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Challenges and Stress While Teaching Problem Solving in Mathematics

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Abstract

The purpose of our research is to examine what challenges and stressors teachers face when teaching problem solving in mathematics classes, whether they do problem solving mostly with gifted or better students than with other students in the class. We used a quantitative research method through a survey questionnaire that teachers filled out online. Hypotheses were tested with the Kruskal-Wallis's test to determine differences between groups of teachers. The results showed that teachers, regardless of the university they graduated from and the average number of students in the class, define the same challenges that students and teachers face when solving problems, and that they try to implement problem solving with all students in the class, not only with the gifted. Teachers report that problem-solving teaching takes a lot of time and preparation, and that problem-solving take time during class. Such teaching itself is demanding in preparation. For the challenges faced by students, teachers state students' quick withdrawal, lack of self-confidence, and lack of prior knowledge and problem-solving skills. It is difficult for teachers to achieve the outcomes by solving problems in mathematics classes, but they are aware that solving problems gives students better skills. It is important to understand the impact of teacher stress and reduce the stressors that teachers face when solving problems in class, because teacher stress affects student success in problem solving, which is related to student success in mathematics.

Keywords: challenges; class size; competence; self-efficacy; stressors

1. Introduction

Beginning in the mid-1930s, attention began to be paid to teacher stress, what are the challenges, stages and how it manifests itself. We can define stress as a hypothetical construct that represents a state of balance between an individual's response to the demands of the environment (Erdiller & Dogan, 2014).

Furthermore, stress is defined as a non-specific response of the body to any demand placed on it. Stressors that occur in teachers can be deficiencies in the working environment, professional limitations, teacher-teacher relationship, unfulfilled goals (Erdiller &Dogan, 2014). All these stressors are interconnected, because if the teacher has shortcomings in the working environment or cannot improve professionally, all this can affect the final goals, which can cause stress for some teachers.

Many teachers enter the teaching profession with a high level of commitment that they can influence the world and society through the knowledge, skills, and abilities of their students, and that they will be given the appropriate resources to do so.

Solving problems should be the fundamental goal of mathematics, as stated at several mathematical conferences, because students should be trained for an important mathematical competence and competence in general, which is problem solving. Teachers have been given this task, but under what conditions they work, whether it is always feasible, few care and pay attention to it.

Therefore, in this paper we wanted to examine what stressors teachers encounter when solving problems in mathematics classes, whether they solve problems only with gifted students or with all students, and whether there are any differences regarding the demographic characteristics of teachers.

The goal of this research was to find out what challenges, or stressors, teachers face when teaching problem solving in mathematics classes, and in what percentage they teach problem solving only with gifted students.

In accordance with the aim of the research, the following research hypotheses were set:

H1: There is no statistically significant difference between mathematics teachers with different college degrees regarding the challenges they face when teaching problem solving.

H2: There is no statistically significant difference between mathematics teachers who have different degrees regarding the challenges students face when teaching problem solving.

H3: There is no statistically significant difference between mathematics teachers who work in classes with different numbers of students regarding the challenges they face when teaching problem solving.

H4: There is no statistically significant difference between mathematics teachers who work in classes with different numbers of students regarding the challenges students face when teaching problem solving.

H5: There is no statistically significant relationship between only better students solving problems and teachers teaching problem solving only to better students.

2. Literature review

2.1 Troubleshooting

Mathematicians have always been interested in how to solve problems. However, the turning point in teaching problem solving was the contribution of mathematician Georg Polya. He believed that problem-solving skills are not innate but can be learned. In particular, problem solving has been a topic at every ICME conference since 1969. In the 1980s and 1990s, researchers and educators were engaged in defining mathematical problems, classifying problems and ways of approaching mathematical problem solving, and recognizing the importance of problem solving for students. From the end of the 90s until now, various countries around the world are working on implementing problem solving into curricula and programs. Also, more and more researchers are interested in teachers' opinions about problem solving in mathematics classes, how they implement problem solving in class and what challenges they encounter when teaching problem solving.

A mathematical problem is a problem that can be presented, analysed and, if possible, solved using mathematical strategies. As such, it can be a simpler, real-world problem or a more complex, abstract, purely mathematical problem (Blum & Niss, 1994). A mathematical problem is a task in which the solution is not obvious, as well as the solving strategy itself (Pólya 1981, Blum & Niss 1991, Nunokawa 2005). Nunokawa, (2005) also says that the problem is what requires deeper thinking, using previous knowledge, transforming the task. Problems are also tasks whose difficulty and complexity make them problematic and non-routine (Xenofontos, 2014 according to Schoenfeld, 1992, Goos, et al., 2000).

Problem solving is generally considered the most important cognitive activity in everyday life (Jonassen, 2000). We can define it as finding an answer to a question in a task, for which there is no known method or procedure (Cindrić, 2014).

Problem solving in education still has no formal structure, although many people are rewarded for solving problems. Too little attention is paid to the study of the problem-solving process itself (Jonassen, 2000).

Pedagogues and psychologists point out that teaching mathematics should not be reduced only to the implementation of methods, procedures, or the application of algorithms. Solving mathematical word problems has been described as the "heart of mathematics", because it connects mathematics with real life, which increases the student's motivation to learn mathematics (Khoshaim, 2020).

Solving problems in mathematics education has various meanings:

1. goal,

2. process,

3. basic skill,

4. research method,

5. mathematical thinking i

6. teaching approach (Chapman, 1997).

Kurnik, (2002) states that the problem situation created by the teacher himself is of particular interest because the goal is to increase the efficiency of mathematics teaching and raise the level of students' mathematical education. The same author believes that it is not enough just to pass on certain knowledge, perhaps not even to manage in problem situations in the sense that they perceive and formulate a problem, but to train students to solve problems, and Stojaković, (2005) says similarly, that the teacher is a collaborator and coordinator of teaching, and not just a supplier of ready-made knowledge and solutions. Students in problem-based teaching think instead of memorizing mechanically, produce instead of reproducing, create instead of copying (Stojaković, 2005). Furthermore, the lesson is not successful if the students do not work actively, that is, if they do not solve problems (Kurnik, 2002). Problem-based teaching precisely serves that, for students to become better thinkers and problem solvers (Nickerson, 1994).

2.2 Teacher stress and problem solving

As stress became present in modern society in general, it also became present in the teaching profession. Stress at the teacher's job also affects his job satisfaction. However, what leads to stress is, among others, the impossibility of achieving set student achievement goals, following new teaching guidelines, and introducing problem solving into everyday teaching (Ariaza & Lobel, 2018).

It must be understood that stress has devastating effects on physical and mental health if the stressors are not mitigated.

Regarding the definition of stress, many researchers have provided definitions. We will name some. Before that, it is necessary to emphasize that it is particularly challenging to define stress in people considering the emotional and cognitive aspects that are unique to psychological stress (Ariaza & Lobel, 2018).

Lazare and Folkman (1984) defined stress as a special relationship between a person and the environment that the person evaluates as threatening his well-being. This definition emphasizes the complexity of stress by emphasizing the importance of the individual, the situation and one's own assessment of the ability to manage that situation (according to Ariaza and Lobel, 2018).

Similarly, Demaray (2003) says that stress is an emotional, cognitive, and physiological experience when the demands of the environment exceed individual resources for adaptation; individual attempt to manage these requirements.

Cognitive behaviourists emphasize two approaches to coping with stress: cognitive coping - emotionally focused and behavioural coping - focused on solving the problem that causes stress (Demaray, 2020). So, for a teacher to remove stress, he must learn to deal with the situation that causes him stress and try to remove the problem in that situation. Therefore, he needs the support of a superior person, but also a change in the social perception of mathematics, in the sense that it is not necessary to practice individual teaching materials during classes so that students can do quality problem-solving classes.

Many teachers are aware of the importance of integrating problem solving into curriculum documentation. They received advice or some professional education. However, if this is enough for the teacher to implement problem solving, teachers are not sure how to evaluate the problem solving of students, which results in stress for the teacher himself (Andereson et al., 2005).

The perspective of learning and teaching has changed in the world in the last 30 years from one based on behavioural psychology to one based on cognitive psychology, and we have been witnessing this here in Croatia for the last five years. Again, the problem was put before the teacher how to teach lessons that will promote students to learn with understanding (Artzt & Armour-Thomas, 1998).

Teachers are of the opinion that they have this kind of pressure that requires a lot of practice, because solving problems is not a simple competence, especially for students. They simply feel that they cannot process everything (Artzt & Armour-Thomas, 1998).

In order to prepare a problem-solving lesson, the teacher must take into account the planning of the same lesson, how to interact with students and how he imagines interaction between students, and how to evaluate student activities. All that influences it is the teacher's knowledge, beliefs, and goals (Artzt & Armour-Thomas, 1998).

Since 1991, NCTM wants every mathematics teacher to leave these goals for his students to achieve: that students appreciate mathematics, become confident in their mathematical abilities and problem solving, mathematically communicate and reason (Artzt & Armour-Thomas, 1998). Due to the impossibility of achieving the set goals at a satisfactory level, teachers feel frustrated, which results in stress. The teaching profession and stress should be the subject of research by experts in the field in order to help teachers. Teacher self-efficacy is significantly related to the teacher's psychological status, which is affected by stress, burnout at work or job satisfaction (Hu et al., 2019).

Support from the director, a close and cooperative relationship with colleagues affects the reduction of stress, which results in better efficiency (Hu et al., 2019). The sense of self-efficacy of teaching, professional knowledge, leads to a reduction in stress (Hu et al., 2019). Self-efficacy can be defined as confidence in one's ability to successfully organize, manipulate and execute assigned tasks at work Hu et al., 2019). A teacher's self-efficacy reflects the degree to which a teacher is confident in his ability to perform professional duties (Hu et al., 2019).

Teachers are looking for better sources of appropriate problems, using sources other than textbooks, adapting problem solving to class needs, grouping students for research (Anderson et al., 2005).

However, this is in contradiction with the requirements of "practicing" the material because practicing requires time as well as solving problems. A great responsibility is placed on the backs of teachers.

Teacher stress is also related to monthly income, years of service, children's age, number of students in the class (student-to-teacher ratio), time pressure, lack of rewards and recognition (Erdiller & Dogan, 2014).

In my understanding, education, teaching, and learning are not one-way transactions. The teacher is no longer perceived as the one who has more knowledge and who transmits knowledge in a controlled manner, but as a teacher who will help students solve problems, form them to think critically and realize their potential. However, teachers are still people who perform a very sensitive, critical, and demanding job. Working conditions have become more demanding and challenging for teachers because students come to school with fewer hours of sleep, and thus less concentration (Erdiller & Dogan, 2014).

Solving problems is a demanding job for both the teacher and the student, so gifted students are better at it.

A significant part of the research on mathematically gifted students is based on comparing the problem solving of gifted and average students. Research has shown that mathematically gifted students are more successful in this (Koichu, 2011).

As the definition itself says, gifted students are excellent at solving problems. This ability distinguishes them from others according to the results of IQ tests, which mainly examine problem-solving abilities (Gorodetsky & Klavir, 2003).

Gifted students possess a unique set of traits, abilities, characteristics in the learning process that distinguish them from their peers (Lim et al., 2020).

Gifted students solved problems better than average students without prior knowledge and solved analogical examples. Gifted students are more successful in solving problems. They focus on combinations and coding of elements that are in the problem itself when solving, and average students try to connect with previous knowledge, finding similar problems and comparing (Gorodetsky & Klavir, 2003).

Problem solving should find a place in every teaching of mathematics and should be the centre of school mathematics.

3. Methodology

3.1 Subject and goal of research

The goal of this research was to find out what challenges, or stressors, teachers face when teaching problem solving in mathematics classes, and in what percentage they teach problem solving only with gifted students.

In accordance with the aim of the research, the following research hypotheses were set:

H1: There is no statistically significant difference between mathematics teachers with different college degrees regarding the challenges they face when teaching problem solving.

H2: There is no statistically significant difference between mathematics teachers who have different degrees regarding the challenges students face when teaching problem solving.

H3: There is no statistically significant difference between mathematics teachers who work in classes with different numbers of students regarding the challenges they face when teaching problem solving.

H4: There is no statistically significant difference between mathematics teachers who work in classes with different numbers of students regarding the challenges students face when teaching problem solving.

H5: There is no statistically significant relationship between only better students solving problems and teachers teaching problem solving only to better students.

3.2 Measuring instrument

For the purposes of this research, a questionnaire consisting of 3 parts was created.

In the first part, there were 14 items related to the socio-demographic characteristics of the respondents (gender, type of employment institution, area of work, county of work, age, etc.).

In the second part, there were 10 items, 7 of which were of the Likert type (for example: The following statements refer to your method of teaching problem solving. 1. I give students a problem, they solve it independently. 1 – never, 2 – almost never, 3 – sometimes, 4 - almost always, 5 - always), two questions related to the teacher's self-assessment on additional education for setting and solving problems, and evaluation of the Problem-Solving element and one open-ended question as a comment related to the questions of the second part of the Questionnaire.

In the third part of the Questionnaire, there were 5 items with offered mathematical tasks in which respondents had to decide whether that task was a problem or not a problem for fifth grade students.

The data was collected by means of a survey questionnaire online via MS Forms. Content validity was ensured by careful selection of questions that sought to answer all research questions. First, a pilot study was conducted, after which an effort was made to increase the reliability, validity, and applicability of the questionnaire. The pilot research, which was conducted on a sample of N=12, obtained information about the clarity of the questions, the attractiveness of the questionnaire, the time to fill it in, whether the questionnaire is too long or too short, in order to obtain information about the categories of answers from the answers to closed-ended questions and appropriateness, and to generate categories for closed questions from answers to open questions. The reliability and validity of the instrument increased by selecting a representative, unbiased and not too large or too small sample.

The terms used have explanations in theory, and the questionnaire contains questions that will try to answer all research questions. Validity is also ensured by the wealth of collected data (N=211), in addition to impartiality and objectivity (anonymity of respondents).

Also, there is a possibility of generalization since the sample is made up of respondents who belong to 4 counties with different development indices, that is, the possibility of transferring the conclusion to other counties. Various types of questions, closed and open, were used in the questionnaire. This research aims to achieve a step forward towards improving educational work, reducing challenges, and solving problems in mathematics teaching as much as possible. The results of the research will be compared with the results of previous research and given recommendations for teaching problem solving. In the research, quantitative data were collected through Likert scales and a scale of self-assessment of knowledge about problem solving, the use of problem solving in teaching, by marking the offered answers to questions, how they approach problem solving, how they evaluate problem solving. Cronbach's alpha reliability test was used for the reliability of the survey. The Cronbach alpha reliability test on the data collected in the pilot study showed a coefficient of α = .868, which indicates high reliability. After the data collection process was completed, the reliability of the Questionnaire was checked on Likert-type items and it was .749. The Cronbach alpha reliability test showed the following values for individual variables: Method of teaching (α=.394), Finding problems (α=-.265), Importance for students (α=.910), Challenges in teaching (α=.764), Student reaction (α=.366), Monitoring and evaluation (α=.761), and Self-evaluation (α=.694). We can see that the reliability of some variables is low.

Accordingly, a factor analysis was carried out to determine the grouping of particles, the factors that explain them and the dispersion of particles itself. Also, factor analysis was used to see which particles 'spoil' the reliability of the Questionnaire.

KMO (.802) and Bartlett ($p < .001$) indicate that the factor analysis is suitable, and a factor analysis was performed using the method of common factors with the Kaiser extraction criterion and Varimax rotation.

Based on several factor analyses, the new variables Challenges for teachers and Challenges for students were named, according to the context they represent. Those two variables were omitted from further factor analysis.

In the factor analysis without the two variables mentioned above, in addition to KMO (.802) and Bartlett ($p < .001$) and the limitation to 3 factors that explain 50.78% of the variance, it was observed that the particles of the remaining three variables are mostly grouped in one factor. Therefore, according to the context of the particles, two variables Teaching method and Monitoring, evaluation and self-evaluation were formed.

The reliability of the Questionnaire after factor analysis was α=.782. While the reliability of the particles is as follows: Method of teaching (α=.634), Importance for students (α=.910), Challenges for the teacher (α=.786), Challenges for the student (α=.782), Monitoring, evaluation, and self-evaluation (α=.768). We can see that the reliability of all variables is acceptable, so we could proceed with further data analysis.

For future research, space is left for respondents to write down risks and challenges that they identify themselves, which can later be used for some research.

3.3 Participants

The participants were mathematics teachers in four counties in the Republic of Croatia. The sample was a non-random, convenience sample that represents the meanings of characteristics of the wider population in proportions that can be found in the wider population. In the Republic of Croatia, there are four categories of county development among a total of 20 counties. The counties where the respondents work were chosen by random selection, one county from each category.

A letter of request with a link to the questionnaire and all information about the research and the researcher was sent to the official e-mail addresses of the principals of primary and secondary schools, who then forwarded it to their mathematics teachers. The same was also done in teachers' Facebook groups with an additional note about the affiliation of the teachers to the mentioned counties. According to the data available on the website of the State Bureau of Statistics, there are approximately 250 mathematics teachers in the Osijek-Baranja County, 680 in the City of Zagreb, 350 in the Split-Dalmatia County, and 35 in the Lika-Senj County. In the end, the sample consisted of N=211 respondents, of which 59 were from Osijek-Baranja County, 94 from the City of Zagreb, 49 from Split-Dalmatia County and 9 from Lika-Senj County, of which Ž=188, M=23. The counties were selected by random selection from the list in which the counties are classified into categories according to the index of development, so that one county was selected from each category. In this way, it is ensured that the data will cover from the least developed county to the most developed county.

3.4 Procedure

In accordance with the theoretical framework, a survey questionnaire was designed and is attached to this paper. After that, the questionnaire was converted into an online version in the MS Forms tool, and it was sent to the e-mail addresses of the principals of primary and secondary schools, who were asked to forward it to mathematics teachers as selected in the 'Participants' section. The link to the research was also posted in teacher groups on Facebook with a special note on which counties were included in the research.

At the end of the research, the data were downloaded in the form of an Excel table and processed in IBM SPSS 23.

12 respondents participated in the pilot study, and it was observed that teachers carry out problem solving in mathematics classes, that they mostly come up with problems themselves and that problem solving stimulates students' motivation to learn mathematics, their creativity and connection of knowledge. Teachers value summative and formative problem solving, but are also aware of the challenges that problem solving brings. Within the offered mathematical tasks, teachers mostly recognize mathematical problems.

211 (N=211) respondents participated in the research, of which 23 were men and 188 were women (M=23 and F=188). For the purposes of the analysis, the reliability of 40 items of the Likert scale was first checked. The Cronbach alpha reliability test showed a coefficient of .747. We can see that the reliability of the Questionnaire decreased from 'very reliable' to 'reliable'. The variables that were formed in the Questionnaire are the following: Method of teaching, Finding problems, Importance for students, Challenges in teaching, Student reaction, Monitoring and evaluation, and Self-evaluation.

The Cronbach alpha reliability test showed the following values for individual variables: Method of teaching (α=.394), Challenges in teaching (α=.764), Student reaction (α=.366). We can see that the reliability of some variables is low.

Accordingly, a factor analysis was carried out to determine the grouping of particles, the factors that explain them and the dispersion of particles itself. Also, factor analysis was used to see which particles 'spoil' the reliability of the Questionnaire.

KMO (.802) and Bartlett ($p < .001$) indicate that the factor analysis is suitable, and a factor analysis was performed using the method of common factors with the Kaiser extraction criterion and Varimax rotation.

The initial factor analysis (with all particles) yielded eleven factors that explained together

66.978 % of variation. Particles of some variables were dispersed through two factors, and some through three or more.

Based on fourth analysis, the new variables Challenges for teachers and Challenges for students were named, according to the context they represent.

The reliability of the Questionnaire after factor analysis was α=.782. While the reliability of the particles is as follows: Method of teaching (α=.634), Challenges for the teacher (α=.786), Challenges for the student (α=.782), We see that the reliability of all variables is acceptable, so we were able to proceed with further data analysis.

In the next part of the paper, the results of descriptive and inferential statistics will be presented.

3.5 Descriptive statistics

In this research, the respondents were mathematics teachers, and the results of some sociodemographic characteristics are shown in Table 1.

Table 1: Descriptive indicators of sociodemographic factors

Characteristic	N	Share [%]
Respondents	211	x
Sex		
Men	23	10,9
Women	188	89,1
Completed university		
Teacher study	181	85,8
Some other study with subsequently acquired pedagogical competences	23	10,9
Else	7	3,3
Average number of students in the class		
Less than 5	4	1,9
From 5 to 9	5	2,4
From 10 to 14	17	8,1
From 15 to 20	75	35,5
From 21 to 25	92	43,6
From the 26th to the 30th	18	8,5

In accordance with the set research task, we examined teachers' attitudes about teaching methods, challenges for teachers and students, and the results of the descriptive analysis are shown in Table 2.

Table 2: Descriptive indicators of mathematics teachers' attitudes

Variable	N	Min	Max	M	SD
Method of teaching					
I give the students a problem, they solve it independently.	211	1	5	3,05	,712
Students solve the problem in pairs.	211	1	5	2,94	,622
Students solve the problem in a small group.	211	1	5	2,71	,809
Students solve problems according to their steps.	211	1	5	3,24	,795
I use problem solving to motivate students.	211	1	5	3,60	,963
I do problem solving only with gifted students.	211	1	5	2,19	1,058
Challenges for teachers					
Teaching by solving problems takes a lot of time.	211	2	5	4,22	0,706
Teaching through problem solving takes a lot of preparation.	211	2	5	3,99	0,828
Solving problems takes time during class.	211	1	5	4	0,9
When solving problems, students need more school hours to practice similar examples.	211	1	5	3,94	0,876
Teaching that includes problem solving is demanding in preparation.	211	1	5	3,89	0,871
Challenges for students					
Only "better" students are successful in solving problems.	211	1	5	3,28	1,088
Students are not "prepared" to solve problems.	211	1	5	3,33	1,002
Many of my students give up as soon as they encounter a problem.	211	1	5	3,51	0,963
Many of my students do not have the necessary prior knowledge and skills to solve problems.	211	1	5	3,5	0,953
Many of my students lack the confidence to solve problems.	211	1	5	3,64	0,885

The obtained results show that teachers mostly implement problem solving so that students work individually (M=3.05), We can see that the mean value decreases as the form of work changes. However, due to the mean values that are approximately equal to level 3, we see that teachers are undecided about how they teach problem solving, but mostly teach them in an individual form. However, as the mean value of the particles in the Teaching method variable is approximately equal to level 3, teachers neither agree nor disagree with the stated statements, except for the statement that they use problem solving to motivate students (M=3.60), and they disagree with the statement that they implement problem solving only with gifted students. So, teachers try to do problem solving with the whole class and use problem solving to motivate the students.

Deepening knowledge and connecting concepts where level 4 was reported the most.

The teachers also agreed with the statements related to the challenges they face in teaching, that this type of teaching is more demanding in preparation and requires a lot of time, and that this type of teaching requires more time during the lesson and more hours for practice, where they also reported the highest level 4.

Most teachers agreed that students do not have enough prior knowledge, self-confidence to solve problems and that they give up quickly.

3.6 Inferential statistics

In accordance with the set research tasks, a Kruskal-Wallis test was performed for independent samples in order to examine the differences between teachers who have graduated from different faculties with regard to the assessment of challenges for teachers in solving problems in teaching Mathematics.

Table 3 shows the results of the Kruskal-Wallis test.

Table 3: Results of the Kruskal-Wallis test of differences with regard to completed university, p<0.05

	Challenges for teachers
$\chi2$	6,208
Df	2
p	,045

The obtained results show that there are statistically significant differences between teachers who graduated from different faculties regarding the assessment of challenges for teachers when solving problems in mathematics classes, thus rejecting the first null hypothesis.

Table 4: Mean ranks of the variable Challenges teachers by Kruskal-Wallis test analysis, p<0.05

College		N	Middle rank
Challenges teachers	Teacher study	181	107,76
	Some other study with subsequently acquired pedagogical competences	23	107,39
	Else	7	55,93

If we look at the results of the middle range, we see that teachers who have completed teaching studies and teachers who have completed some other study report the greatest challenges they face, while teachers classified as 'Other' report the least challenges. But, in this last group were just seven participants. Further, in accordance with the set research tasks, a Kruskal-Wallis test was performed for independent samples in order to examine the differences between teachers who have graduated from different faculties with regard to the assessment of challenges for students when solving problems in Mathematics classes.

Table 5 shows the results of the Kruskal-Wallis test.

Table 5: Results of the Kruskal-Wallis test of differences with regard to completed university, p<0.05

	Challenges for students
χ2	2,816
Df	2
P	,245

The obtained results show that there is no statistically significant difference between teachers with different completed faculties regarding the challenges for students when solving problems, thus confirming the second null hypothesis. Regardless of the college they graduated from, teachers report the same challenges for students.

Since in this paper we wanted to examine whether there are statistically significant differences between teachers who work with different average number of students in the class with regard to the assessment of challenges for teachers when solving problems in mathematics classes, the Kruskal-Wallis test of differences was performed, and the results are shown in Table 6.

Table 6: Results of the Kruskal-Wallis test of differences with regard to the average number of students in the class, p<0.05

	Challenges for teachers
χ2	8,167
Df	5
P	,147

There is no statistically significant difference between teachers who work with different average number of students in the class with regard to the assessment of the challenges for teachers in solving problems in Mathematics classes, and we confirm the third null hypothesis. Regardless of the number of students teachers work with, they report equal challenges for teachers.

As we wanted to examine whether there are significant differences between teachers who work with different numbers of students in the class with regard to the assessment of challenges for students when solving problems in Mathematics classes, we conducted the Kruskal-Wallis test for independent samples.

Table 7 shows the results regarding the average number of students in the class.

Table 7: Results of the Kruskal-Wallis test of differences with regard to the average number of students in the class, p<0.05

	Challenges for students
χ2	6,808
Df	5
P	,235

It is also evident that there is no statistically significant difference between teachers who work with different numbers of students in the class regarding the assessment of challenges for students when solving problems in Mathematics classes, and we confirm the fourth null hypothesis. Regardless of the number of students teachers work with, they report equal challenges for students.

We were interested in whether there is a relationship between teachers only doing problem solving with gifted students and only better students being successful in problem solving.

Table 8 shows the results of the Spearman correlation test.

Table 8: Results of the Spearman correlation test, p<0.05

		I do problem solving only with gifted students.	Only better students are successful in solving problems.
I do problem solving only with gifted students.	correlation coefficient	1,000	0,276
	P		,000
Only better students are successful in solving problems.	correlation coefficient	0,276	1,000
	P	,000	

From the results, we see that there is a statistically significant but weak connection between the fact that teachers conduct problem solving only with gifted students and that only better students are more successful in solving problems, therefore we reject the fifth null hypothesis. Thus, some teachers believe that only better students are successful in solving problems and that they conduct problem solving only with gifted students who are assumed to be better.

4. Discussion

In this paper, we wanted to examine what challenges teachers and students face during problem-solving classes, whether these challenges represent stress for the teacher, whether the teacher conducts problem-solving only with gifted students or with all students in the class.

We have emphasized the research of teacher stress that comes from teacher self-efficacy.

The results showed that teachers who implement problem solving in mathematics lessons encounter poor prior knowledge and unmotivated students, and that only better students are successful in solving problems, teachers do not have a good source of problems, the teaching is demanding in their preparation, requires a lot of time as well as the very implementation of such classes, and the poor ratio of students in the class to teachers. These results were also given by other researchers (Ariaza & Lobel, 2018; Andereson et al., 2005; Artzt & Armour-Thomas, 1998; Hu et al., 2019; Erdiller & Dogan, 2014; Koichu, 2011)

Teachers strive to improve in their profession and provide students with the best possible support and are aware that acquiring the competence to solve problems, not only mathematical but also in general, is very important for further education and life itself.

The stressors we have listed affect the teacher's sense of self-efficacy, which can reduce the teacher's view of his own professionalism.

If the teacher's professionalism is impaired, and thus the efficiency, this leads to stress for the teacher. Thus, research has shown that self-efficacy affects teacher stress.

5. Advantages and limitations

The scientific contribution of this work is the creation of a measuring instrument with a high reliability coefficient.

A limitation of this study is the unreliability of the Problem Finding variable. However, with factor analysis, the measuring instrument was improved.

Furthermore, the limitation is also that, although there were only four counties in the research, it is recommended for future research to take respondents from other parts of the Republic of Croatia into account.

6. Conclusion

The contribution of this research at the level of the Republic of Croatia is that a different sample was used than previous research. Taking a random selection of counties from the categories of development, we have reached a conclusion for the rest of the Republic of Croatia as this method covers all categories according to the development index.

The results showed that teachers, regardless of the completed university and the average number of students in the class, equally define the challenges faced by students and teachers when solving problems. There is a difference in the fact that teachers who are classified as 'Other' when choosing a college, they have completed are less exposed to the stresses reported by other teachers. The reason for this may be that the teachers who were classified as 'Other' are teachers on short-term exchange, which we know is not such a rare case in mathematics teaching.

Furthermore, teachers try to solve problems with all students in the class, not only gifted or better students, but they believe that better students are more successful in solving problems.

Teacher stress is important and should be the subject of further research. Teacher stress and burnout are associated with many adverse outcomes for students, teachers, and the education system. Although much research has focused on promoting the social, behavioural, and academic achievement of students, much less attention has been paid to supporting and understanding the teachers who are charged with achieving these outcomes. Therefore, it is necessary to give teachers support from the administration and the professional service at the school, increase the number of hours of mathematics classes, but not the weekly responsibilities of teachers, offer more sources of problems, so that teachers can prepare more adequately for teaching problem solving and so that they can individually to approach each student and reduce the emphasis on practicing the teaching material and on grades, which are still very much present in our society. It is necessary to have appropriate additional materials for work and provide funds for their purchase.

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