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Papers are published in English. A paper may comprise an empirical study using an acceptable research strategy, such as survey, case study, experiment, archival analysis, etc. It may contain a theoretical study aimed at advancing current theory or adapting theory to local conditions or it may arise from theoretical studies aimed at reviewing and/or synthesizing existing theory. Concepts and underlying principles should be emphasized, with enough background information to orient any reader who is not a specialist in the particular subject area.

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The paper. The paper is carefully formatted according to the template of the journal (see bellow). Special attention is paid to the exact application of the Harvard referencing convention to both continuous citations and list of references. If an electronic source has the DOI number assigned, also it will be provided in the list of references. Manuscripts are submitted via the editorial system in the DOC.

Research highlights. The core results, findings or conclusions of the paper are emphasized in 1-3 bullet points (max. 100 characters per bullet point including spaces). The highlights are submitted as a text into the submission form in the editorial system.

Copyright form. The submission of a paper will imply that, if accepted for publication, it will not be published elsewhere in the same form, in any language, without the consent of the Publisher. The manuscript submitted is accompanied by the copyright form signed by the corresponding author who declares the agreement of all authors with the conditions in the Form. The Form is submitted into the editorial system in the PDF format.

Suggested reviewers. It is required to suggest two experts appropriate to evaluation of the paper. The experts should be out of the affiliation of the author(s), Czech University of Life Sciences Prague, and also both experts should be from different affiliations. The reviewers are submitted into the text fields in the submission form of the editorial system.

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# EDITORIAL

The Journal on Efficiency and Responsibility in Education and Science (ERIES Journal) has come a long way since the first issue was published in March 2008. Initially the ERIES Journal was published twice per year, but later, at the beginning of 2011, the Editorial Board decided to increase the number of issues to 4 per year. Since the first issue of Volume 4, the ERIES Journal has been publishing as an E-journal 4 times per year. This current issue of the ERIES Journal, which you hold in your hands, is the first issue which is also published in a print version (ISSN 1803-1617). Over the last 6 years many interesting articles have been published.

In this first printed issue we have articles from Charles University in Prague, the Czech University of Life Sciences Prague, and Mendel University of Agriculture and Forestry in Brno. We are glad that the journal constantly attracts researchers, academics and authors from various institutions, and the Editorial board is committed to continuously improve the ERIES Journal quality.

Jarmila Novotná from the Faculty of Pedagogy, Charles University in Prague and her co-authors Petr Eisenmann, Jiří Příbyl, Jiřina Ondrušová and Jiří Břehovský, present an interesting research paper about developing pupils' creativity approach to solve mathematical problems using heuristic strategies. Their work discusses the question of whether a short-term work of three months can result in an improvement of pupils' abilities.

Ludmila Natovová and Hana Chýlová from the Czech University of Life Sciences Prague address the question of the mutual relationship of the perceived self-efficacy, well-being and particular health-promoting behaviours of 211 students from the Faculty of Economics and Management at CULS Prague. Self-efficacy, well-being and health-promoting behaviours are assessed according to the Czech version of the General Self-Efficacy Scale, Stress Vulnerability Scale and Czech version of the Satisfaction with Life Scale. Their results show significant correlations between all examined variables.

Yvona Kostecká and Antonín Jančařík from Charles University in Prague bring an interesting study focused on the issue of the linguistic integration of foreign children into the Czech primary system. The study shows, among others, that children who were born to foreigners in the Czech Republic, or who moved to the country at a very young age, do not usually have language problems that complicate their integration into the Czech school system. On the other side, children born outside the Czech Republic who move to the country at a later age do face problems fulfilling the requirements of the school curricula.

The last article from Tomáš Foltýnek, Julius Kravjar and Irene Glendinning discusses and summarises the problem of Plagiarism in Slovakia. This subject is currently also very topical in an international context, not only in Slovakia or the Czech Republic. The achieved results for example show that an incredible 99% of Slovakian students became aware of plagiarism during their bachelor studies. The authors of this short communication also compare their results with other European countries.

We hope that all our readers will find this first printed issue, and all the articles mentioned above, interesting. Moreover, we also hope that the ERIES Journal will continue to contribute to the field of the efficiency and responsibility in education as it has so far. With this first editorial we would like to thank all the authors and reviewers who have contributed in increasing the ERIES Journal quality.

Sincerely,

prof. RNDr. Jaroslav Havlíček, CSc.

*Editor-in-Chief*

# PROBLEM SOLVING IN SCHOOL MATHEMATICS BASED ON HEURISTIC STRATEGIES

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## Highlights

- Even short-term work can bear positive results to pupils' approach to problem solving.

## Abstract

The paper describes one of the ways of developing pupils' creative approach to problem solving. The described experiment is a part of a longitudinal research focusing on improvement of culture of problem solving by pupils. It deals with solving of problems using the following heuristic strategies: Analogy, Guess – check – revise, Systematic experimentation, Problem reformulation, Solution drawing, Way back and Use of graphs of functions. Most attention is paid to the question whether short-term work, in this case only over the period of three months, can result in improvement of pupils' abilities to solve problems whose solving algorithms are easily accessible. It also answers the question which strategies pupils will prefer and with what results. The experiment shows that even short-term work can bear positive results as far as pupils' approach to problem solving is concerned.

## Keywords

Problem Solving, Solving Strategies, Strategy of Analogy, Graphical Representation, Systematic Experimentation, Strategy of Reformulation, Way Back

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## Introduction

It is a truth universally acknowledged that problem solving forms the basis for successful mathematics education; solving of carefully selected problems helps to develop, refine and cultivate creativity (Kopka, 2010, Foreword). How can one tell whether a pupil has learned anything from mathematics? It is generally acknowledged that problem solving is an indicator of the state of grasping concepts and ideas pupils are learning. Problem solving skills develop fast if the solver gets new and new experience with the activity. Pupils' performance in problem solving improves if they repeatedly meet the same type of problem or if they can make use of their previous experience (Eysenck, 1993).

A teacher's attitude and the teaching strategies he/she uses significantly influence educational outcomes, see e.g. (Švec, 2012). Observations from Czech schools suggest that pupils as well as teachers prefer problems in whose case the algorithm suitable for their solution is apparent, in whose case there are no doubts about the choice of the suitable algorithm (Novotná, 2000). In that case the class does not have to undergo the painstaking procedure of looking for this algorithm and can omit the often lengthy and difficult journey to grasping of the problem. The role of the teacher is simpler, he/she only has to detect the place where pupils make mistakes and assess correctness of their solutions. That is the reason why teachers often choose problems in whose case the search for the appropriate algorithm is easy and also often hint at the suitable solving procedure. This means pupils instead of solving a problem simply apply some algorithm chosen according to the signals from the assignment or the teacher. Then they fail if they are to solve non-standard problems whose assignment does not contain elements they are

used to, elements that serve as indicators for selection of the right solving strategy. They feel helpless if they face an atypical, unusual problem or a problem set in an unknown context. Needless to say that this often happens in case of application problems, where pupils are expected to use mathematics for solution to problems from everyday life.

One of the indicators telling a teacher whether a pupil understands the subject matter is the pupil's ability to come up with new, original solving procedures when solving a new problem.

But this is something a teacher cannot teach directly. He/she can expect this approach from their pupils, he/she can ask for it, support them in it but he/she cannot teach it (Sarrazy and Novotná, 2013). This is one of the key concepts of didactics of mathematics, the didactical contract and paradoxes connected to it (Brousseau, 1997).

Looking for ways of improvement of understanding in mathematics has been in the centre of attention of a number of researches and comparative studies worldwide. Examples of these are for example two large scale studies – TIMSS a PISA. Between 1995 and 2007 Czech pupils' achievement in mathematics was declining; since 2007 a statistically significant improvement has shown on the level of 4<sup>th</sup> graders. The decreasing achievement of Czech pupils occurred also in PISA between 2003 and 2009. That is why it is important to look for ways of improving the situation (Mullis et al., 2012; OECD, 2010).

Changes in approaches to problem solving in school practice depend on changes in teachers' attitude and approaches to mathematics education, see e.g. (Tichá and Hošpesová, 2006).

Obviously the necessary condition for teaching mathematics via problem solving without transmission of ready-made knowledge, i.e. condition for creative solving, is teachers' solid knowledge of mathematics, their own experience with creative approach to problem solving, but also sufficient information and materials ready for use in the classroom. Important is the so called specialized content knowledge (Ball, Thames and Phelps, 2008); this knowledge includes identification of key mathematical concepts and possibilities in the given activity, recognition of different forms of representation of mathematical concepts and operations and other strengths and weaknesses. The paper has been developed as extension of the paper (Novotná et al., 2013).

## Our research

the sense of production of original solutions to unusual situations) are shown. Attention is paid especially to the possibilities a teacher has to change their pupils' approach to problem solving from using algorithms they had been told to creative search for suitable, albeit "unschool-like" strategies. This research is part of a longitudinal research focusing on improvement of culture of problem solving by pupils (Břehovský et al., 2013).

The key questions of mathematics education are: Should the teacher direct his/her teaching towards good mastery of algorithms or towards development of students' creativity? Should all students or only the highly able ones be given the opportunity to work creatively? (Sarrazy and Novotná, 2013)

## Theoretical framework

One of the approaches to the teaching/learning process perceives this process as a sequence of situations (natural or didactical) whose result is modification of a student's behaviour typical for getting new knowledge (Brousseau, 1997).

The concept of "problem solving" is a very loosely defined notion, a kind of umbrella term for a number of different theoretical approaches (Nesher, Hershkowitz and Novotná, 2003). If we admit that solving a genuine problem is not just a matter of following a particular algorithm, we have to define heuristic strategies used for their solution. First Polya (1945) and then Schoenfeld (1985) suggested several general strategies for solving word problems based on questions like: What is the unknown? What are the data? What are the conditions? Do you know a related problem that has already been solved? Prepare a plan for the solution. Verify the gained results.

Fan and Zhu (2007) list among heuristic strategies also the following strategies: "Draw a diagram", "Guess and check", "Look for a pattern", "Make a systematic list", "Use before/after conception". Eisner (1982), Sanford (1985), Kaufmann (1985) state that it is visual imagination which is crucially important in problem solving. Stacey (1991) characterizes the "Trial and error strategy" as an intuitive strategy that anybody can use.

## Studied heuristic strategies

The developed heuristic strategies are the author's modification of strategies published in (Kopka, 2013) and (Polya, 2004).

*Strategy of analogy:* Analogy is a type of similitude. If we are to solve a particular problem we find an analogical problem, i.e. a problem that will deal with a similar problem in a similar way. If we manage to solve this similar problem, we can then apply the method of its solution or its result in the solution to the original problem.

*Guess – check – revise:* This is a strategy in which we first, drawing from our experience, make a guess about the solution to the given problem. Then we check whether the solution meets the conditions of the assignment. The next guess is made with respect to the previous result. We carry on in this way until we find a solution.

*Systematic experimentation:* Systematic experimentation is a strategy in which we try to find the solution to a problem using several experiments. First we apply some algorithm that we hope will help us solve the problem. Then we proceed in a systematic way and change the input values of the algorithm until we find the correct solution.

*Problem reformulation:* When using this strategy we reformulate the given problem and make another one which may either be brand new, is easier for us to solve and whose solution is either directly the solution to the original problem or facilitates its solution. A specific and very important example of this strategy is translation of a word problem from one language of mathematics to another. Classical geometrical problems such as trisection of an angle were easy to solve when translated to the language of algebra.

*Solution drawing:* When using graphical representation we usually visualize the problem by making a drawing. We write down what is given and often also what we want to get. The drawing we get in this way is called an illustrative drawing as it illustrates the solved problem. Sometimes we can see the solution of the problem immediately in this drawing. However, in most cases we must manipulate with the drawing (e.g. we add suitable auxiliary elements) and we solve the problem with the help of this modified drawing. We call this drawing the solution drawing.

*Working backwards:* This is a very common strategy in mathematics. We assume that what we have to find/prove/construct holds/exists. Then we try to deduce from this assumption something we already know or something that is easy to prove/calculate/construct. Thus we in fact try to get from the end to the starting situation as close as possible. The procedure is reverted in the final calculation/proof/construction.

*Use of graphs of functions:* When there are functions in the problem assignment or when it turns out within the solving process that it is desirable to introduce functions then it is usually good to draw graphs of these functions. These graphs often considerably contribute to finding the solution to the given problem.

## Material and methods

The paper describes assessment of the first stage of a short-term experiment from our research. The experiment was carried out in two lower secondary schools in Ústí nad Labem (7<sup>th</sup> grade – 26, resp. 28 pupils aged 13) and two upper secondary grammar schools (Most and Lovosice – third grade–19, resp. 11 students aged 18).

The experiment lasted three months. In this period the teachers presented to their pupils and students prepared problems (in total about 30) that could be efficiently solved using the above described heuristic strategies. They were those general strategies that do not seem natural to the pupils, that they rarely or never come across at school but are very useful.

In case of lower secondary schools these strategies are the strategies of Analogy, Working backwards, Guess – check – revise and Systematic experimentation. In case of upper secondary grammar schools these strategies were Problem

reformulation, Solution drawing, and Use of graphs of functions. The aim of this work was to make pupils and students use these strategies correctly.

The teachers were given a sufficient number of problems that can be solved using one of the above described strategies. Most often they were such problems in whose case the use one of the strategies results in faster, more efficient or elegant solution to the given problem. Most of the used problems were developed by authors of this paper or are their modifications of problems published in Czech collections of mathematical problems. In case that the problem is borrowed from a publication, the publication is cited.

Teachers kept an updated record of spontaneous use of any of the discussed strategies by their pupils and their reaction to the expected solution reached with the help of this heuristic strategy. Problem solving always had constructivist form. There was always some pupil or student who demonstrated and explained their solving procedure to other pupils. The teachers encouraged their pupils to search for more solving procedures. This approach to solving was used both in case of problems from the lessons targeted at the current subject matter and short problems used as warm-up activities in the beginnings of some lessons.

The pupils sat an initial and a final test in the beginning and end of the experiment. These tests consisted of 4 to 5 problems.

#### *Conditions of the test:*

The pupils were given the time limit of 40 minutes. They were allowed to use simple calculators and computers on their desks. All the pupils had basic skills in use of spreadsheet Excel. There was no significant intervention of the teachers in the solving process.

In the following section we show the solved problems. In case of each of the problems we also name the heuristic strategy that leads to efficient solution. We present a short illustrative use of the stated strategy.

#### *Lower secondary school:*

1. A car covered the distance of 420 km and used up 29 l of petrol. What was its average petrol consumption per 100 km?

Efficient solving strategy: Analogy

We formulate a problem that is easier numerically and evoke the process of finding the solving procedure: *A car covered the distance of 200 km and used up 16 l of petrol. What was its average petrol consumption per 100 km?*

The answer lends itself automatically – the average car consumption per 100 km was 8 litres.

How did we arrive at this result? The calculation can be reconstructed as follows:  $16/(200/100) = 8$ .

Let us now return to the original problem and let us solve it in the same way. The answer is: The average consumption of the car per 100 km is about 6.9 litres.

2. (Cihlár and Zelenka, 1998). State the two consecutive odd numbers whose product is 323. Efficient strategy: Guess – check – revise

In Table 1, one odd number is chosen arbitrarily and the consecutive odd number and the product of both are calculated. The last column indicates if the numbers solve the assigned problem or if we have to start again with a greater or smaller odd number. The process is repeated until the solution is discovered.

First odd number	Second odd number	Product	Is it 323?
1	3	3	No. The product is (too)small.
11	13	143	No. The product is small.
21	23	483	No. The product is small.
19	21	399	No. The product is small.
17	19	323	Yes. It is the solution.

**Table 1: Example of Guess – check – revise**

The answer is: The sought numbers are 17 and 19.

3. The number is ten less than twice the number. What number is it?

Efficient solving strategy: Systematic experimentation

The experimentation was conducted using a spread sheet.

n	n + 10	2n	Does n + 10 = 2n hold?
1	11	2	No
2	12	4	No
3	13	6	No
4	14	8	No
5	15	10	No
6	16	12	No
7	17	14	No
8	18	16	No
9	19	18	No
10	20	20	Yes

**Table 2: Example of Systematic experimentation**

The answer is: The desired number is 10.

4. When driving on the motorway, an interesting symmetrical number showed on my odometer: 24942. After two more hours of driving there was another interesting symmetrical number on the odometer. What number was it? Did I observe the speed limit?

Efficient solving strategy: Systematic experimentation

In systematic experimentation, one can use spread sheet and in a finite number of steps, the solution will be discovered quite fast (use of ICT is not essential but it facilitates calculations). If we take into account conditions of the context we realize that the number on the odometer is 24942. Having driven on the motorways for only two hours, the figure in the position of tens of thousands cannot change. Then it is obvious, that also the figure in the position of units cannot change. Therefore the number of steps needed to find the solution decreases. In Table 3, the digit in the place of hundreds regularly increases by 1 and the other two digits are changed correspondingly in such a way that the number remains symmetrical.

Step	On the odometer	Covered distance	Average speed
0	24942	0	0
1	25052	110	55
2	25152	210	105
3	25252	310	155
4	25352	410	205

**Table 3: Example of Systematic experimentation**

Table 3 shows the first number that can be observed on the odometer is 25052. In this case, the driver was observing the speed limits. The next symmetrical number that can be observed on the odometer is 25152. And also in this case the driver was observing the speed limits. If speed limits are observed, the following symmetric number cannot be come across on the odometer.

The answer is: The maximum speed on the motorway in the Czech Republic is 130 km/h. It is obvious that if we observe the speed limits, only 25052 or 25152 can be come across on the odometer. If the driver drives faster than is allowed, in addition numbers 25252 and 25352 can be come across on the odometer.

5. Adam says: "I first lost one half of my glass marbles and then one half of what was left. Now I have 19 glass marbles." How many glass marbles did Adam have in the very beginning?

Efficient solving strategy: Working backwards

At the end, Adam had 19 marbles. Before the second loss, he had twice as many, i.e. 38 marbles. Analogically before the first loss, he had 76 marbles.

The answer is: At the very beginning, Adam had 76 marbles.

Note: In case of using an equation (which is fully legitimate in this case) the solver faces the necessity to express the "half of the half from the previous step"  $(1/2)[x - (1/2)x]$ . This might be a difficulty that the solver can prevent if they use the Working backwards strategy.

Upper secondary grammar school:

1. Determine the number of all roots of the equation  $x^2 = 2^x$ .

Efficient solving strategy: Using graphs of functions.

In Fig. 1 there are graphs of both functions  $x^2$  and  $2^x$ . The roots of the equations are represented by the intersection points of the graphs.

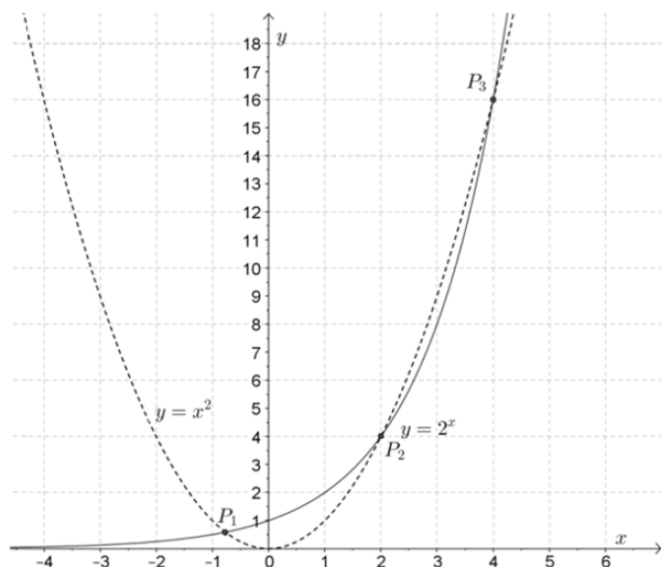


Figure 1: Graphical representation of the roots of the equation

2. (Zeitz, 2007). let there be a square inscribed in a circle and the circle be inscribed in a square. Determine what part of the larger square is formed by the smaller square (see Fig. 2).

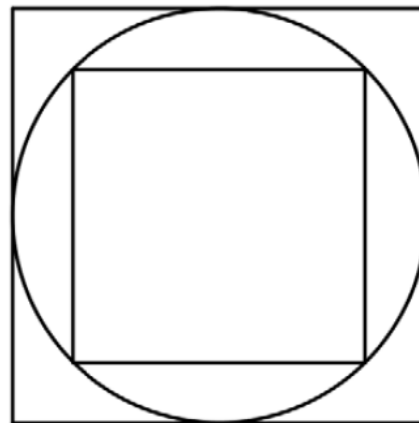


Figure 2: Figures assigned in Problem 2

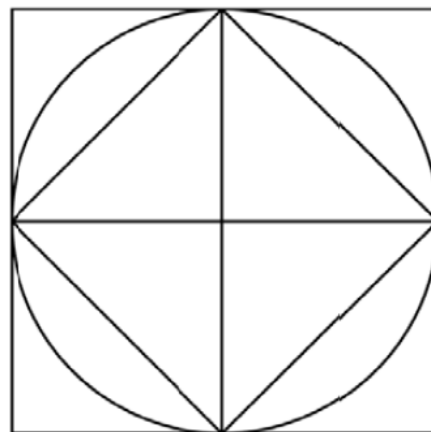


Figure 3: Solution drawing

Efficient solving strategy: Solution drawing (see Fig. 3).

3. Decide which of the fraction is greater:  $125/126$  or  $124/125$ .

Efficient solving strategy: Problem reformulation

The assignment of the reformulated problem: *Let us have two equal pizzas (congruent circles). Let us cut the first one to 125 equal parts and the other to 126 equal parts. We eat one piece of each of the pizzas. In which pizza is there more left?*

4. (Maláč and Kurfürst, 1981). Calculate the area of the "drop" whose circumference is composed from circle arcs. Data in Fig. 4 are given in centimetres.

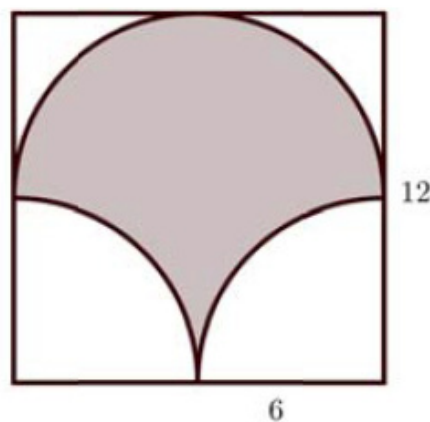


Figure 4: Figure assigned in problem 4

Efficient solving strategy: Solution drawing

Fig. 5 justifies that the area of the "drop" equals the area of the rectangle with the lengths of sides 6 cm and 12 cm.

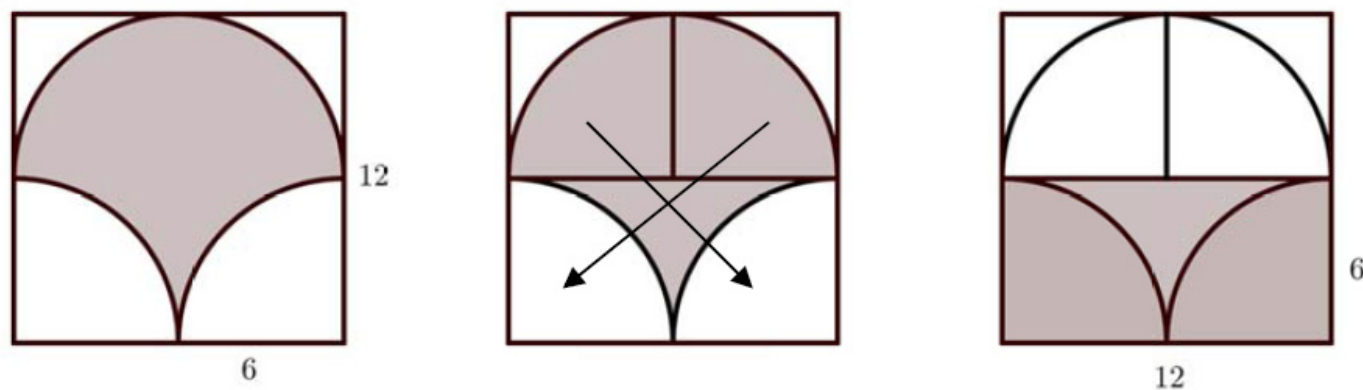


Figure 5: Movement of figures

The answer is: The area of the drop is  $72 \text{ cm}^2$ .

## Results

### Research questions

1. Is it possible to achieve any progress in the ability to solve mathematical problems using the above described heuristic strategies for such a short period of time (3 months)?
2. In case of which strategies is this possible and which cannot be “implanted” in such a short period of time?
3. Does the above described work of the teachers with the pupils and students have any side effects?
4. If so, are they positive or negative?

### Lower secondary school:

Strategies trained: Analogy, Working backwards, Guess – check – revise and Systematic experimentation.

1. There was no significant progress in the use of the strategy of Analogy. This shows that the three month period was too short.
2. There was a considerable progress in the use of both strategies based on experimentation, i.e. Guess – check – revise and Systematic experimentation. Having compared the initial and the final tests it can be stated that the growth in use of this strategy was 30% percent. Moreover, almost all problems solved using these solving strategies in the final test were solved correctly. And the situation was similar in case of the strategy Working backwards was more frequent in the final tests. This shows that also this strategy is a heuristic strategy that can be learned by repetition (after a short use).

### Upper secondary school:

Strategies trained: Problem reformulation, Solution drawing and Use of graphs of functions.

1. There was no significant progress in the used strategies of Problem reformulation and Solution drawing. This shows that the three month period was too short.
2. There was significant progress in the use of the strategy Using graphs of functions. Having compared the initial and the final tests it can be stated that the growth in use of this strategy was 50% percent. Moreover, almost all problems solved using this solving strategy in the final test were solved correctly.

## Discussion

Results of the short-term experiment discussed in this paper are promising. This is confirmed not only by the observed changes in the use of solving strategies by the pupils but also by spontaneous comments of the teachers involved in the experiment. In general, the teachers stated the following:

- Some pupils and students (about one half of them) stopped being afraid to solve word problems at the end of the experiment, they stopped withdrawing from the solution in case they were not sure of how to solve them from the very beginning.
- They learned to look for the solution, not to give up.
- Also pupils and students who used to be passive in lessons of mathematics started to get involved in problem solving.
- Pupils and students started to comment on their solving procedure, justify it and in case of written solutions produce a verbal answer.

In case of upper secondary schools (where one of the developed strategies was the strategy Use of graphs of functions) both teachers involved in the experiment also stated the following:

- Students began to use graphs of functions for problem solving even in situation when this would not have occurred to them before. In other words they started to use graphs of functions spontaneously as one of the possible solving procedures.

In the experiment presented in this article heuristic strategies of Fan and Zhu (2007) were enriched by two others: the strategy of analogy and problem reformulation. Moreover, the experiment confirmed the importance of visual imagination for problem solving stated by Eisner (1982), Sanford (1985) or Kaufmann (1985).

Not all of the strategies used in the presented experiment can be considered as intuitive strategies that everybody can use (Stacey, 1991); this is valid for two of them: Guess – check – revise and Systematic experimentation.

## Conclusions

Apart from the short-term experiment whose implementation and results are discussed in this paper, we also work on a longitudinal experiment (systematic work for the period of 14 months). We expect the pupils to be able to use actively in the end of this experiment problem solving strategies that they choose as optimal for the specific problem. In this sense we say that their “Culture of problem solving” will improve (for details see e.g. Eisenmann, Novotná and Příbyl, 2013).

The research also focuses on the question which of the explored strategies is most often spontaneously selected by the pupils (i.e. which they find most natural) and which they select rarely or never (i.e. which they find unnatural). And most importantly – what this depends on.

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# THE PROCESS OF CZECH LANGUAGE ACQUISITION BY FOREIGN PUPILS AT LOWER SECONDARY SCHOOL

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## Highlights

- The study results show that there is a significant difference between the needs of learners

## Abstract

The study results show that there is a significant difference between the needs of learners. Learners from related linguistic areas reach the threshold level of language skills very quickly, whereas children with a very different language (in our case, children from Asia) reach the threshold level of receptive skills quickly, but have big difficulties with productive skills. It is therefore necessary to focus on these areas and pay attention to this in Czech-language instruction. The study also shows that children who were born to foreigners in the Czech Republic or who moved to the country at a very young age do not usually have language problems that complicate their integration into the Czech school system, while children born outside the Czech Republic who move to the country at a later age face problems fulfilling the requirements of the school curricula, which are connected with their insufficient acquisition of the Czech language.

## Keywords

Diagnostic test, foreign pupils, children, integration, language proficiency

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## Introduction

The Czech educational system in its modern post-war history has not had a great deal of experience with the integration of foreign children. Following the fall of the Iron Curtain, however, the number of foreign immigrants began to rise, with a particularly sharp increase following the accession of the Czech Republic to the European Union. Between 1985 and 2008 the number of non-nationals residing in the Czech Republic showed a more than ten-fold increase, with numbers increasing from 37,000, approximately 0.36% of the population, to almost 440,000, over 4% of the national population (Drbohlav et al., 2010). Even though the global economic crisis has caused a significant decrease in the number of immigrants in the Czech Republic after 2008, the total positive balance of migration has remained at historically high levels (see Figure 1).

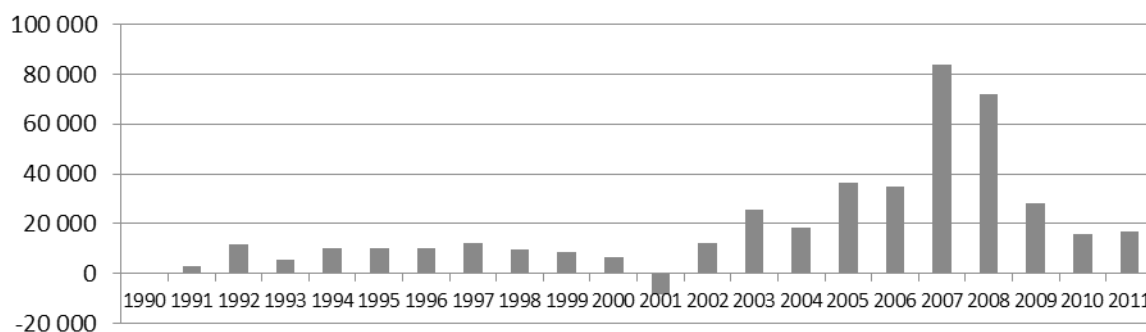
The fall of the Iron Curtain, and especially the period after the Czech Republic joined the European Union, gave rise not only to a change in migration numbers, but also to a change in the immigration structure. Short-term labour migration was progressively replaced by immigrants interested in long-term residency. There was an increase in the number of immigrants coming to the Czech Republic together with their families or who came with the idea of starting a family in the Czech Republic and having children. Czech society, and particularly the Czech educational system, now faces the problem of how to address this newly emerging situation. In the search for solutions to this new situation we can be inspired by the international experience of countries that have a long experience with the integration of foreign pupils in the education system. For example Coleman et al. (1966) deal with the equality of educational opportunity of foreign students in the USA, Vallet and Caille (1999) describe

issues related to the integration of pupils of secondary schools in France, Spiess, Büchel and Wagner (2003) demonstrate the effect of age of the child entering school for the success of school integration. Our surveys carried out in primary schools<sup>1</sup> in Prague in the years 2009, 2010 and 2011 (Kostecká et al., 2010, 2011, 2012) point to the fact that one of the most important factors significantly affecting the successful integration of children with a foreign mother tongue into the Czech primary school system is the ability to communicate in Czech.

The research presented in this article focuses on the issue of the linguistic integration of foreign children into the Czech primary school system. It is a crucial topic because at school these children acquire a key skill: the ability to communicate in the language of the majority society. The ability to master the majority language at the age of compulsory education is in fact the key to success both at school and in the wider society later in life (Remennick, 2003). We concentrated at testing of the validity of two hypotheses about the way how children of foreigners are integrated into Czech school system. We hypothesized that children of foreigners that have been more exposed to the Czech language are doing better in terms of Czech language proficiency. Although the positive effect of length of residence in the host country on language proficiency of immigrants have been widely documented in the foreign literature (Carliner, 2000, Stevens, 1999, Espinosa and Massey,

<sup>1</sup> For the purpose of this article, the term "primary school" will be used to define schools for children between the ages of 6 and 11, and "lower secondary school" for children between the ages of 11 and 15. These two levels make up the period of compulsory education in the Czech Republic.

## Net migration



**Figure 1: Balance of migration in the Czech Republic in the years 1990 -2011, source: CZSO (Population change in the Czech lands 1785 - 2011, absolute figures).**

1997), this relationship was not analyzed among the pupils in the Czech primary schools. We also hypothesized that children from linguistically close language groups (Slavic) would acquire ability to use Czech language more quickly than children from linguistically more distant language groups (Asian). Number of studies prove that such relationships exist: Chiswick and Miller (1996) found that in Australia, Modoof et al. (1997) in the United Kingdom, Tribalat (1995) in France, and Hayfron (2001) in Norway to name some of them. Again, no such study has ever been conducted in the Czech Republic so far.

### Material and Methods

To be able to achieve the above-stated objectives, we first had to develop a diagnostic tool with which to assess the language proficiency of the children tested in relation to the levels defined by the CEFR<sup>2</sup> (Šára et al., 2001, Cvejnová, 2006, Cvejnová et al. 2007) which implies a certain level of independence in communication.

A diagnostic test<sup>3</sup> was designed so as to meet the recommendations of the CEFR, the European Language Portfolio for the given age group and the recommendations of the international affiliated organizations ALTE (The Association of Language Testers in Europe) and EALTA (European Association for Language Testing and Assessment).<sup>4</sup> The diagnostic test was developed to be applicable from zero knowledge of the language to level B2, for children in lower secondary schools. Subtests included all language skills, i.e. both receptive skills, such as reading and

listening, and productive skills, such as speaking and writing. Not only did this tool help us to quantify the progress achieved by immigrant children over a given period of time, but it also enabled us to objectively estimate how much time they needed on average to master the language at the B1 threshold level, and to assess the impact of various types of factors on the speed of learning the language. We also took into consideration the children's nationality/native language and the length of their stay in the Czech Republic<sup>5</sup>. A total of 118 primary school pupils speaking 16 different native languages enrolled in 8 different schools took part in the tests. The schools that participated in the testing met the following selection criteria: they had a large number of foreign pupils and each was located in a different area of Prague (historical centre, inner city, suburbs). The research was a follow-up on a pilot survey similar to this one carried out in 2010.

Reliability and internal consistency of tests were tested by different methods. As a measurement of the internal consistency of the test, an alpha coefficient (see Cronbach, 1951) and a split-half reliability (0.91) coefficient were computed (see Kuder and Richardson, 1937). The alpha coefficient ( $\alpha=0.96$ ) is higher than 0.9, what can be considered as proof of excellent internal consistency of testing. The alpha coefficient is also higher than the split-half reliabilities (which equals to 0.91), which again shows that this test is reliable. The quality of the test is also confirmed by the very high score in the Spearman-Brown Prophecy test (score equals 0.95). To describe the language test results we used descriptive analysis (Horn, 1993). To measure the relationships between language test results and selected indicators describing individual children (length of stay in the Czech Republic, language distance between native language of tested children and Czech language) we used correlation and regression analyses. The more detailed description of actual methods that was used could be found in the specific parts of the text below.

<sup>2</sup> CEFR - Common European Framework of Reference for Languages: Learning, Teaching, Assessment (Council of Europe, 2011).

<sup>3</sup> Each diagnostic test consisted of specifications, a recording script for the diagnostic test, recordings for the listening tasks, a script for the verbal part of the diagnostic test, assessment criteria, an answer key for the tasks, guidelines for examiners and instructions for the full version of the diagnostic test.

<sup>4</sup> In the creation of the test we were taking inspiration from the diagnostic tests the Cambridge ESOL Examinations, English tests for young learners and also from Czech diagnostic tests, namely the Certified Examination in Czech for Young Learners, test developed by Cvejnová et al. (2007) and test for young learners developed by Kostecká et al. (2011). In creating the tests we were also taking advantage of the experience in developing tests and test methods described in the technical literature (for example Harrison 1983, Davies 1990, Smith 1995, Hughes 2003, Hasselgreen 2005, Bachman, Palmer 2009).

<sup>5</sup> We expected that at all schools children are taught by standard methods.

## Results

First of all, the data obtained during the research confirmed, as expected, that the length of stay in the Czech Republic has a positive impact on the level of language proficiency of foreign children enrolled in Czech primary schools. The length of time spent in the Czech Republic had a positive impact on pupils' test performances in all categories. A moderate correlation ( $> 0.5$ , see Table 1) was observed between the length of residence of a pupil in the Czech Republic and the child's achieved scores at each level of the test (A1, A2, B1, B2). There was also a strong correlation ( $> 0.5$ , see Table 2) between the length stay in the Czech Republic and the scores achieved by a child in the subtests dedicated to each language skill separately (listening, reading, writing, speaking). It appears that the length of time in the country has a higher correlation with the results obtained in tests at advanced levels (see Table 1). The length of stay in the country has more effect on the speaking and writing skills of a pupil (see Table 2) than on his ability to read and understand the spoken language (El-Hmoudová and Milková, 2012).

	Total score in tests at A1 level	Total score in tests at A2 level	Total score in tests at B1 level	Total score in tests at B2 level
Length of stay	0.509	0.565	0.596	0.588

**Table 1: Corellation (Pearson correlation coefficient<sup>6</sup>) between the lenght of stay in the Czech Republic and scores at different levels of the language test**

	Total score in subtests Listening	Total score in subtests Reading	Total score in subtests Speaking	Total score in subtests Writing
Length of stay	0.503	0.521	0.613	0.561

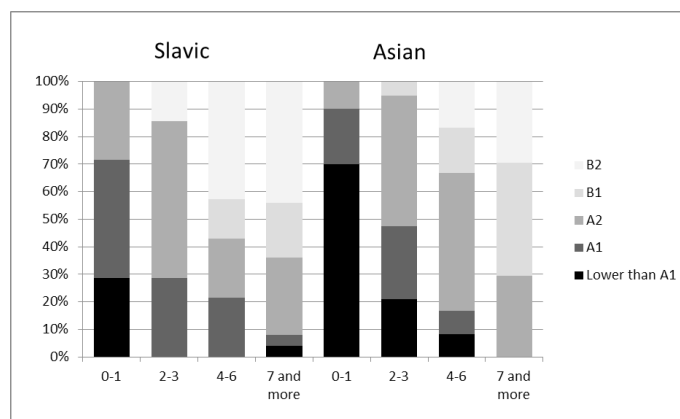
**Table 2: Corellation (Pearson correlation coefficient) between the length of stay in the Czech Republic and scores at different subtests of the language test**

We also sought to discover what is the necessary length of stay in the Czech Republic for foreign pupils to reach the *threshold level*. The test results show that with each added year of residency in the Czech Republic, the number of children who do not reach the threshold level decreases, at least in certain speech skills. Most pupils in lower secondary schools, who were living in the Czech Republic before entering the school system, attain the B1 level in all language skills (Table 3). Nevertheless, the testing showed that even those children who had lived a long time in the Czech Republic country and were attending a lower secondary school may have problems understanding some linguistic specifics, which are culturally conditioned (e.g. they do not understand proverbs).

Length of time in the CR (years)	Lower than A1	A1	A2	B1	B2
0-1	10	5	3	0	0
2-3	4	7	14	1	1
4-6	1	4	9	6	8
7 and more	1	1	13	13	17

**Table 3: Absolute number of children tested according to the highest attained language skill level and the length of time they had been in the Czech Republic (the level is attained when the success rate of each language skill subtest is at least 60%)**

During the survey we also observed the differences in the speed and the method of Czech-language acquisition by children whose native language belongs to the Slavic language family and is therefore related to Czech (53 pupils), and children who come from linguistically and culturally different regions, in our test these were children from an Asian background (58 pupils). It appears that learners whose background is in a language related to Czech have a strong advantage mainly during the first years they reside in the Czech Republic (see Figure 2) and reach a higher level earlier than learners from linguistically and culturally different (i.e. non-Slavic) backgrounds. Students from Asian countries who enter school upon arriving in the Czech Republic have absolutely no or almost no knowledge of the Czech language. These differences progressively disappear as the length of time in the Czech Republic increases.

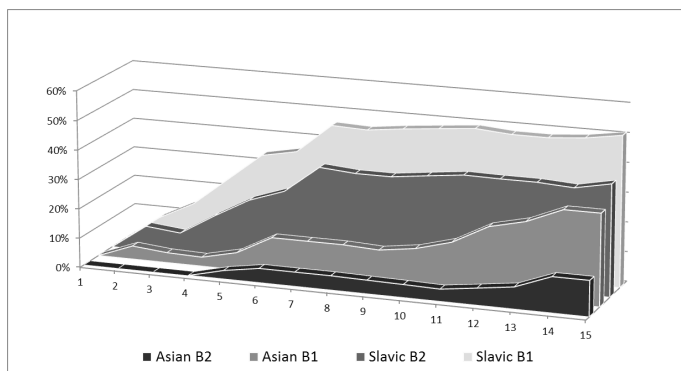


**Figure 2: Highest attained language proficiency level of Slavic and Asian children according to their length of time in years in the Czech Republic (the level is attained when the success rate of each language skill subtest is at least 60%)**

The following figure (Figure 3) further specifies the process of learning Czech by Slavic and Asian children according to the length of time they had been in the Czech Republic. The figure shows that while almost half of the students from a Slavic language environment reached the B1 threshold level after about six to seven years of residing in the Czech Republic, only about 15% of children from an Asian background reached this level in the same period of time.

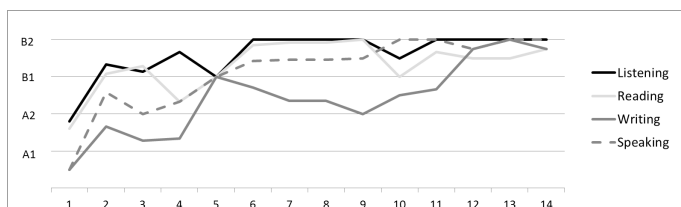
<sup>6</sup> The values of Pearson correlation coefficient can theoreticall vary between -1 and 1. While value -1 means perfect inverse relationship and value 1 means perfect direct correlation, values around 0 indicate no relationships between variables.

<sup>7</sup> A tested pupil progressed to a higher level (A2, B1, B2) in each language skill only if he/she scored at least 60% in the lower level.



**Figure 3: Proportion of Slavic and Asian pupils that reached level B1 and B2 according to their length of time in the Czech Republic (the level is attained when the success rate of the given level subtests is at least 60%)**

We also sought to ascertain whether the development of language skills is homogeneous in all areas, or whether pupils improve in some areas faster than in others. The data suggest that pupils, particularly those with an Asia background, tend to acquire receptive skills (listening and reading) much more quickly than productive skills (writing and speaking) (see Figure 4). But even here, the differences dissolve with time.



**Figure 4: Achieved level in each language skill subtest for Asian pupils according to their length of time in the Czech Republic (the level is attained when the success rate of the given language skill subtest is at least 60%)**

The question that is often discussed is to what extent the development of language skills is influenced by the age at which children arrive in the Czech Republic. Elementary school teachers who were interviewed during the research conducted at selected Prague schools in 2009 tend to claim that integration (including language integration) is generally much less of a problem for children who arrived in the Czech Republic at a very young age or were born in the Czech Republic (Kostecká, 2010). We were interested whether the data that we collected support such claims. First, we selected 58 children of Asian background from the whole sample, as their age structure was favourable to our purposes. From this sub-sample we selected 51 children that formed three distinct subgroups:

- pupils that were born in the Czech Republic or arrived in the country during their first year of life (this subgroup consisted of 14 pupils)
- pupils that arrived in the Czech Republic when they were 10 to 11 years old, that is during the two final grades of elementary school (this subgroup consisted of 18 pupils)
- pupils that arrived in the Czech Republic when they were 12 years old or older, that is during the lower secondary school (this subgroup consisted of 19 pupils).
- The language testing provided information on each pupil's highest attained level of language proficiency. Information about that is provided separately for the three above-defined subgroups in Table 4.

Age of arrival in the Czech Republic	The highest attained level of language proficiency				
	Lower than A1	A1	A2	B1	B2
0-1 years	0	0	0	1	13
10 – 11 years	1	0	1	4	12
12 years and older	2	3	2	7	5

**Table 4: Absolute number of children tested according to the highest attained levels of language proficiency and the age at which they arrived in the Czech Republic (the level is attained when the success rate of each language skill subtest is at least 60%<sup>8</sup>)**

It is clear from the table that the language skills of Asian pupils that were born in the Czech Republic or arrived in the country as babies were generally at the B2 level in the case of those of lower secondary school age at the time the testing was organized. This language skill level seems to be high enough and does not limit the pupil's ability to fulfil school requirements. In contrast, the pupils who moved to the Czech Republic at the age of 12 or higher and therefore started attending lower secondary school more or less immediately after their arrival generally attained a much lower level of language proficiency when they were tested. It is not surprising but rather self-evident. We know that the level of language proficiency increases with the increasing length of stay of the children in the Czech Republic and, obviously, children who were born in the Czech Republic or moved to it at a very young age had spent more years in the country before entering lower secondary school than those who had arrived to the country at an older age.

But how do the language skills of pupils develop during the time period that corresponds with lower secondary school? As we do not have panel data that would allow us to observe the language skills development of the individuals over time, we can only estimate the pace of progress from the data we have by comparing the language skills of pupils who have been in the Czech Republic for different lengths of time. To estimate the speed of progress we used the method of linear regression, which allows us to estimate the parameters of regression equation

$$Y=a+bX$$

where  $Y$  is a dependent variable (in our case the attained level of language proficiency in the diagnostic test of language competences),  $X$  is an independent variable (number of years the tested pupils spent in the Czech Republic), and coefficients  $a$  and  $b$  are the parameters of the regression equations. The regression equation can be expressed by a straight line that generally shows how the values of the dependent variables change in relation to the changes to the independent variables. We estimated the parameters of the regression equations separately for the three groups described in Table 4. The key parameter of the regression equation for us is coefficient  $b$ , which describes the slope of the line (coefficient  $a$  is called the intercept and is not relevant in our case). The higher coefficient  $b$  is, the greater the progress in attaining the language proficiency by the tested pupils in relation to the length of time of the pupil in the Czech Republic (see Table 5).

<sup>8</sup> A tested pupil progressed to a higher level (A2, B1, B2) in each language skill only if he/she scored at least 60% in the lower level.

Age of arrival in the Czech Republic	The slope of the regression line (coefficient b)
0-1 years	0,19
10-11 years	0,33
12 years and older	0,46

**Table 5: The slope of the regression line describing progress in attaining language proficiency by the tested pupils in relation to the length of time of the pupil in the Czech Republic (the level is attained when the success rate of each language skill subtest is at least 60%)**

It is clear from Table 5 that the slowest pace of progress in attaining language proficiency in relation to the number of years spent in the Czech Republic was observed among the lower secondary school pupils who were either born in the Czech Republic or moved to it at a very young age. In contrast, the most rapid progress was found among those lower secondary school pupils who moved to the Czech Republic at age 12 or over. The findings concur with the results of previous research suggesting that the process of attaining language skills is not linear, but instead follows a logarithmic curve – the pace of progress is the quickest in the years immediately after arriving in the Czech Republic, while the pace of progress slows down with the increasing number of years spent in the country. This general model of language acquisition development as identified by the diagnostic test was valid for all pupils regardless of their gender, age, or ethnic background (Kostecká et al., 2013).

When language skill testing was organized among children at the lower secondary school level, the analysis of data suggested that children who were born in the Czech Republic (and therefore lived in the country for a relatively long time) were at that age already not improving their language skills as quickly as those who had come to the Czech Republic at a later age. This is logical, as the children who had lived in the country for a long time had reached or were close to the highest measurable level of language proficiency, and therefore, could not improve as quickly as those children whose language proficiency was generally at a lower level. These children had experienced the period in which language progress occurs most rapidly already when they were at an early school age or even a preschool age. Even if these children are still learning the Czech language, the pace of their language development is no longer measurable using our diagnostic instrument. Children who came to the Czech Republic between the ages of 10 and 11 were still making noticeable improving, even if they had already attained a relatively high level of proficiency. The most rapid progress was observed among children who had come to the Czech Republic in the oldest age category.

Finally, we were interested in how individual language skills developed among the tested children. We used the same method of estimating the progress as was described in the preceding part of the text. The results of the analysis are summarised in Table 6. The pace of the progress in language acquisition among the children who were born in the Czech Republic or came to it at a very young age is generally already very slow in the areas of speaking, reading and listening as the tested children had already mastered these language skills. The situation is different when the progress of this group of pupils in writing is considered – the pace of their progress is even quicker in this area than that of the other two groups of tested pupils. The ability to write correctly in Czech is evidently the most difficult of the tested language

skills. This skill is generally acquired by children later than the other three tested skills. It seems that the ability to understand, speak and read in Czech must precede the effective learning of how to write. The attainment of language skills among the pupils that moved to the Czech Republic at age 12 or later generally progresses very quickly in the areas of listening and speaking, that is in the skills that are needed most in everyday life in the country that is their new homeland. The progress in reading and particularly the progress in writing is generally much slower in this group. It is possible that the learning of these “academic skills” will progress at a much quicker pace after their skills in the area of understanding and speaking reach some threshold level.

Type of language skills	Age of arrival in the Czech Republic 0-1 years	Age of arrival in the Czech Republic 10 – 11 years	Age of arrival in the Czech Republic 12 years and older
	The slope of the regression line (coefficient b)		
Reading	0,19	0,21	0,32
Writing	0,38	0,32	0,13
Listening	0,10	0,22	0,52
Speaking	0,02	0,34	0,43

**Table 6: The slope of the regression line describing progress in attaining language proficiency by the tested pupils in relation to the length of time of the pupil in the Czech Republic by individual language skills**

The relationships that were identified by the analysis of the information obtained with our diagnostic tests can, however, only be considered possible clues from which hypotheses could be formulated and properly tested by testing the language acquisition of a substantially larger sample of foreign pupils in Czech schools. Such language testing is scheduled in 2014, when our research team will test at least 400 pupils in both elementary and lower secondary schools in the Czech Republic. Greater number of children enrolled into the survey could increase the significance of correlation. The results of this testing will answer the question whether the above-described relations can be considered general trends.

## Discussion

How our result are related to results of the other researchers? It is not easy question to be answered. While much attention is paid to the issue of the integration of immigrants into mainstream society both in the Czech Republic (e.g. Drbohlav and Džurová, 2007, Kušnířáková and Čížinský, 2011) and in abroad (e.g. Djajic, 2003, Kasimis and Papadopoulos, 2005, King and Newbold, 2007, Ley, 2007), only limited number of studies has been devoted to the topic of integration of children of foreigners into schools in the host countries. Yet, many of the studies were theoretical scholarly publications (e.g. Průcha, 2007, 2011; Šindelářová, 2005, 2008, 2011) and only some of them were empirical studies based on surveys carried out in schools (e.g. Kocourek, 2001, 2002).

In the literature dealing generally with the linguistic integration of foreigners into host societies a number of hypotheses have been formulated concerning factors that influence the whole process. Chiswick and Miller (2001) mention among others exposure to the language, Beenstock et al. (2001) and Chiswick and Miller (2005) stress the linguistic distance of the

immigrant's mother tongue from the language of the destination country. The data analysed in this article that come from surveys we conducted in 2011 at eight primary schools in Prague, allowed us to confirm the validity of both basic hypotheses. First, we proved that the language proficiency of foreigners in Czech schools was positively correlated with exposure to the Czech language (estimated as the amount of time the student had been in the Czech Republic). Second, we proved that the effectiveness of language acquisition related to the linguistic distance between the pupils' native language and Czech. Our analysis proved that children from a Slavic background reached the so-called *threshold level*, which is equal to a B1 level of language proficiency, as established by the CEFR, and which implies a certain level of independence in communication, more quickly in every language skill area than the children from an Asian background.

## Conclusion

The results of this study prove that the process of acquiring language skills is critical for the integration of immigrant children into the educational system. Some children enter Czech schools with basically no knowledge of the language. At the time of the research, Czech legislation guaranteed intensive language courses for children from countries of the European Union only. The results showed that this assistance was not very effective. The vast majority of foreign children attending Czech schools come from non-EU countries (Russia, Ukraine, China and Vietnam). In 2012, Czech legislation was amended. Free preparation for entering the primary school system, including Czech language classes tailored to the needs of learners, is now extended to all foreigners, i.e. including students from countries outside the EU. The study results show that there is a significant difference between the needs of learners. Students from related linguistic areas reach the threshold level very quickly, whereas children with a very different language (in our case, children from Asia) reach the threshold level of all receptive skills quickly, but have big difficulties with productive skills. It is therefore necessary to focus on this area and pay attention to it in Czech language instruction.

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# IS THERE A RELATIONSHIP BETWEEN SELF-EFFICACY, WELL-BEING AND BEHAVIOURAL MARKERS IN MANAGING STRESS AT UNIVERSITY STUDENTS?

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## Highlights

- Subject with lower level of vulnerability to stress experience probably higher level of well-being
- People with higher self-efficacy prefer healthier life-style

## Abstract

This paper addresses the question of mutual relationship of the perceived self-efficacy, well-being and particular health-promoting behaviours in respondents – students of the Faculty of Economics and Management of the Czech University of Life Sciences. A descriptive, correlational research design was conducted. The Czech version of the General Self-Efficacy Scale GSES, Czech version of the Satisfaction with Life Scale SWLS and Czech version of Stress Vulnerability Scale was administered to 211 undergraduate students from September to October 2013. Having tested normal distribution of each variable via Kolmogorov-Smirnov and Shapiro-Wilk test, our statistical analysis was based on the calculation of values of the nonparametric Spearman's rank correlation coefficient. Results show significant correlations between all of examined variables. In terms of the examined variables, self-efficacy, behavioural markers connected to vulnerability to stress and well-being in particular appear to be meaningful concepts that can be well used in education and counselling related to coping with stress during university studies.

## Keywords

Behaviour, Self-efficacy, Stress, University students, Well-being

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## Introduction

Questions on student progression and student retention have increasing importance for most universities. This is the reason why researchers have taken interest in the issues of perceived stress, academic load associated with study, coping strategies, as well as various behaviours associated with stress, such as the development of alcohol and drugs addiction, changes in everyday activities, sleep regime or food intake (Kausar, 2010; Digdon, Landry, 2013; Robotham, Julian, 2006). Authors of this study have already dealt with the issue of self-efficacy and coping strategies in university students in their previous studies (Natovová et al, 2013; Chýlová, Natovová, 2013). Our previous research work was focused on the field of age and gender differences in coping strategies adopted by university students (Natovová, Chýlová, 2012). Lazarus (1999: 102) defines coping as activities, which have "...to do with the way people manage life conditions that are stressful". Other authors (Tanaka, 2009: 87) define coping as a term "...referring to the cognitive or behavioural efforts used to manage, reduce, or control stress". With respect to coping, emotion-oriented, task-oriented and avoidance-oriented stress coping activities are commonly distinguished (Aldwin and Yancura, 2011), or groups of positive, negative and neutral coping strategies can be identified and measured by psychodiagnostic tools (Janke and Erdmann, 2003).

According to the results of the research on coping we broadened the area of our interest and tried to define a relationship between perceived self-efficacy, groups of coping strategies and specific behaviours that can contribute to higher vulnerability to stress. In our sample of students, a correlation has been found between behaviour strategies increasing stress vulnerability and the

second groups of coping strategies. We have ascertained that vulnerability to stress in terms of behaviours significantly negatively correlates ( $\rho = -0.41$ ) with strategies of distraction and substitute gratification, while self-efficacy significantly positively correlates with positive coping strategies in general ( $\rho = 0.56$ ), as well as with coping strategies of minimization and denial of guilt ( $\rho = 0.48$ ) and of situation control, response control and positive self-instructions ( $\rho = 0.53$ ). By contrast, in case of self-efficacy we have found statistically significant negative correlation with negative coping strategies ( $\rho = -0.71$ ). Therefore we assume that effective coping in connection with higher level of self-efficacy relates also to individual's perceived satisfaction with life and leads to health-promoting behaviour. This paper follows and elaborates on previous research work in this field.

We have therefore attempted to cover the issue of stress coping in a comprehensive way, focusing, in addition to coping strategies, also on a potential link to the study of self-efficacy and on any particular behavioural indicators associated with increased or decreased vulnerability to stress. The main aim of this study is to find an answer at the question whether there is a correlation between the perceived self-efficacy, particular health-promoting behaviours and the level of well-being in respondents – students of the Faculty of Economics and Management of the Czech University of Life Sciences. In order to understand the interrelations, first we need to clarify how the research constructs are defined.

The concept of self-efficacy was created by Albert Bandura, founder of the social cognitive theory. Defining this concept, Bandura (1997: 3) says that "perceived self-efficacy refers to

beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments". Jerusalem and Schwarzer (1992) claim that generalized self-efficacy is one of the personal resource factors that counterbalance taxing environmental demands in the stress appraisal process, within which stress can be cognitively appraised as either a challenge, threat, or harm/loss; in subsequent stage of stress coping dispositional self-efficacy facilitates coping with stress. Warner et al. (2011) note that besides one's general confidence in one's ability to manage demands placed on them and achieve one's goals, perceived self-efficacy may also differ with regard to specific life spheres and problems encountered. General resources for enhancing self-efficacy include mastery experience, vicarious experience, verbal persuasion, and somatic and affective states (Bandura, 1997; Warner et al., 2011). Loeb, Steffensmeier and Kassab (2011: 812) hypothesize that there exists a relationships between self-efficacy and health behaviours, both health-promoting and health-monitoring. These authors (Loeb, Steffensmeier, Kassab, 2011; Bandura, 1997) assume that higher perceived self-efficacy in relation to health-promoting behaviours results in improved health. Lipke et al. (2009) conducted study on the putative moderating role of self-efficacy in the intention-planning-behaviour relationship (physical activity). They concluded that self-efficacy moderates the mediation of intentions into behaviour via plans, that people must hold sufficiently high levels of self-efficacy. This study therefore also focuses on this aspect; namely on identifying vulnerability to stress with respect to specific behaviour factors (smoking, sports activities, leisure time activities, etc.). In this study we have attempted to measure and to quantify several essential components of healthy life style (frequency of aerobic exercise, social activities, food intake regime, smoking and alcohol drinking etc.).

Subjective well-being (SWB) is, according to Diener (2000), people's cognitive and affective evaluation of their lives. Elsewhere Diener (1994) states that subjective well-being comprises people's longer-term levels of pleasant affect, lack of unpleasant affect, and life satisfaction. The concept displays moderately high levels of cross-situational consistency and temporal stability. Well-being is frequently assessed as a part of the concept of so called "quality of life", which is usually expressed as a combination of mutually interconnected factors: well-being, subjective assessment of one's health condition and life satisfaction. Even though some authors consider well-being to be a key factor and recommend to standardly monitor it in various contexts (Kebza, 2005).

Diener et al. (1985) claim that it is possible to isolate various components of subjective well-being: affective, emotional aspects (positive and negative affects) and cognitive, judgemental aspects – life satisfaction. Judgment of life satisfaction is dependent upon a subjective comparison of one's circumstances with what one considers to be the appropriate standard. Diener and Diener (1996), in their article "Most People Are Happy", hypothesise that people might be motivated to attain positive states and to avoid or reduce unpleasant states and therefore may be likely to use positive coping strategies and, as a result, be mainly happy.

In his recent studies Diener (Nickerson, Diener and Schwarz, 2011 or Diener et al., 2002) paid attention to the relation between positive affect and college success, respectively job outcomes. Last year Diener (2012) described newest important findings on worldwide subjective well-being, namely benefits in health,

longevity, citizenship, and social relationships as a result of high subjective well-being.

Proceeding from the theoretical background described above, the main goal of this study is to determine whether a correlation can be found between subjective evaluation of life satisfaction – state of well-being of a person, perceived self-efficacy and behavioural indicators of vulnerability to stress of full-time and part-time students of the Faculty of Economics and Management (FEM) of the Czech University of Life Sciences (CULS).

## Materials and Methods

### Group of respondents

A descriptive, correlational research design was conducted from September to October 2013. The Czech version of the General Self-Efficacy Scale (Křivohlavý, Schwarzer and Jerusalem, 1993), Czech version of the Satisfaction with Life Scale (Diener et al., 1985) and Czech version of Stress Vulnerability Scale (Schreiber, 2000) was administered to 211 undergraduate students from September to October 2013. The target population of the present study was full-time and part-time students at the Faculty of Economics and Management (FEM) at the Czech University of Life Sciences (CULS) within the study programmes Economics and Management and Regional Development in distance-studies centre in Hradec Králové and in Prague. Descriptive characteristics of the sample are shown in Tab. 1.

The subjects volunteered to participate in the survey and received no benefits for their participation.

	N	%	Mean Age	Median Age	Stand. Dev.	Min. Age	Max. Age	Part-time/ full-time %
Male students	77	36.5	22.82	20.00	7.81	17	64	21.8/ 78.2
Female students	134	63.5	28.09	23.00	10.16	18	51	56/ 44
Total	211	100	26.2	20.00	9.7	17	64	43/ 57

**Tab. 1: Descriptive characteristics of subgroups of respondents.**

### Assessment Measures

Assessment in this study comprised three parts: measurement of perceived self-efficacy with Czech version of the General Self-Efficacy Scale (GSES), mapping of behavioral markers connected with higher vulnerability to stress via Stress Vulnerability Scale (SVS) and assessment of individual life satisfaction and pleasant feelings – well-being with Czech version of the Satisfaction with Life Scale (SWLS).

General Self-Efficacy Scale (GSES) consists of 10 statements measuring the efficiency of one's own action and perceived ability to manage problems on a four-point Likert-type scale. Possible score ranges from 10 to 40 points, and administration takes about four minutes. In this research work, we have used the original scale adapted for the Czech language (Křivohlavý, Schwarzer and Jerusalem, 1993). Typical items are e.g. "I can always manage to solve difficult problems if I try hard enough" Or "I can solve most problems if I invest the necessary effort".

Similarly, the Stress Vulnerability Scale (SVS) scale contains 20 items arranged in a 5 point Likert-type scale. It entails degrees ranging from 1 (always) to 5 (never) respectively and the subject had to rate each item according to how much of the time the

statement was true of him/her. Students were administered a Czech version of this scale, published in Czech by Schreiber (2000). Typical items of SVS scale are: "I give and receive affection regularly", "I eat at least one hot, balanced meal a day" or "I am able to speak openly about my feelings when angry or concerned".

The Satisfaction With Life Scale (SWLS) is a scale designed by Diener et al. (1985) to measure global life satisfaction. The SWLS consists of 5-item scales, where participants indicate how much they agree or disagree with each of the items using a 7-point scale that ranges from 7 (strongly agree) to 1 (strongly disagree) (Diener et al., 1985). Scale includes items like "In most ways my life is close to my ideal" or "So far I have gotten the important things I want in life". Pavot and Diener (2008) refer to the favourable psychometric properties of SWLS, including its high internal consistency and high test-retest reliability (0.82), Cronbach's alpha 0.87. Satisfaction with life scales are frequently used as indicators of well-being.

## Statistical Analysis

This research aims to determine whether a correlation exists between the variables self-efficacy (GSES index), vulnerability to stress associated with individual's behaviours (SVS index) and subjective well-being (SWLS index). First we tested normal distribution of each variable. In all cases we have rejected the null hypothesis on normal distribution of these variables based on general Kolmogorov-Smirnov and also more powerful Shapiro-Wilk normality tests. Results of these tests are displayed in Tab. 2.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
GSES	0.09	211	0.00*	0.99	211	0.03*
SVS	0.08	211	0.00*	0.97	211	0.00*
SWLS	0.10	211	0.00*	0.98	211	0.00*

Lilliefors Significance Correction, \* $\alpha = 0.05$

**Tab. 2: Tests of Normality.**

With respect to the specifics of the distribution of all variables mentioned above, we proceeded from the calculation of the nonparametric Spearman's rank correlation coefficient.

## Results

Data was analyzed using descriptive and inferential statistics described in previous section. As we mentioned in the beginning, in this study we focused on the identification of potential correlations between perceived level of self-efficacy, vulnerability to stress in terms of behavioural indicators and subjective satisfaction in life and positive affectivity – subjective evaluation of well-being.

To make relationships between all variables clear and understandable, we have to describe the specifics of each variable in our research sample separately. Tab. 3 shows descriptive characteristics of general self-efficacy. In our previous study the mean value of Self-efficacy - GSES index was 29.66 (Chýlová, Natovová, 2013), and values shown in Tab. 3 correspond with this trend.

	N	Mean GSES	Stand. Dev.	Min.	Max.
Male students	77	29.73	4.38	14	40
Female students	134	28.55	4.48	17	38
Total	211	28.98	4.47	14	40

**Tab. 3: Descriptive statistics of Self-efficacy – GSES index.**

Values of Self-efficacy index differ significantly from other groups of respondents as for example from entrepreneurs, students from other Czech universities or German students (Chýlová, Natovová, 2013), but are relatively stable across our research work on various samples of our students. It is still a question, what are the causes for this fact and how it could be used it in education and also in personal development of our students during their studies at our faculty.

Tab. 4 shows descriptive characteristics of behavioural indicators connected to vulnerability to stress (SVS index) in our research. When looking at vulnerability to stress measured via behavioural markers displayed in Tab. 4, we see slight difference between male and female students.

	N	Mean SVS	Stand. Dev.	Min.	Max.
Male students	77	23.04	8.30	9	59
Female students	134	24.64	6.74	7	43
Total	211	24.06	7.37	7	59

**Tab. 4: Descriptive statistics of Vulnerability to Stress – SVS index.**

In general, values of SVS index less than 30 points show relatively appropriate behaviour patterns, which don't increase the vulnerability to stress. Answering the question about possible differences in several age and gender different groups deserves thorough independent research and will be analysed in a subsequent study.

The third variable which we took into account in present study is subjective well-being. Average values of SWLS index in common population are 19 – 24 points. Our values correspond with this trend and are displayed in Tab. 5. Also in this case we can observe slight difference between male and female subgroups, but deeper analysis is required and will be processed in our future research work.

	N	Mean SWLS	Stand. Dev.	Min.	Max.
Male students	77	23.23	5.58	11	35
Female students	134	24.05	5.63	9	35
Total	211	23.74	5.61	9	35

**Tab. 5: Descriptive statistics of well-being – SWLS index.**

As we presented above, the main aim of this study is to find an answer to the question whether there is a correlation between the perceived self-efficacy, particular health-promoting behaviours and the level of well-being in respondents – students of the Faculty of Economics and Management of the Czech University of Life Sciences. Results of the calculation of Spearman's rank correlation coefficients are shown in Tab. 6.

			GSES index	SVS index	SWLS index
Spearman's rho	GSES index	Correlation Coefficient	1.000	-0.32**	0.27**
		Sig. (2-tailed)	.	0.00	0.00
		N	211	211	211
	SVS index	Correlation Coefficient	-0.32**	1.00	-0.27**
		Sig. (2-tailed)	0.00	.	0.00
		N	211	211	211
	SWLS index	Correlation Coefficient	0.27**	-0.27**	1.00
		Sig. (2-tailed)	0.00	0.00	.
		N	211	211	211

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Tab. 6: Values of Spearman's correlation coefficient.**

Several important findings are apparent when observing the results shown in Tab. 6. Our previous research (Natovová et al., 2013) has not confirmed a correlation between stress vulnerability in terms of behaviours and self-efficacy. In contrary, our results displayed in Tab. 6 show significant correlations between all of our variables.

## Discussion

First examined variable was self-efficacy, in Tab. 6 as GSES index. Self-efficacy is a strong concept and Bandura (1997) generally presumes that people who have confidence in their ability to efficiently achieve their goals are also healthier, more successful and more effective. These people are also likely to experience a lower level of stress, similarly to the conclusions of Lazarus (1999: 102) "...when coping is ineffective, the level of stress is high; however, when coping is effective, the level of stress is apt to be low". In our previous study we identified correlations between coping strategies and self-efficacy (Natovová et al., 2013). According to our results people who have confidence in their ability to manage everyday problems and concerns in an effective and efficient way are also more likely to use positive coping strategies (including the three most effective coping strategies of situation control, reaction control and positive self-instructions, see Janke and Erdmann, 2003). At the same time, higher perceived self-efficacy may predict lower use of negative coping strategies. This fact probably explains positive correlation ( $\rho = 0.27$ ) between general self-efficacy and subjective well-being. People who consider themselves capable and effective to handle with difficulties and problems in their lives have according to our findings higher satisfaction in life, commonly described as the feeling of subjective well-being. On the other hand, we can observe clearly negative correlation ( $\rho = -0.32$ ) between self-efficacy (GSES index) and health-related behaviour connected to vulnerability to stress, in Tab. 6 the SVS index. People with higher self-efficacy probably prefer healthier life-style compared to people with lower self-efficacy level. This fact corresponds with findings of Bandura (1997), Lazarus (1999) and others. On the other hand, the SVS scale is general and further examination of the data, probably also intensive item analysis, would give more insight into behavioural patterns (social support items, sports, sleep and food intake regime etc.). Speaking about behavioural patterns connected to stress vulnerability, we need to take into account also relationships discussed in our previous work (Natovová et al., 2013, Chýlová and Natovová, 2013). First, stress vulnerability in terms of behaviours (expressed by the value of SVS) significantly negatively correlates with a group of positive coping strategies (Janke and Erdmann, 2003), which includes the strategies distraction - distract from stress related activities/situations or turn to stress incompatible ones a substitute gratification - turn to positive activities/situations (Natovová et al., 2013). In this case, we can state that higher vulnerability to stress may be associated with decreased pursuit of activities that are incompatible with stress or decreased pursuit of fulfilment in other areas except for the stress-related area. The relationship between vulnerability to stress and the use of distraction and substitute gratification strategies should be discussed in the sphere of counselling and teaching, because more frequent use of these strategies may lead to broader changes in behaviour and lower vulnerability to stress.

In Tab. 6 we can observe also a negative correlation ( $\rho = -0.27$ ) between behavioural markers connected to vulnerability to stress (SVS index) and subjective well-being (SWLS index).

Respondents with lower level of vulnerability to stress probably experience positive feelings and subjective satisfaction with life – they experience probably higher level of well-being. Issues of well-being and his impact at several life areas for university students are broadly discussed and examined and our results support the knowledge from different authors. Bozoglan, Demirer and Sahin (2013) investigated the relationship between well-being, loneliness, coping, decision styles and decision self-esteem and found out, that loneliness, self-esteem, and life satisfaction (well-being) explained 38% of the total variance in Internet addiction. Eroğlu (2012) considers well-being as an indicator of life quality, achievement of subjective aims, handling of difficulties of life and having pleasure of life. Samuel, Bergman and Hupka-Brunner (2013) say that well-being may serve as an individual resource by fostering educational and occupational outcomes. Van Petegem et al. (2008) claim, that student well-being can be considered a major output indicator of quality of education. The importance of the topic of well-being in university study seems obvious and has an important place also in broader context of responsibility in education.

Results presented in this research paper are inspiring also for deeper analysis, as we pointed above. Significant correlations provide information about the relationship between variables, but don't answer questions about causality. Further data analysis, for example regression analysis and testing of appropriate theoretical models, can provide more insight into causality of these variables in our future research work.

## Conclusion

In this research, we considered a link between perceived self-efficacy, subjective well-being and specific behaviours that can contribute to higher vulnerability to stress. In our sample of students, a correlation has been found between all of the variables (self-efficacy as GSES index, vulnerability to stress as SVS index and well-being as SWLS index). This correlation is understandable, stemming from the concepts introduced above, and this fact needs to be taken into consideration in the sphere of teaching and counselling.

As we mentioned above, in our previous research we have identified relations between the level of perceived self-efficacy and most groups of coping strategies (positive, negative, as well as the first and third subgroups of positive coping strategies as distinguished by Janke and Erdmann, 2003). Self-efficacy therefore appears to be a meaningful concept that can be well used in education and counselling related to coping with stress. States of uncertainty regarding important issues (e.g. stressful life events, which students can experience in personal and social life during university studies) throw people into a state of confusion: those who are capable of modifying the course of events significantly are equally capable of foreseeing them (D'Amico et al., 2013). Topics and activities oriented on increasing of self-efficacy of our students can lead to increased satisfaction with life and can also be related to health-promoting behaviour.

Our intended future research work in this area should be outlined here. The research should focus on various spheres of work and private life and the perception of such specific self-efficacy (e.g. self-efficacy in relation to study, self-efficacy in relation to sports activities, self-efficacy in partnership, etc., as mentioned by Bandura, 1997, for example). For the purpose of education and psychological counselling at CULS, possibilities of training activities aimed at enhancing perceived self-efficacy in students of the Faculty of Economics and Management of the

Czech University of Life Sciences should also be considered in order to heighten the level of satisfaction with life – subjective well-being.

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# CASE STUDY: POLICIES, STRATEGIES AND RESPONSES TO PLAGIARISM IN SLOVAKIA

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## Highlights

- The case study describes the situation about plagiarism in Slovakia

## Abstract

The European project “Impact of Policies for Plagiarism in Higher Education Across Europe” has identified best practices and gaps related to plagiarism in different European countries. Slovakia is one of the interesting ones, where national repository for plagiarism detection was established. However, there are still gaps in terms of policies and overall understanding of plagiarism. This case study describes what happened in Slovakia in last few years, compares the situation with other European countries and discusses the results. Additionally, the number of occurrences of the terms “plagiarism”, “academic ethics” and “academic integrity” in media and on the Internet is examined in relation to recent changes.

## Keywords

Plagiarism policies, Slovakia, National repository

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## Introduction and Motivation

The project Impact of Plagiarism in Higher Education Across Europe (IPPHEAE) was funded by the European Union's LLP/Erasmus Programme and took part from 2010 to 2013. The project's goal was to find out how the growing problem of plagiarism is being addressed in different EU countries. As a result, a report for each particular country was issued. Situation in Slovakia is quite outstanding and brings valuable experience worth sharing with other countries. That is why we decided to publish this case study. The goal of this case study is to describe changes in Slovakia, evaluate differences between Slovakia and the rest of Europe and point out some interesting facts coming from Slovakia's experience. We will talk namely about differences between software tools for plagiarism detection, plagiarism policies and penalties for plagiarism. These concepts are often not distinguished properly, which may lead to problems.

Although a much research has been conducted in the UK (Borg, 2009) and parts of Europe (Pecorari, Shaw, 2012) into policies for plagiarism and aspects of academic dishonesty and cultural differences (Leask, Carroll, 2011), this is the first time an EU-wide survey has been completed on this subject. The IPPHEAE research design was influenced by much of the earlier research in Europe (Carroll, 2007) and (Weber-Wulff, Wohnsdorf, 2006), Australia (Bretag, Mahmud, 2009) and USA (McCabe, 2005).

## Background Information

This part of the study was previously published at (Kravjar, Noge, 2013).

Low awareness of copyright, intellectual property rights and academic ethics combined with a growing number of Internet users, students and higher education institutions have created a breeding ground for the spread of plagiarism in written papers in Higher Education Institutions. According to (Skalka, Drlik and

Vozár, 2009) ‘Internet was the likely catalyst for an avalanche of plagiarism; it provided students, often including primary school pupils, with resources for quick, easy and effortless access to information about the assigned topic and later even complete texts.’

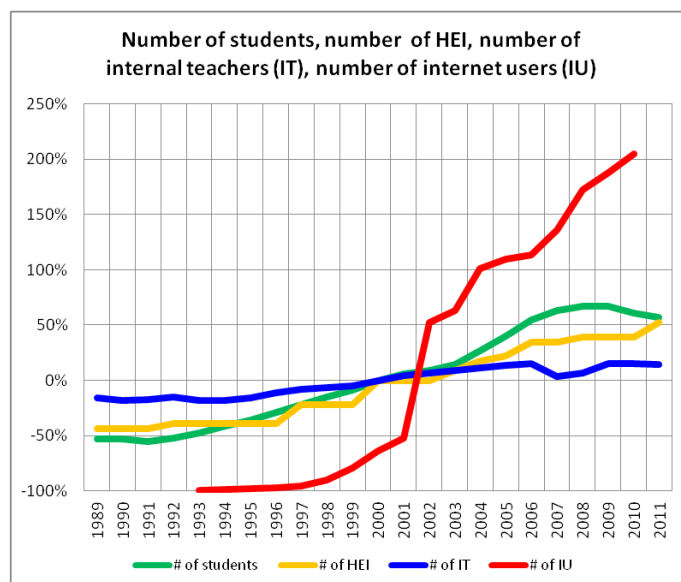
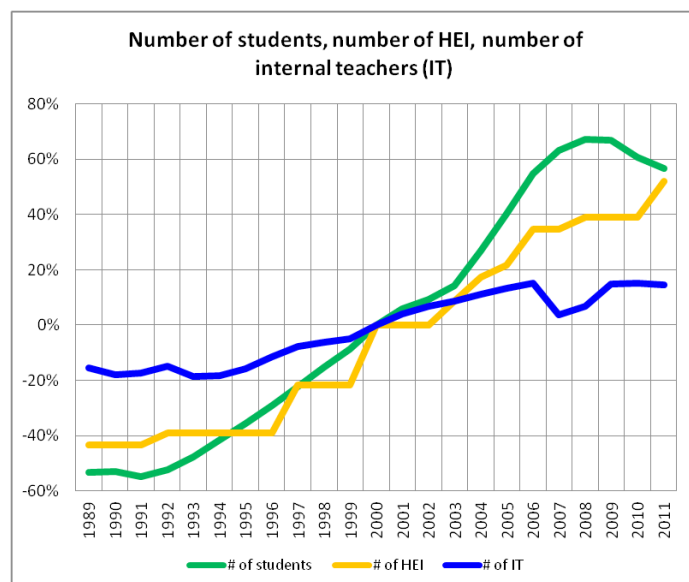
A comprehensive overview of the state of academic ethics in Slovakia is analysed by Králiková (2009) in her publication “Implementation of rules of academic ethics at Slovak HEIs”. She states that: ‘The issue of academic ethics started to attract attention in Slovakia especially in the past three years. It usually appeared in relation to the issue of plagiarism among students and teachers. However, plagiarism is just one of the infractions against academic ethics and the issue of academic ethics in Slovakia is much broader than just plagiarism.’

Staroňová (2010) described the causes supporting plagiarism as follows: ‘...plagiarism has its roots mainly in the method of teaching; the absence of systematic education (ideally from the primary school level), teaching the students to write argumentative texts, list resources correctly, benefits of quotations (it is much easier to go back to the original source and critically consider the author's conclusions) and especially ethical principles that would clearly define plagiarism as violation of intellectual property rights and parasitizing on the work of others and not playing down the situation. It is very sad to watch how many teachers who should teach students ethical principles, explain to them the nature of plagiarism and require them to think and write originally are themselves guilty of the sin and play down its significance if caught in the act.’

In 1989, there were 13 HEIs in Slovakia and today there are 40; 36 operate under the Slovak legal order. The development of the number of students, teachers, HEIs (iEDU, 2012) and the number of Internet users (www.indexmundi.com, 2012) is shown in Graph 1. The number of students and teachers apply to HEIs operating under the Slovak legal order.

The year 2000 saw the highest annual increase in the number of HEIs (5), 2002 was the year with the highest increase in the number of Internet users (nearly 1.5 million, almost 28 % of the total population). In 2006, there was the highest annual increase in the number of students (over 20,000); 2004 and 2005 were also the years of high annual increases in the number of students (more than 17,000 and more than 18,000 respectively). The highest increase in the number of teachers (774) was recorded in 2009.

In 2006, more than 213,000 students studied at Slovak HEIs for—3.3 times the number in 1989; by that year the HE sector had expanded to 32 HEIs—2.4 times the number in 1989; the number of internet users increased and exceeded 3 million, representing more than 55 % of the total population. However, still only one HEI used an electronic system to detect plagiarism. In 2008, another HEI (University of Economics in Bratislava) implemented detection software and in 2009 by a third HEI (Comenius University in Bratislava) had followed their lead.



**Graph 1: Development of observed indicators over time transformed according to the formula  $100 \cdot (x_i - x_{\text{median}}) / x_{\text{median}}$  (Kravjar, Noge, 2013)**

At the time of writing this case study, there are 20 public, 3 state and 13 private HEIs in Slovakia. According to the Annual report on the state of higher education in Slovakia (Ministry of Education, 2012), there are currently approx. 200,000 students. Almost 5 % of them are from foreign countries, mainly from Greece, Norway and the Czech Republic. Around 60 % of students study in bachelor degree, 30 % in following master's degree, 5 % in "long" masters degree and 5 % in Ph.D. degree. From the population of 19 years olds 57.7 % enter Higher Education. The most popular fields of study are social sciences (including economics) (58 % of students), followed by technical sciences (20 %), health sciences (9 %) and natural sciences (5 %). Total public income for all (public) Slovak HEIs was approximately 450 million EUR. More than 2000 students (1 %) realized their international mobility in 2012. The most popular destinations are the Czech Republic, Germany and Spain. More than 1100 international students chose Slovakia as their destination increasing the Slovak student population by 0.6 %.

### Introducing the Plagiarism Detection Software

This part of the study draws significant inspiration from (Kravjar, Noge, 2013) and (Kravjar, 2013).

In Slovakia, there were many discussions on the subject of plagiarism, but without a specific result for a long time. In 2001, the first HEI (Vysoká škola manažmentu—in Trenčín) in Slovakia started to use an electronic system to detect plagiarism. The system to detect plagiarism was not the only innovation in this HEI; there were also other related measures: the rules of academic ethics were adopted, as well as a process defining the procedure for the investigation of suspected plagiarism (Kročitý, Argaláš, 2010).

Initially opinions of representatives of HEIs varied greatly on the use of the system to detect plagiarism. The Slovak Rectors' Conference (SRC) plenary's opinion on plagiarism dated 28 September 2006 entitled "Measures to eliminate plagiarism in the processing and presentation of bachelor's, master's and dissertation theses" (Slovak Rectors' Conference, 2006a) was a significant event for promoting changes in perceptions about the use of software. The document is important because it states that:

- Plagiarism is considered a serious problem that must be addressed by informing students how to write papers correctly and how to cite literary sources;
- The best way to reduce plagiarism is prevention;
- In the case of confirmed plagiarism, it requires that the student bears the consequences in accordance with the internal regulations of a HEI.

Another important document was approved by SRC on the same day, "The Code of Ethics for HEI Employees" (Slovak Rectors' Conference, 2006b). However, the Code contains no mention of plagiarism, as if plagiarism had no relationship to teaching and research staff of HEIs.

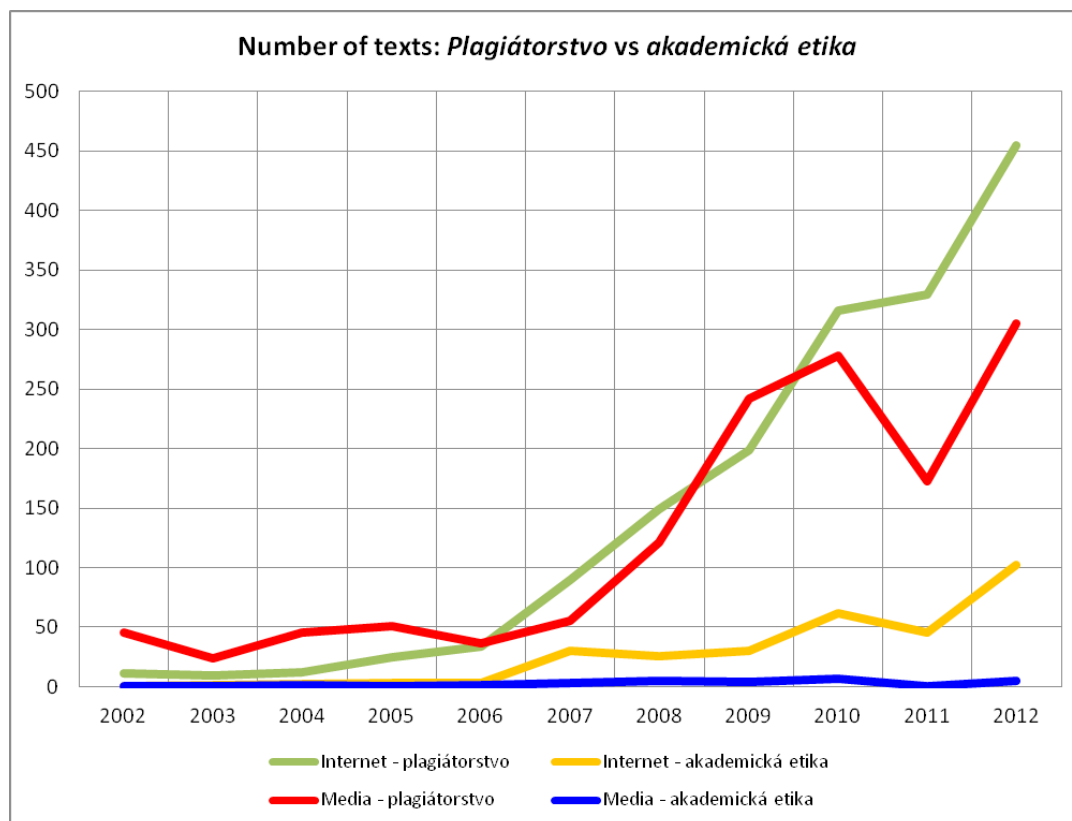
These two documents did not change the status quo nor did they affect the suppression of plagiarism. A more effective action was needed, with a major impact on combating plagiarism. SRC (February, 2008) adopted a resolution with the potential for a fundamental solution. The plenary of Slovak Rectors' Conference revisited the issue of plagiarism. It asked the Ministry of Education of the Slovak Republic to coordinate the relevant activities, especially those relating to the acquisition of the software. It also urged the members of the Slovak Rectors' Conference to create an electronic archive of theses.

It recommended that HEIs modified their regulations to address the issue of plagiarism.

In March 2008, Internet media reported (Supuka, 2008) that the Minister of Education promised to obtain software to control plagiarism for HEIs in Slovakia<sup>1</sup>. The Ministry of Education decided that a comprehensive solution would be implemented at a national level covering the collection, processing and originality check of specified papers. HEIs in Slovakia would be required to use this comprehensive solution (Skalka et al., 2009).

repository and system to detect plagiarism began on 30 April 2010.

The launch of central repository along with plagiarism detection system into live operation represents a significant milestone in the fight against plagiarism of theses and dissertations (bachelor's, master's, rigorous, dissertation, habilitation) at HEIs in Slovakia. The pre-implementation period and the first months of the operation of these systems was a period when *plagiarism* often appeared in the media and on the Internet. When we consider the time interval from 2002 to 2010 the



**Graph 2: The number of text occurrences concerning plagiátorstvo and akademická etika on the Internet and in the media (Kravjar, 2013)**

The basic strategic goal was defined and it was necessary to develop a strategy to achieve it. One of the major factors that contributed to the success in achieving the strategic objective was finding the support in the Parliament and incorporation in the amendment to the Higher Education Act of the obligations for HEIs to send specified papers in the central repository in order to be checked for originality after registration.

The amendment to the Higher Education Act was approved in 2009 and paved the way for the preparation of a nationwide repository of bachelor, master, dissertation, rigorous<sup>1</sup> and habilitation<sup>2</sup> theses. Slovak Centre of Scientific and Technical Information (SCSTI) was commissioned by the Ministry of Education to define system requirements definition, obtain the necessary software by public procurement, to implement it and SCSTI was also made responsible for its operation and further development. The preparation phase was challenging because of the perceived urgency. The real operation of the central

<sup>1</sup> A "small doctorate" can be received by a person with a master's degree. It requires that a candidate passes rigorous examination and defends his/her rigorous thesis.

<sup>2</sup> A prerequisite for the granting of the scientific-pedagogical degree "docent" (assistant professor) is habilitation lecture, submission and defence of the habilitation thesis.

number of texts containing the word *plagiátorstvo* and all of its forms on the Internet and in the media reached maximum just in the year 2010. The expectation, that the significant growth will be present too in the case of terms *academic ethics* and *academic integrity*, it was not confirmed (Graph 2). The maximum of texts containing the term *akademická etika* including all its forms for the 2002-2010 is reached in 2010 for Internet and for media. But the frequency of term *akademická etika* on Internet is many times lower than the frequency of the term *plagiátorstvo*, it amounts to 15.6 % on average. The occurrence of texts containing the term *akademická etika* is low – 26 total occurrences with peak value 7 in 2010. In the case of *akademická integrita*, the occurrence of the term was even lower than in the case of academic ethics. On the Internet, we found 12 texts with a maximum of 5 in 2011. In the media, there was no occurrence of the term *akademická integrita* and that is something that was not assumed at all.

The occurrence of texts about *akademická etika* and *akademická integrita* shows that these terms are infrequent in the text on Internet and in the media and it is likely that knowledge of these terms, their meaning and understanding in the society is low. It is a negative situation that requires action. Why? Because full understanding and respecting of academic ethics and academic integrity can significantly contribute to the prevention of plagiarism.

## Comparison of Slovakia with the EU average

This part of the study draws significant inspiration from (Foltýnek, 2013).

On analysis of student responses to the survey of HEIs conducted for the IPPHEAE project, several notable differences were found and reported between the Slovak responses and the EU averages. We have examined almost 5000 anonymous surveys from all EU countries, 236 of them were from Slovakia. Respondents were students and teachers from several different HEIs.

Almost all Slovak students (99 %!) become aware of plagiarism before or during their bachelor studies. The EU average shows that 20 % of students become aware of plagiarism during their

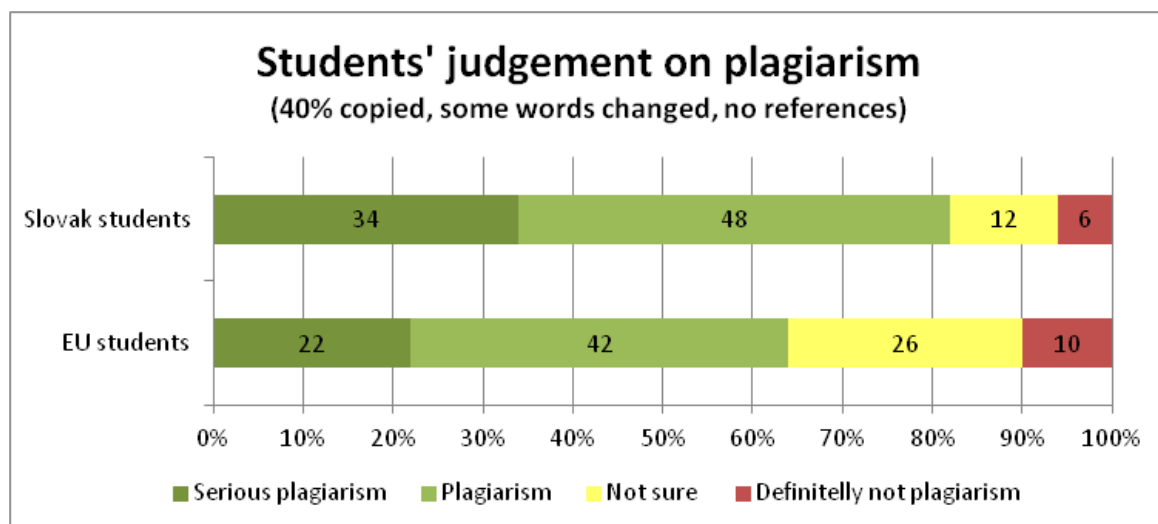
gave us following results:

Also the other sub-questions of this question provided results proving that Slovak students are the most aware of plagiarism among all EU countries.

## Reasons for students' plagiarism

This part of the study draws significant inspiration from (Foltýnek, 2013).

Slovak students think that the most important reasons leading students to plagiarism are easiness of cutting and pasting from the Internet, students' conviction that they would not be caught, running out of time and the fact, that students do not want to learn anything, just pass the assignment. These reasons



Graph 4: Students' judgement on plagiarism (IPPHEAE survey results)

masters/PhD degree or are still not sure about it. Although the percentage of students receiving training in scholarly academic writing was similar (62 % in SK compared to 60 % in EU), Slovak students were much less likely to ask for more training in plagiarism, academic writing and academic integrity (36 % in SK compared to 63 % for all EU). Significant numbers of Slovak students (96 %) were convinced that their institution had policies and procedures for dealing with plagiarism. The EU average for this criterion is 66 %. Students were convinced that policies were available to students (80 % in SK, 53 % in EU), that penalties were administered according to a standard formula (62 % in SK, 38 % in EU). They were also convinced about the existence of policies dealing with academic dishonesty (87 % in SK, 56 % in EU). Evidence that indicated Slovak universities do address this problem was the fact that 70 % of students correctly identified a case of serious plagiarism from a scenario that only 37 % of EU-wide student respondents were able to identify. The percentage of Slovak students thinking that one of their teachers may have plagiarized in his/her class notes was almost the same as that for the EU as a whole (33 % in SK, 30 % in EU). Only 14 % of Slovak students said they might have plagiarized, whereas the average for all EU student responses was 29 %.

The most frequent methods for Slovak students to get to know about plagiarism are student guides and handbooks followed by workshops.

When given a specific case (40 % of a student's submission is from other sources and is copied into the student's work), Slovak students were more likely to judge it as plagiarism (or serious plagiarism), compared to the EU average. For example, the sub-question stating that some words in copied 40 % of text were changed, but with no quotations, references or in text citations,

are also the most important ones for all EU students.

If we highlight reasons, where Slovak answers differ from EU ones by more than 10 per cent points, we can see interesting results (see table below). We can see that the biggest differences are in these reasons:

- They are not aware of penalties
- They think their written work is not good enough
- They can't express another person's ideas in their own words
- There is no teachers control on plagiarism
- They don't understand how to cite and reference
- The consequences of plagiarism are not understood

Slovak students tend to underscore all of these criteria compared to EU students. We can see that the introduction of the central plagiarism detection tool led to the knowledge that there are penalties, there is teachers control on plagiarism and the consequences are understood. The other reasons (their written work is not good enough, they can't express another person's ideas in their own words and they don't understand how to cite and reference) show other differences in Slovak attitudes, which are probably not related to the existence of central repository.

We can see that the only reason significantly over-scored by Slovak students was that they are unable to cope with the workload.

Another reason, mentioned by some students, is diversity of assignments. Teachers usually give the same assignment to all of the students, or the assignment is the same as it was in previous years. Very often the assignment does not support enough variety, so students know that their texts will be similar to each

other anyway. In this situation it is practically impossible to avoid plagiarism and students naturally tend to copy their work.

## Penalties for plagiarism

This part of the study draws significant inspiration from (Foltýnek, 2013).

We have examined what happens if a case of plagiarism is uncovered. It is often up to the teacher to decide. Where the case is more severe (depends on the teacher's opinion), the student is sent to the disciplinary committee. The most common penalty is zero mark and repetition or failure of the module or subject.

In case of plagiarised dissertation, student is likely to be expelled from the institution. The students often added comments, that a specific penalty depends on the scale of plagiarized text and on whether it is student's first case of plagiarism or not.

If we compare Slovak students' answers with the EU average, we can see that Slovaks underscore less severe criteria (no action would be taken, verbal warning) and are more likely to tick the more severe criteria (repeat or fail the module or subject, suspend from the institution). This proves that Slovak students are more convinced than their European colleagues, that the consequences of plagiarism are severe.

	Reason	SK students	EU students
1	They think the lecturer will not care:	33 %	31 %
2	They think they will not get caught:	63 %	62 %
3	They run out of time:	71 %	64 %
4	They don't want to learn anything, just pass the assignment:	63 %	53 %
5	They don't see the difference between group work and collusion:	9 %	16 %
6	They can't express another person's ideas in their own words:	42 %	55 %
7	They don't understand how to cite and reference:	41 %	52 %
8	They are not aware of penalties:	19 %	41 %
9	They are unable to cope with the workload:	53 %	41 %
10	They think their written work is not good enough:	15 %	33 %
11	They feel the task is completely beyond their ability:	30 %	28 %
12	It is easy to cut and paste from the Internet:	66 %	67 %
13	They feel external pressure to succeed:	16 %	25 %
14	Plagiarism is not seen as wrong:	34 %	35 %
15	They have always written like that:	32 %	34 %
16	Unclear criteria and expectations for assignments:	17 %	22 %
17	Their reading comprehension skills are weak:	23 %	27 %
18	Assignments tasks are too difficult or not understood:	25 %	25 %
19	There is no teachers control on plagiarism:	8 %	20 %
20	There is no faculty control on plagiarism:	8 %	14 %
21	The consequences of plagiarism are not understood:	28 %	39 %

**Table 1: Reasons leading students to plagiarism (IPPHEAE survey results)**

		SK Students			EU Students	
		Assign.	Dissert.		Assign.	Dissert.
a.	No action would be taken	4 %	0 %	<<	21 %	5 %
b.	Verbal warning	26 %	7 %	<<	50 %	15 %
c.	Formal warning letter	26 %	14 %	=<	27 %	26 %
d.	Request to rewrite it properly	29 %	16 %	<<	51 %	35 %
e.	Zero mark for the work	68 %	44 %	>=	53 %	42 %
f.	Repeat the module or subject	64 %	38 %	>>	38 %	26 %
g.	Fail the module or subject	46 %	38 %	>>	38 %	26 %
h.	Repeat the whole year of study	13 %	20 %	=	11 %	19 %
i.	Fail the whole programme or degree	24 %	29 %	>=	13 %	33 %
j.	Expose the student to school community	17 %	18 %	=	14 %	19 %
k.	Suspended from the institution	28 %	42 %	>>	14 %	29 %
l.	Expelled from the institution	24 %	34 %	>=	12 %	30 %
m.	Suspend payment of student grant	13 %	17 %	=	13 %	19 %
n.	Other	6 %	6 %	<<	11 %	10 %

**Table 2: What happens when plagiarism is uncovered (IPPHEAE survey results)**

## Software versus Policies

This part of the study draws significant inspiration from (Foltýnek, 2013).

We can see that the introduction of plagiarism detection software and the occurrence of the terms “plagiarism” and “academic integrity” in the media and on the Internet led to the students’ convincement about the existence of unified guidelines.

However, if we look at the survey answers from 2 senior management staff at the same university, they will show us there are no unified guidelines for addressing plagiarism. Each of them was from different faculty and their answers were totally opposite. They both agreed that policies for plagiarism and other forms of academic dishonesty were separately defined. One of them added, *‘Just the penalties are not known in case of top politicians’*. However, answers to following questions seem like an exercise of negation: Do you think it should be [separately defined]? Yes. No. Do you have a set of standard penalties for cases of student plagiarism? No. Yes. Are there standard penalties for other forms of academic dishonesty? Are these penalties separate from those for plagiarism? No. Yes. Do the plagiarism policies, procedures and penalties differ according to a student’s level or background? Yes. No. Are there other factors taken into account, e.g. first offences, international students, mitigation circumstances? Yes. No. And so on. When one looks at the methodical instructions for theses at this university, s/he may find two mentions of plagiarism: *‘Thesis must not have the character of plagiarism and violate someone else’s copyright.’* and: *‘The head of supervising department is to inform the dean of any case of plagiarism’*. According to study regulations, dean then passes the case to the disciplinary committee, which decides. And evidently, the result may be different from faculty to faculty. So the question is, can we consider these two mentions of plagiarism consider as “defined policy”?

## Conclusion

Even though Slovakia has two key documents approved by the Slovak Rectors Conference, which introduce Ethical Codex, Measures to eliminate plagiarism and plagiarism detection software in operation, it does not mean unification of policies and procedures for dealing with plagiarism. However, the rising occurrence of the words “plagiarism”, “academic ethics” and “academic integrity” raised public discussion about these topics and students are convinced that policies exist and probably think twice before committing plagiarism. Undoubtedly, it was significant step forward and Slovakia is much ahead of many European countries now, which was proved by the survey conducted under the IPPHEAE project. We have confirmed that Slovak students are much better informed about the concept of plagiarism than their European colleagues. The reasons possibly leading Slovak students to plagiarism are also significantly different from the EU average.

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