (school) testing and assessment of knowledge with the school success of pupils in the national assessment of knowledge in mathematics and Slovenian language. The research has shown that none of the single elements can have a decisive influence on the results by itself, but rather interdependence between them. A change of one element can influence the structure and efficiency of other elements, thus their consistency is required. The results also show that pupils make differences between teachers of mathematics or Slovenian language, i.e., a closer cooperation with mathematical teachers than with Slovenian language teachers.

Key words: national assessment of knowledge, Republic of Slovenia, mathematics, Slovenian language

Introduction

National assessment of knowledge is in a number of school systems, besides the internal evaluation and international comparative studies, as for example PISA or TIMSS, one of the mechanisms for determining the quality of education (Markelj and Majerič, 2009). By way of external testing of knowledge we can gather various information, e.g., on individual's, on average results of pupils from different schools. The significance and impact of national assessment of knowledge is many fold and includes the creation of school policy, ranking of school children upon school entry, evaluation of school system efficiency and improvement of school practice (Zupanc, 2005).

The external testing of knowledge at the end of primary school has in Slovenia taken place for two decades and its description and purpose of assessment have been changing. Upon the introduction of *National Assessment of Knowledge* in the school year 2005/2006 the role of external examinations changed again. The national

assessment of knowledge has since 2005/2006 lost its selective function and kept the informative and formative function. The results in national assessment of knowledge are no longer a part of school marks, and they neither influence the entry to secondary schools with limited entry, but function as additional information about pupils' knowledge being important for pupils (primary schools send a written notice to parents about the pupils' results in the national assessment of knowledge), for teachers and for the schools pupils attend, and also for the schools pupils intend to enter, and the entire results have been interesting for the state and the state institutions being responsible for education at national level.

When we speak about *internal testing and assessment of knowledge* we primarily think about testing and assessment of knowledge, done by each teacher in his class either orally or in written. This was on the basis of questions prepared by themselves and without any additional information on comparability of the characteristics of such testing with other teachers working at other schools, as well as on the comparability of results of such testing and assessment – school marks – with others (Žakelj and Grmek, 2010). External examinations and assessments are understood as verification with tests, composed by educational experts and experts for measurements, i.e., for the composition and analysis of measurement instruments. Basic features of external testing and assessment are as follows: all pupils solve the same or comparable exercises; equal criteria of testing administration are in place; tests are at least to a certain degree metrically verified (Bucik, 2001).

Knowledge assessment, the purpose of which has in the past merely been of informative character, and in the function for selection and repression purposes, has more and more been oriented to educational and motivational purposes emphasising the stimulative role of marks and teachers' as well as pupils' participation in decision making process in organisational and thematic aspects (Strmčnik, 2001). The result of assessment is final mark. The assessment encouraging the best mark, taking place in the context of class events, besides numerical marks implement qualitative descriptions of learning achievements (Ivanuš Grmek and Javornik Krečič, 2004). The mark "good" tells little to pupils about what knowledge they master well and what they do not. With the help of descriptive criteria for determining knowledge learning results pupils achievements may also be described as follows: we emphasise the quality of individual result, qualitative descriptions make it possible to understand achievements in relation to pupils' abilities, their former results and in relation to the context. They serve to both, teachers and pupils for teaching and learning, for setting learning objectives and, of course, to establish the final mark. Žakelj and Magajna (2003) determined a selection of general criteria for mathematics, for planning of teaching process for mathematics, as well as to formulate the feedback information for pupils about their acquired knowledge. First of all they identified the areas to be monitored: pupils' understanding of concepts and procedures, of communicating and solving as well as studying problems.

When selecting areas it is necessary to be careful about including only those areas that we want to test, i.e., the knowledge, skills and competences, we want to encourage, and which are based on the subject objectives. We have to avoid choosing the most obvious, easy recognisable areas showing only the most evident successes and failures of pupils and neglecting those areas that show a universal

comprehensive achievement while fully respecting the ways (processes) which bring the result (Sentočnik, 2004).

The qualitative criteria do reach their objective if they are presented also to pupils. Pupils are expected to know them in advance, before dealing with a certain learning contents. Teachers use them when *planning activities* for instruction as well as for the production of the feedback information for pupils about their acquired knowledge. Teachers use them to present to pupils the achieved objectives and learning results, to point at pupils' potentials or possible gaps in their knowledge. This way, teachers by using descriptive criteria, through a dialogue explain to pupils the mark from a qualitative aspect and not only on the basis of collected points.

All these moments make an important contribution to the democratisation of the relationship between pupils and teachers as well as to a more active attitude of pupils to learning and assessment of knowledge. And teachers who encourage pupils to active participation in the instruction and combine learning and teaching, testing and assessment, acquire during this process qualitative feedback information on pupils' advancement (Marentič Požarnik, 2000).

Methods

Teachers carry out testing and assessment of knowledge quite differently: some of them regularly establish assessment criteria, present them to pupils, explain marks to pupils, discuss with pupils the testing results, others do that very rarely or never. Furthermore, teachers give pupils directions when preparing for instruction. They give homework to pupils regularly, systematically or only occasionally; some of them announce the content and the assessment criteria, others do that only occasionally.

In our research we focused on the following:

- what is the connection between pupils' results in the *national (external) assessment of knowledge* in mathematics and Slovenian language, and the approaches in the internal (school) testing and assessment within the instruction of mathematics and Slovenian language;
- are there any differences in the knowledge testing and assessment approaches between the teachers of mathematics and teachers of Slovenian language, and if yes, what are those differences.

For our study we implemented the descriptive and causal – non-experimental method of empirical researching. The sample covered 1454 pupils coming from the ninth grades of Slovenian primary schools, from which 54% of girls and 46 % of boys. Questions in the questionnaire referred to the approaches of teachers to testing and assessment of knowledge. Part of the questions was logically adapted from the questionnaires on *Identifying and providing quality assurance for National Examination Centre of the Republic of Slovenia and the study PISA 2006* (OECD, 2007). The implemented survey questionnaire contained provided measurement characteristics and is sufficiently reliable.

We statistically processed the data in line with the purposes of the research with the help of programme packages SPSS, RUMM2020 and R 2.8.1. We implemented: basic descriptive statistics, Pearson's correlation coefficient, Wilcox test of differences with predetermined rankings, the reliability analysis through classical testing theory (Guttman-Cronbach coefficient α).

Results

Marks for mathematics and Slovenian language in the 7th, 8th and 9th grade

In connection with this question we focused on final marks of pupils from seventh to ninth grade in mathematics and Slovenian language and then the connections with the results in the national assessment of knowledge. Both, in case of mathematics as well as in case of Slovenian language the number of marks "sufficient" increases from the seventh to the ninth grade, and the number of "excellent" marks from the seventh to the ninth grade decreases a lot, both in mathematics and Slovenian language. Similar results are provided by the Slovenian Statistics Office for the school years 2004/05, 2005/06 and 2006/07 (http://www.stat.si).

The number of excellent marks slightly increases in mathematics on the ninth grade compared to the eighth grade, and in Slovenian language the number of excellent marks from seventh to eighth and from eighth to ninth grade decreases.

The correlation coefficients between the marks in all three grades and the results at the *national assessment of knowledge* are increasing from grade to grade, both in mathematics as well as in Slovenian language and are from r_{xy}=0.63 to r_{xy}=0.68 in Slovenian language and from r_{xy}=0.67 to r_{xy}=0.71 in mathematics. Thus, we have an important statistical connection between the final marks in Slovenian language and mathematics and the results of the *national assessment of knowledge*. On these grounds we could ascertain that the marks given by teachers both in mathematics and in Slovenian language are quite objective and have therefore a very good announced value for pupils' success in the *national assessment of knowledge*.

Teachers' approaches to testing and assessment of knowledge

We asked pupils what statements are true for Slovenian language teachers and for teachers of mathematics in reference to their approach to testing and assessment of knowledge. We were interested in whether teachers while testing and assessing knowledge tell pupils what they are expected to know for questioning and written exams; whether they present criteria already before the written assignment; if they explain criteria for oral assessment; if they show any example of good exercise or bad exercise after the written exam; whether there are a lot of bad marks in written exam, if there is more repetition and consolidation in the following lessons and if teachers talk with pupils; and also if teachers help them to improve their knowledge in case there are a lot of low marks.

Approaches of teachers of Slovenian language and mathematics to testing and assessment of knowledge

The results show that a lot of teachers both for Slovenian language and mathematics tell in advance the content of testing and knowledge assessment, but not the criteria for testing and assessment. Hence, 67.0 % of pupils think that Slovenian language teachers often or always tell in advance what they are expected to know for testing and assessment, and in case of mathematics only 73.0 % of pupils agree with it. According to the opinion of pupils majority of teachers do not present the criteria for written exams in advance. Thus, only 27.0 % of pupils think that teachers of Slovenian language often or always present assessment criteria before the written exam. In case of mathematics this percentage is slightly bigger,

however, even for mathematics only 40.0 % of pupils think that teachers of mathematics often or always present criteria of assessment before written exam.

Pupils' answers show that a discussion on reasons for failure in examinations and the presentation of more or less successfully written tests of individual pupils selected by teachers is not a usual practice in the instruction of mathematics and Slovenian language.

Only 32.0 % of pupils claim that Slovenian language teachers often or always show examples of good or bad assignments. And in case of mathematics this activity is recognised by 43.0 % of pupils. Mathematics teachers decide slightly more often than teachers of Slovenian language to discuss problems and for more consolidation. In case written exam results in several low marks, 43.0 % of pupils consider that teachers of Slovenian language often or always talk to them about the reasons to this situation. And in case of mathematics such activity is detected by 53.0 % of pupils. There is also more repetition and consolidation in mathematics than in Slovenian language. Following the opinion of 46.0 % of pupils they have more repetition during the next lessons when there are more low marks**.** And in mathematics this teachers' activity is noted by 60.0 % of pupils.

Most of the correlation coefficients among the enumerated variables and results in the national assessment of knowledge in mathematics and Slovenian language ranged between 0.000 and 0.114, which could have meant that the stated factors did not have a direct connection with the results of pupils in the national assessment of knowledge. From this we may conclude that none of those factors has a decisive impact. Low correlation coefficients between the above enumerated variables and the results in the national assessment of knowledge should give us an incentive to carry out further research work on the approaches to the testing and assessment of knowledge having influence on the quality and sustainability of pupils' knowledge.

And on the other hand, we should be aware of the fact that pupils often experience instruction differently from teachers' expectations which entails different answers of teachers and pupils to the same questions so (Ivanuš Grmek et.al., 2007, Kalin et.al., 2009); we should, therefore, pay much more attention to joint reflection on learning process, what has been often referred to by Cencič (2009).

Comparisons between the approaches of Slovenian language teachers and teachers of mathematics

As it may be seen from the ranking averages, teachers of mathematics more often than Slovenian language teachers do the following:

- tell what pupils should know,
- present assessment criteria,
- after assessment show examples of good and bad exams,
- have more repetition in case of bigger number of negative marks and talk with pupils about the reasons for a given situation,
- last, but not statistically significant, they also explain more often the oral marks to pupils.

To sum up, in terms of larger cooperation with pupils the results unveil advantages for teachers of mathematics, in comparison to Slovenian language teachers, what concerns their approach to testing and assessment of knowledge.

Discussion

The study results have shown that marks at schools, both in mathematics and in Slovenian language, have a high predictive value also for the success in the *national assessment of knowledge*. As regards the teachers' approaches to testing and assessment of knowledge the study has shown that a large number of Slovenian language and mathematics teachers convey the contents and assessment criteria in advance, and also tell *what pupils should know* in case of questioning and written exams; both often explain the marks pupils get in oral assessment, however, they more rarely explain criteria for written assessments.

In case of teachers' telling pupils in advance what they should know, there are significant differences between teachers of mathematics and Slovenian language teachers. Teachers of mathematics statistically significantly more often tell in advance what pupils should know than teachers of Slovenian language. As regards explaining oral assessments there are no statistically significant differences between teachers of mathematics and Slovenian language. Both often explain oral assessments.

Discussion about the achieved results, about the reasons for success or failure, about criteria of assessment, significantly contribute to the increase of learning motivation, to the building of one's knowledge and consequently to the increase of the knowledge assessment culture. Facing different views or oppositions with arguments disagreement stimulates pupils' curiosity and cognitive conflict, having impact on conceptual changes. Various solving strategies usually include also different contents and thus make it possible to have an insight into the interconnection of knowledge.

How pupils will tackle certain exercises and what relation they will have to the learning subject cannot be influenced only by their values and interests; an important moment in providing pupils' active participation in the instruction is contributed also by teachers' actions (Žakelj, Grmek, 2010). For pupils' advancement correct feedback that is conveyed by teachers is vital. Teaches have strong influence on the pupils' inner motivation as well as on the acquisition of deeper knowledge also through their approaches to how they convey to pupils feedback information on the attained knowledge. Teachers use of descriptive assessment criteria for describing and explaining marks and teachers' actions, when they talk with pupils about why their knowledge was insufficient, may have, if they are well prepared and transferred, an explanatory and applicative power, which enables pupils to have an insight into their own achievements (Rutar Ilc, 2008). Solely formalistic presentation of marks and collected points in tests do not touch very much pupils' attitude towards how to learn a certain subject; sometimes they may even have a negative impact on their relationship to knowledge (Marentič Požarnik, 2000).

This information reminds us that teachers should pay more attention to talking with pupils about the assessment criteria, about typical mistakes in the exams, and also for explaining marks to pupils. All this significantly contributes to the enhancement of pedagogical approaches in the assessment of knowledge (Gipps, 1994) and to the increase of knowledge assessment culture. Here it is important to stress the quality of each individual result, and the qualitative description should help pupils understand their results in relation to their capability, their previous achievements and to the context. (Ivanuš, Grmek, Javornik, Krečič, 2004).

On the other hand, the formation of pupils' views is largely influenced by external factors. The researchers (Caplan, Choy and Whitmore, 1992), who found out surprisingly high results of Indo-Chinese refugee children in American schools, attributed pupils' high results to values. The above mentioned authors ascertain (ibid), that the pupils' success is closely influenced by dynamic and motivational dimensions, since they represent the objectives we are striving for. Musek (1993) also underlines that values are an important regulator of behaviour, since they influence the assessment of phenomena and making decisions for action. They represent a certain kind of standards on the basis of which we measure and evaluate things. For the parents of children coming from middle and higher social classes it seems logical that their children will continue their education which again influences children's learning motivation (Robertson, 1989). The ambitions of parents and their expectations regarding their children's education are important. Interviews with parents have shown that they are fully aware of how important education is for inclusion into a new environment, though they did not have it themselves. (Caplan, Choy and Whitmore, 1992). They believed that their children will influence their own destiny through their diligent learning, which does not depend only on pure luck, but also on persistence and effort.

If we take a look at knowledge from a broader perspective, we cannot avoid the interpretation which places knowledge into a wider context, where the so called demonstrated knowledge is not influenced only by the instruction quality, but this variable is joined also by several other variables as for example, the quality of pupils' lifestyle, encouraging or discouraging environment where pupils come from (Toličić and Zorman, 1977; Serpell, 1993; Malačič et. all, 2005; Žakelj at. all, 2009; Žakelj and Ivanuš Grmek, 2010), as well the intellectual abilities of each individual (Marjanovič Umek at. all., 2006). Education, and creativity linked to it, as well as social context are intertwined among them and compose a wide range of factors that influence the performance of each individual at school and later on his vocational status.

Conclusion

The pupils' results in the *national assessment of knowledge* are important feedback information for teachers and school leaderships since they can on the basis of deepened analysis of results, which their pupils achieved in the *national assessment of knowledge*, think more deeply about learning and teaching and on these grounds prepare the strategy for the improvement of work. We can learn from the results of the *national assessment of knowledge* what are the advantages and weaknesses in the knowledge of a certain class, school and in general. Fully respecting other factors (e.g., social structure of population, proportion of pupils for whom Slovenian language is not their mother tongue, the share of pupils with special needs) we can make conclusion on (in)adequacy of conditions for instruction (curricula, textbooks, teachers' qualification and training, etc.), which is the first step towards the improvement of learning and teaching. Here, one should not overlook, that also social and cultural environment in which pupils are embedded significantly influences the quality of pupils knowledge; this has in the recent years also been pointed at by the fact that the average results of the national assessment in some Slovenian regions are significantly lower than the national average and than

the average results reached by pupils in some other regions (Žakelj and Ivanuš Grmek, 2010).

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