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LIFE SKILLS OF YOUNG PEOPLE WITH DISABILITIES AND YOUTH WITHOUT DISABILITIES

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Original scientific paper

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ABSTRACT

The aim of this paper is to determine the differences in life skills of young people with and without disability in chronological age from 18-35 year-old in Tuzla Canton. The respondents sample consists of two sub-samples. First sub-sample contains 50 young people with disability, chronological age from 18-35 of both genders. Second sub-sample contained 50 young people without disability, chronological age from 18- 35 of both genders. Research data were analysed using method of parametric and non-parametric statistics. Frequencies, percentages and measures of central tendency have been calculated (arithmetic mean and standard deviation). P-values have been used for examining the difference between variables and variance analysis has been used for examining the importance of differences. The results show that there is a significant statistical difference between young people with and without disabilities in the of life skills assessed: job retention skills, skills to cope in danger. Based on the results obtained, it is recommended to start the program and training in early age which will make life easier to disabled persons and their families.

Key words: *young people with disability, young people without disability, independence, life skills*

INTRODUCTION

In the world of variety it is general opinion that being different is discriminating in many life spheres. Today, in Bosnia and Herzegovina live large number of people, with different level and type of disability, which are coping with being a part of society. Still, being included in local community does not imply that people with disability ask for additional care of public but, it implies their commitment and possibility to achieve rights as a human and citizen. People with disabilities are spread all over the world and in all levels of society, with share of 10% of total population (Anić, 2002). Within the ecological concept, around 25% of population is affected by disability

(Rački, 1996). Word Disability implies “any limitation or ability reduction in undertaking any activity, in the way, or within scope, which is considered normal for human being”. Disabled person, though, is a person with disability (Rački, 1997). Disabled person is any person with different body, thought or mind state or illness which permanently disables the fulfilment of personal and social need in everyday social and economy life (Žunić, 2001). Expression disability, as well as the earlier “defect”, however, still has a negative connotation besides other personal characteristics, where imitation, impediment and disability are put forward (Zovko, 1990).

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In the last few decades, in our society, at least three common models in the approach to disability phenomenon which are mutually intertwined and they affect the relationship between the community and disabled people, as well as relationship between disabled people towards disability phenomenon and themselves (Zahirović et al., 2009). In order to determine the base for standardized assessment of functioning and the interaction with the environment it is necessary to make a specification for each separated function, activities and factors of environment when def In order to achieve the basis for a standardized evaluation of the functioning of people, and its interaction with the environment it is necessary for each of the outsourced functions, activities and environmental factors to make a specification of when the damage on the observed variable does not exist, when the damage is mild, moderate, or strong/ total (Strnad & Benjak, 2010). The philosophy of independent living of people with disabilities is based on the principle that people with disabilities are not passive recipients of care and aging, but people who can and have the right to control their own lives, to make choices, make decisions and take responsibility for them (Dinkić & Momčilović, 2005). The main principles of philosophy of independent living of people with disabilities are: choice, making a decision, control, responsibility and the right to make a mistake. The preconditions for an independent living for people with disabilities are: the possibility of obtaining relevant information, the possibility of exchanging experiences with other people with disabilities, the existence of accessible housing, the existence of technical aids, the existence of an accessible architectural environment, the existence of accessible transport, the existence of personnel assistant service (Vučenović & Mastikosa, 2015). The philosophy of independent living is the result of efforts of the disability movement to see the issue of disability as a human rights issue (Lučić, 2009). Skill is the ability of an individual to quickly and accurately perform a series of gradually organized operations or assembly operations for more easily and efficiently performing a task. Social skills enable people to know what to say, how to make good choices and how to behave in different situations (Ferić- Šlehan & Kranželić, 2005). Self-esteem in people with disabilities is defined as assessment of their own capacities to function in a social environment (Omolayo, 2009). Activities of daily living include tasks for which a

person regularly prepares or as an addition for participation in his or her social roles and work in everyday life (Trombly, 1995). Social skills are one of the most important factors of development of identity (Erikson, 2008). The management of social interactions is one of the most complex tasks that people do, and it implies the inclusion of many physiological systems such as visual and auditory perception, speech and problem solving (Masty & Schwab, 2006).

THE AIM OF THE RESEARCH

The aim of this paper is to determine the differences in life skills in young people with and without disabilities.

WORK METHODS

The sample

The sample of correspondents consisted of two subsamples. First subsample contains 50 young people with disability, chronological age from 18-35 of both genders. Second sub-sample contained 50 young people without disability, chronological age from 18-35 of both genders randomly selected in Tuzla Canton.

The sample of variables:

It is analysed 2 variables in total: job retention skills, skills to cope in danger.

The method of conducting research

The research has been conducted in the time period of two months during which the research took place on the field. Each respondent answered the questions individually after previous instructions of interviewer. Respondents were asked to express their agreement or disagreement, or the level of agreement or disagreement with the views expressed in the claims. Young people with disabilities were interviewed individually. The time that was scheduled for an interview with each respondent was 15-25 minutes. Young people without disabilities were interviewed in groups. Time for filling in the questionnaires provided by this study is 15 minutes. All respondents are familiar with the research and are informed on how to complete the questionnaire.

Measuring instruments

Life skills inventory was used for the purpose of this study and it examines life skills (Life skills inventory /Independent Living Skills Assessment Tool - Department of social and health services-Washington State, 2000), in certain categories that are necessary for independent living, Multidimensional scale of perceived social support (Zimet et al, 1988).

Data processing methods

Research data obtained were analysed using method of parametric and non-parametric statistics. Frequencies, percentages and measures of central tendency have been calculated (arithmetic mean and standard deviation). P-values have been used for examining the

difference between variables and variance analysis has been used for examining the importance of differences. Data are shown in the table. Data are obtained in statistical analysis software package SPSS 16 for Windows.

RESULTS

Results obtained in table 1 show that there is a statistically significant difference between the existence of disability and level of efficiency in performing a skill related to job keeping. In a sample of young people with disabilities there are evident issues related to skills in anger management in crisis situations, seeking a raise, communication with superiors. A minor percentage of respondents with an extraordinary efficiency performance in the skill mentioned is evident for people with disabilities than without.

Table 1 The difference between respondents in the art of job retention

Group of respondents	JOB RETENTION									
	Primary		Central		Advanced		Exceptionally		Total	
	f	%	f	%	f	%	f	%	f	%
Persons without disabilities	0	0,00	0	0,00	0	0,00	50	100,00	50	100,00
People with disabilities	11	22,00	13	26,00	2	4,00	24	48,00	50	100,00
$\chi^2 = 35,13; df = 3; p < 0,001$										

Results obtained in the table 2 show that there is a statistically significant difference between the existence of disability and level of efficiency in performing a skill related to coping in danger. In a sample of young people with disabilities there are evident issues

related to skills in usage of fire extinguisher, a gas leak procedures, providing first aid and resuscitation. A minor percentage of respondents with an extraordinary efficiency performance in the skill mentioned is evident for people with disabilities than without.

Table 2 The difference between respondents in the art of coping with dangers

Group of respondents	GETTING AROUND IN DANGER									
	Primary		Central		Advanced		Exceptionally		Total	
	f	%	f	%	f	%	f	%	f	%
Persons without disabilities	0	0,00	0	0,00	0	0,00	50	100,00	50	100,00
People with disabilities	18	36,00	3	6,00	13	26,00	16	32,00	50	100,00
$\chi^2 = 51,51; df = 3; p < 0,001$										

DISCUSSION

The research includes people with disabilities and people without disabilities. In a sample of people with disabilities the most represented are people with cerebral palsy (40%), followed by multiple sclerosis (24%), spinal cord injuries (16%), muscular dystrophy (10%), multiple disabilities (4%), amputation (4%), and visual impairment (2%). Young people with and without disability differ in level of qualification. Most young people with disabilities who are included in this study have a high school education according to regular curriculum and plan of education (72%), while young people without disabilities mostly tend to have a university degree (76%). Young people without disabilities are more interested in further education and improvement (52%) compared to young people with disabilities (44%). A very small percentage of young people with disabilities are using assistive technology in their daily activities (4%). Only 4 (8%) of young persons with disabilities from the test sample is employed, but the problem of unemployment is expressed among young adults without disabilities, although, 19 young people (38%) from test sample is employed. A significant percentage of young people without disabilities (44%) are financially supported by their parents, and the respective percentage of people with disabilities is even higher (58%). A disturbing fact is that (6%) of young people with disabilities does not have any income, and 14% receive care and assistance, which is their only income. The research results show that there is a significant statistical difference between young people with and without disabilities in the majority of life skills assessed: household management, culture of living, transport, education planning, job search skills, job retention skills, skills to cope in danger, interpersonal skills, family and parenting planning. Although results have shown that a minor percentage of respondents with disability is familiar with resources of local community and the laws that define their rights and obligations than respondents without disabilities, there is not statistically significant difference between these groups of respondent in the skills mentioned. Reason for that can be found in the fact that young people with disability, included in the research, are members of organisations through which they get informed about their rights and resources in the local community. In the research obtained related to the field "self-care" it is concluded that young people with disability are better in assessment of possi-

bilities to get things done in their own way and when they want, in comparison to their parents. Larger percentage of young people with disability (67,5%) is considered to be able to take care of themselves: to make a meal, keep the hygiene, keep the house and clothes clean, when compared to their parents. On the other hand, the same research states that parents believe that young people with disabilities can make decisions about their movements, where and when they want (with or without additional aids or assists), whereas young people with disabilities disagree. The least choice that they have, young people with disabilities have expressed in terms of possibility to go on trips and vacations that they want, which are assessed as "very bad". Results related to the use of money show that young people with disabilities are having issues with control of money spending, compared to their parents. When asked whether there is any amount of money on which they can decide for themselves, the majority of respondents, included in this study, responded negatively (Bratovčić & Mehmedinović, 2015). According to research conducted, "Comparative research on quality of employment of people with disability", results have shown that of the total number of respondents, 92.2% answered the question which relates to the assistance of others in performing activities of daily living. More than half of this number is considered that they did not need any help of others in carrying out these activities (63.3%). Respondents who indicated that they need assistance in activities of daily living, it is largely related to administrative affairs, going out places of residence, housework, movement and transportation. When observing the assistance needed, it is evident that employed persons who need assistance in performing basic household work (personal hygiene, toilet, dressing and transfers and etc) almost do not exist since for over 90% of respondents the assistance is not necessary. This was expected since the sample contains in over 50% persons with sensory and intellectual impairment, who don't need this kind of help. Therefore, this report confirms the fact that the most difficult persons to employ and the least number of employed persons are the ones with a higher level of disability. Regarding the fact that the sample is about 30% of people with physical impairments that mainly lead to these needs, but only 10% of them, is in need of basic assistance, therefore, this conclusion is more likely, because even person with this type of disability tend to employ those who have a lower level of impairment (Ljubinković, 2009).

In a study conducted in the field of functional life skills among young people with multiple and mild disabilities, which included housekeeping, participation in community and recreation, the results showed that young people with multiple disabilities needed more sessions (12-50) than young people with milder issues, which is supposed to lower the number of sessions for mastering the skills listed (Cobb et al, 2006). Furthermore, research in the field of "Education and Training" has shown that parents of young people with disabilities better assess the possibility for further education and training than young people with disabilities. Young people estimate that their opportunities for additional training and education are poor due to distance from urban centres, the inaccessibility of public transportation, inaccessibility of environment and institutions, poor financial situation and prejudice against persons with disabilities (Bratovčić i Mehmedinović, 2015). The study "Unlimited- Survey for people with disabilities and employers' shows that in order to find employment, people with disabilities are usually informed about available job positions through Employment Agency (109 persons, 60.9%), followed by inquiring with friends and acquaintances if they know of any job position (92 persons, 51.4%), and track ads on job position in newspapers (64 persons, 35.8%), Internet (56 persons, 31.3%), 35 of them (19,6%) personally contacted various employers for the purpose of employment or searching for influential people to help them in employment (27 persons, 15.1%). The least contacted are private employment agencies (2 persons, 1,1%), exploring the possibility of starting your own business (9 persons, 5.0%), addressing the associations of persons with disabilities to help in finding a job (12 people, 6, 7%), provide ads to job seekers (13 persons, 7.3%), inform about incentives for employment of disabled persons (17 persons, 9.5%). It is interesting that 15 of them (10.1%) do nothing with regard to job search, while 6 persons (3.4%) did not answer this question (Blažinić-Papišta, 2011). While in the research conducted where the results showed the absence or underdevelopment of the following social skills affect the labour and social integration of people with disabilities, and therefore affects the retention of employment: the lack of communication skills leads to disagreements and misunderstandings; inadequate relationship with colleagues leads to isolation, making it difficult to cooperate in the performance of their tasks, and affects the quality and efficiency of the completion of some work. Certain social skills (social rules) are directly related to work performance, such as: compliance with the working

hours, compliance with time for a break, good interpersonal relationships with colleagues and superiors, listening to instructions, accepting criticism and more. All mentioned above implies the need for the development of social skills in young people with disabilities, as well as their efficiency and productivity (Arsenović & Pantelić, 2014).

CONCLUSION

Based on the research results there is a following conclusion: The results in this research show that there is a significant statistical difference between young people with and without disabilities in the of life skills assessed: job retention skills, skills to cope in danger. Based on the results obtained, for young people with disabilities it is recommended to start the rehabilitation program and training on developing and adopting life skills at early age in order to increase the feeling of success and safety and to create conditions for safe success in the further education and quality of their lives.

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GRADE AS THE MOTIVATIONAL FACTOR IN LEARNING MATHEMATICS

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Original scientific paper

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ABSTRACT

In this research the motivation for learning mathematics was tested, as well as the effect of grades on the motivation of primary school level students. On a sample of $N=100$ participants, primary school students, we conducted a survey, the results of which show that the participants are more motivated with extrinsic factors, then intrinsic factors for learning mathematics. Grades are the main factor that has the most influence on the motivation level of students for learning mathematics, because students need good grades for their further education. The results also show that punishment and rewards from parents for bad and good grades has no effect on the motivation level of students.

Keywords: *grade, motivation, learning, mathematics*

INTRODUCTION

Fundamental task in the teaching of mathematics is for students to adopt mathematical knowledge which is needed for making justified decisions in everyday life. Curriculum of mathematics resembles the need to prepare students for critical thinking and changing of the society. Mathematics is the way to understand the world. As a school subject mathematics needs to secure solid foundation for learning other subjects in every other educational area: technical and technological, social and humanistic, natural sciences, linguistics and communications, art, and even physical health education and in the practical work and design. It is also foundation for further education and lifelong learning.

The educational role of mathematics means that it has a share in the training and formation of the personal-

ity of students. To educate students in general, even in mathematics, it means to develop these things in them (Rešić, 2013):

- Intellectual area - The intellectual training of students includes the development of mental abilities, among which most important are attention, observation, performance of thinking operations, logical reasoning, the possession of intuition, imagination and memory.
- Morale area - teaching mathematics is educational act that develops positive characteristics and will of students. Dealing with mathematics develops in students' perseverance, patience, systematism, initiative, self-control, meticulousness, discipline, and these are all the moral virtues that have personalities with strong character.

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Aesthetically area - Math can provide lasting intellectual pleasure, colored with aesthetic and emotional tones, so that at the same time it is deepening knowledge and refining taste. Math among students develops a sense of symmetry, harmony, precision, clarity, and other and all of these are elements of beauty.

- Work-technical field - Working-technical training of students through teaching mathematics is multiple: development of a positive attitude towards work, forming of certain abilities, skills and habits that are necessary for practical activity.

Preparedness of teachers is a form of respect for students because only prepared teacher is ready to answer questions. However, it is necessary to be ready and to adjustments in the course of time of the class depending on the reactions of students. Questions should be responded with respect, if you require a long answer, give a brief one and encourage students to ask you after the class if possible. It is very important that your reaction is commendable (e.g. 'This is an important idea'), but never offensive.

Respect is also seen in specifying the rules – which you will also comply to (e.g. about grades, assignments...) encourage activity and communication (avoiding unidirectionality). Accent in teaching is placed on the understanding of mathematics and its application in the real world. Start of the class is particularly important. Preparedness protects against the unpleasant / serious questions as prepared teacher can concentrate on the very activity of teaching. However: no need to overdo it and lose all spontaneity. The aim is to ensure the preparation of a mix-up in the middle of the class, and not to prevent thinking about what is taught. Preparation gives sufficient assurance that it can be responded to the casual questions, to make certain adjustments during the lectures and to submit certain digressions (and lecturer to still be able to return to the main topic). It is recommended that after every class you think of your lecture - what was good and what is not?

In education, following teaching and motivational techniques can be used: crossword puzzles, networks, boo games, associations, quizzes and mental maps. Quizzes can be very different. All students can compete, groups or specific students. Quizzes can be designed as a current television quizzes. Along with them are often used puzzles, rebuses, game of galls, short sound recordings, short videos, cartoons, drawings, mime, pantomime, clothing, objects, models, balls, dolls, collage, different games, drawing, funny short stories, anecdotes, quotations, metaphors and so on. In schools are usually used motivational

techniques of writing down thoughts or brainwriting and storm of ideas or brainstorming.

The purpose of motivational techniques in the classroom is quick and efficient learning of new words, years, names and events. These motivational techniques relate to course content and motivate students to learn new teaching facilities.

Teachers can increase or decrease the complexity of the content with the help of teaching motivational techniques (higher number of new concepts and terms, etc.), and can use them for any educational content in teaching.

Special motivational techniques however are designed for relaxation and a short break for students. These techniques are especially relaxing with music (with breathing exercises), with movement (eg, lifting a hand, getting up, changing the seating arrangements, etc.), or special techniques of meditation or relaxation (with the emphasis on the power of words). Motivational relaxation techniques can be used at the beginning of the class or before the execution of demanding tasks.

Music can help create a special mood for the pupils. It is most commonly used as sound background before the start of the class and during the breaks. It can also be used as an aid or supplement to the exercises of relaxation, especially at the beginning of the class or before the evaluation. Music can also be used as a background while reading or listening to the source texts, or as background when processing a new teaching material (Dhority, 1992, p. 111). Teachers can choose a special music for the repetition of teaching material, and as a motivation for new teaching material (classical, folk, popular music ...), and a special music during the processing of the teaching material (for example, the classic music of the 19th century in order to attract the attention of the students or the Baroque music for comprehensive exposition of the teaching material), while training and during active participation of the pupils a special music can be used in combination with reading text or answering the questions (individually, in pairs or all students). In the teaching folk dances and singing of folk songs, or similar can be used.

A special motivational technique that involves movement can be used when applying the method of conversation or when determining and repetition of material. For example, students can answer questions by raising the left arm (the exact statement) or raising your right hand (incorrect assertion), all students can rise up, and then, in the case of incorrect claims sit etc.

In addition, clapping of hands can be used. In teaching students share teaching/worksheets for the classroom, help teacher prepare teaching aids, and the like. Also, the game in which the teacher throws a smaller ball and sets different questions or student throws the ball and examines other students can be used. Throwing and catching a ball should affect the faster reactions and responses of students. Special technique of relaxation and concentration is carried out using the positive suggestions that can encourage, or influence the positive mood, thoughts, and feelings. With this technique students and teachers become aware of the moment and so enter into the teaching process.

Special relaxation technique is also a visualization, which allows students to easily and clearly present desired goals.

Barica Marentič Požarnik specifies the following options:

- Suitable degree of news, surprises, and unexpected and inconsistent analytic data,
- Periodically turn to the methods that encourage personal involvement of students,
- Simulations, role-plays,
- Organizing knowledge tests in the form of puzzles and quizzes,
- Enable a choice of themes and ways of how to perform certain tasks (pupils choose their literary works that will read and report or themes that they will explore) and elective courses can help in defining and extending student's interests;
- Interest and internal motivation is generally stronger with opportunity for students to ask about what is not clear to them, to speak about their experiences and ideas and to express their opinions, even when they differ from the teacher's, which is enabled by open, democratic relations (Požarnik, 2000, p. 191).

Teachers can increase the motivation for a school or homework with authentic tasks (visual or in writing-graphics), work in groups, professional trips, working on various projects and research work and alternative assessment (collegial, self-evaluation) and in other ways. Teachers can use a variety of teaching strategies, methods and procedures that stimulate the interest of students and operate motivationally on them, for example, an image or oral demonstration, the use of a different image or the written materials, use of the Internet or CD etc.

With the method of exposure teachers can use special techniques such as relaxation techniques and visualization, metaphorical storytelling, global rollout of teaching materials, choice of words, variations of

voice, music and the like.

Ways to encourage motivation for learning are often presented in the form of advice and basic rules for teachers.

The first rule applies to meeting basic requirements: provide an organized classroom environment. The teacher should be the one that supports, sets the tasks that are challenging but not too difficult. Make tasks that are worth solving.

The second rule is that the students' need to build self-confidence and positive expectations: It should begin work on the student's level. May the learning objectives be clear, specific and achievable, emphasize comparing students' results, rather than competition.

The third rule is that students need demonstration of the values of learning: It is important to connect the teaching task with the needs of students, working activities that fit the interests of students, to stimulate curiosity. Make assignments entertaining for the students. New knowledge can be used, but also and what is already known, explain the connection between the current learning and later life.

The fourth rule is that teachers need to help students to stay focused on the task: Regularly enable students to produce works. It is necessary to avoid stressing the score and lower the risk of the task, but at the same time not to make the task too simplistic. It is necessary to model the motivation for learning and teach the teaching tactics to the students (Woolfolk, 2002, p. 373).

One of the rules of motivation is that it is necessary to make the most out of the introductory section at the beginning of each class. This part should be focused on the motivation for learning and work. Therefore, teachers using different motivational techniques should particularly pay attention to just the first few minutes of the class. The initial students' motivation, teachers can increase with the positive response to the following questions concerning the success, purpose, joy, encouragement and objective:

Success: Is it anticipated work at the appropriate level for students? The event takes place in the appropriate pace? Does every student do what suits his abilities, previous knowledge and experience? If the student's work is not at the required level, is it required of him to work until he succeeds?

Purpose: Do students understand personal advantage they will gain by learning what you teach? Do students value the importance of what they learn for work in life? Do you teach actively your subject and themes?

Joy: Are your classes different? Do they include substantial activity from students? Are the activities that you use entertaining for the students, for example discussions, group work, games, competitions, criticism, etc.? Do you recognize the importance and the interest of the students?

Do pupils have the possibility to show creativity or expression, for example, in problem teaching or planned activities? Do you teach you with enthusiasm? Do you have a good relationship with the students?

Incentives: Do you often encourage your students, for example, with grades, comments, compliments, etc.? Are incentives and recognitions for success given in a timely manner, after the student has finished his work?

Objective: Are the goals worth it for your students to reach them? Do you check often and plan deadlines for submission of student's work? Do you set personal goals for students, and praise them as is appropriate? Do you encourage students to take responsibility for their own learning? Do you drive most talented students to determine their educational needs and set their own learning objectives and evaluate their learning and change it in accordance with the results?

Teachers should not ask simple questions, such as: 'How to motivate students?', but rather the question: 'How to increase students' motivation?'

'Optimistic messages should be an integral part of the class. One of them could be: 'I know that today's work is a difficult challenge, but I know that we can all overcome it. Let's give our best! I have prepared some exercises that you may find tiresome, but you will eventually be delighted by what you have achieved.'

Even for the inappropriate behaviour in the classroom teacher can use different motivational strategies - e.g. he may use a traffic light, or red, green and orange card, and in such way that he puts a green card or paper on the board when it is allowed for students to talk among themselves.

When a teacher puts orange card, it means that silence is expected within one minute, but if you put red card, this, of course, means that the class should be in complete silence (Ginnis, 2004, p. 221).

The teacher should offer students a variety of areas, tasks and activities for the election; he should include divergent questions and tasks; should introduce new elements, diversity and surprises; should constantly give specific feedback on success; should include elements of imagination and play; express positive ex-

pectations for students; should introduce its own projects or projects in groups, learning in nature and so on. (Požarnik, 2000, p. 193).

The motivation for learning means directing energy to the achievement of the learning objectives. It is possible to use a variety of motivational techniques in this process. In any subject it is required that the student discovers and formulates for himself (Rakic, 1977, p. 105).

For motivation of students perseverance is important, and duration. The longer it lasts, the greater is the chance of success and completion of assigned tasks. Learning objectives which present the achievements that students should achieve are also important.

The stated goals improve the performance, because they focus attention on the task, include effort, increase persistence and enhance the development of new strategies for reaching goals. Reaching the educational objectives is influenced by the students' acceptance of the goals envisaged by the teacher; if students accept, these goals then encourage and motivate.

Motivational techniques in teaching refer to the knowledge of students and the new teaching material; they impact on the emotional engagement of students, and also to their interest and wishes. Motivational techniques can be classic, innovative, planned, spontaneous, short term, long term, opening, closing or inter-motivation. Due to the senses of students, they can be visual (sight), auditory (hearing), kinetic (movement), olfactory (smell) and gustatory (taste).

RESEARCH

A large number of students in primary schools have developed a negative attitudes, anxiety and resistance towards mathematics and they learn mathematics solely for the grades. The importance of knowledge of the basic elements of the subject of mathematics is crucial for the further education of students, but also for functioning in everyday life. It is therefore important to examine the factors that motivate students to learn and master the knowledge of mathematics. Grade in mathematics has a big impact on students for their motivation towards the subject. According to that, basic problem of this research will be to examine how evaluation of students in mathematics has an impact on their motivation and developing their attitudes towards mathematics.

Methods and techniques of research

The paper the following research methods will be used:

- Survey research method.
- The method of theoretical analysis.

For the processing of data following statistical methods will be used:

- Descriptive statistical methods.
- Correlation.
- t - Test.

Model of research

In the study participated a total of $N = 100$ subjects, students of elementary school 'Safet Basagic' Novi Travnik. Of these 25 students were of sixth grade, 25 students of seventh, 25 of eighth and 25 of the ninth grade. Students filled conveniently made questionnaire for this study which we in addition to basic socio-demographic data of students, collected data and information relating to their motivation and factors that motivate them in terms of learning mathematics. Participation in the study was voluntary and parents of children were notified prior to the survey on the participation of their children in the mentioned study.

The organization and process of research

The survey was conducted during the school year 2015/2016. Testing participants lasted for four days. Each class (sixth, seventh, eighth and ninth) was tested one day. The study was conducted in the framework of regular teaching formal classes and in classes of mathematics. Before conducting research students the purpose and intent of research was explained to them, and it was made clear that their answers are completely anonymous and will be analyzed solely on group, and not at the individual level. Students were asked to provide open and honest answers and that in case of ambiguity they contact the teacher. Participation in research is voluntary, and it was stressed to students who do not want that they do not have to fill out the survey questionnaire. Before completing the questionnaire students got the instructions, and it was thoroughly explained to them how to fill out the questionnaire. Completing the questionnaire took 20 minutes.

RESULTS

The survey was conducted on a sample of 100 respondents. When it comes to the gender structure of the sample on the basis of the presented results we can conclude that out of the total number of respondents, 61% of them were females while 39% of respondents were male.

As for the place of residence of the respondents, more than half of the respondents who participated in this study, therefore, 53% live in urban areas. Furthermore the suburb is inhabited by 24% of respondents while in the rural areas lives 23% of respondents.

Respondents who participated in this study are primary school students and from sixth to ninth grade. Of the 100 respondents from each class we had a 25% student -respondents who participated in the study.

Below, we wanted to examine whether students -respondents are punished if they get a bad grade in mathematics. Data show that the present situation is such that 64% of respondents are punished by their parents if they get a bad score. But we also have 36% of respondents who answered that in case you get a bad grade in math they pass without being penalized. In addition to questions about the punishment for the bad score, respondents were asked whether they are rewarded if they get a good grade in math. In this case, 64% of respondents stated that if they get a good grade in mathematics it is followed by prizes for this, while 36% of respondents have received no reward for a good grade.

As far as the average score at the end of the school year based on the results we see that more than half of the students, 56% of them, at the end of the school year 2015/2016 had 'very good'. In the past school year, 21% of students who participated in this study, it was 'excellent', and 20% had a 'good average'. But 3% of the previous school year ended with an average 'enough' while those with 'inadequate' were not in this study.

When it comes to the average score at the end of the school year for all respondents, we can say that the survey involved students whose average grade was in the range of 2 therefore enough, as a minimum, and 5 excellent, as the maximum rating. The average score at the end of the school year 2015/2016 for the participants of this study was $M = 4.0$ ($SD = .7$).

Much like with the average score at the end of the school year in the remainder of this paper grades in mathematics in students who participated in the study are presented. In this case, the largest number of respondents, namely 37% at the end of the year, had a 'good' grade in math, and 21% of students grade 'very good'. Furthermore, 19% of students 6-8 class had a grade 'excellent', and 15% grade 'enough'. However, it should be indicated that in the study participated and 8% of respondents in mathematics who had had an unsatisfactory grade.

In the following interpretation of the research results we will continue to observe the grades in mathematics so that on the basis of the presented results we can conclude that the survey involved students whose score in mathematics was in a range of 1, therefore 'insufficient' as a minimum and 5 'excellent', as the maximum score. The average score in mathematics at the end of the school year 2015/2016 for the participants of this study was $M = 3.3$ ($SD = 1.2$).

Before the main analysis, we checked the normality of distribution in order to determine whether the results are normally distributed, or whether it will be used parametric or nonparametric statistics.

For this purpose, we used a Kolmogorov-Smirnov and Shapiro-Wilk test for checking the normality of the distribution. First, we checked the allegations where we measured extrinsic motivation in patients. So based on the displayed results, we see that for each measured claim $p < 0.05$ which means that the distribution of results for claims for extrinsic measurement of motivation significantly deviate from normality.

In the second set, we examined the allegations where we measured intrinsic motivation in patients. And this case has been used Kolmogorov-Smirnov and Shapiro-Wilk whose results indicate that there is a statistically significant variance ($p < 0.05$) from the normality of the distribution for all measured claims. Therefore, the allegations where we measured intrinsic motivation are not normally distributed.

In the last set of allegations we measured how distributed allegations relate to the praise and punishment in children. And also for this set of statements the results of Kolmogorov-Smirnov and Shapiro-Wilk test show that for each measured claim $p < 0.05$, which means that the distribution of the results for all the claims, statistically significantly deviates from the normal distribution.

On the basis of all the displayed results, we see that all the claims from the questionnaire have a distribution

of results, which significantly deviate from normality, which is why below is used nonparametric statistic to check statistical importance.

Claims in the survey are divided into 3 sets which we measured: extrinsic motivation, intrinsic motivation, and praise and punishment for the students.

Extrinsic motivation was measured by the 9 claims, and on this scale the maximum score was 45, and the minimum 9, with the lowest score that any of the students had was 26. Average value for extrinsic motivation was $M = 36.9$ ($SD = 4.2$).

When it comes to intrinsic motivation, it was measured through 6 claims in the questionnaire, and consequently the highest possible score was 30, with the highest in our survey result obtained was 27, and the lowest 8. Average value on a scale of intrinsic motivation was $M = 14.9$ ($SD = 3.8$). We ended up the questionnaire with 4 claims where we measured the impact of praise and punishment to motivate students measured by the 4 claims where the maximum possible score on the scale was 20, and the minimum 4. Average value of claims where we measured the impact of praise and punishment was $M = 13.6$ ($SD = 2.4$).

In the remainder of this paper we analyzed the individual claims where we examined extrinsic motivation. The students could score each statement considering the extent to which they agree with a statement with scores of 1, which means that it does not agree, to 5, which means that it fully agrees with that statement. It is interesting to note that the respondents showed the highest level of agreement with the statement that follows: *The most important are grades in math, but not the knowledge*, where it was $M = 4.4$ ($SD = 0.8$). Based on this, we see how students value more grades, rather than acquired knowledge that will be useful in life and in further education. On the other hand claim with which students the least agree: *I like when the teacher reads aloud marks because everyone can hear that I got a good grade*, where the average score was $M = 3.3$ ($SD = 1.5$).

The next in the line as the object of analysis were the claims that are used for the examination of intrinsic motivation. The students could also in this case rate every claim considering the extent to which they agree with it, with scores of 1, which means that it does not agree, to 5, which means that you fully agree with this statement. Looking at the results shown in the table, we can conclude that the students who were the participants of this research to a lesser extent, agree with the statements which shows a relatively low average grades.

Namely, the highest level of agreement was reached with this claim: *I prefer to study and to earn a grade in mathematics, than to have it as a gift*, from which we see that the students still want to get the well-deserved grade proportional to the effort they have invested, and not to have higher grades given to them as a present $M = 2.9$ ($SD = 1.2$). However at the claim: *I'm ashamed if my teacher gifts me grade in mathematics that I didn't deserve*, we got the lowest average score that is $M = 2.1$ ($SD = 1.1$).

When it comes to the claims relating to the praise, or criticism, we can say that students and in this case also used ratings from 1 to 5 to appraise the level of agreement with each of the claims and the highest degree of consent and, therefore, the highest average rating was observed in the claim: *I'm trying to get good grades in Math, so my parents would not criticise or punish me* $M = 3.7$ ($SD = 1.3$). On this basis, we can conclude that students want to satisfy the expectations of their parents in order not to be criticised for the poor success in school. The lowest ratings and, therefore, the smallest level of consent we received at the claim: *I'm studying to get good grades in Math just because my parents will reward me*, where $M = 3.2$ ($SD = 1.2$) and at the claim: *When my teacher criticises me because of the poor grade, I'm trying to learn it as soon as possible and fix the grade*, at which the average rating was $M = 3.2$ ($SD = 1.0$).

In the remainder of this paper, we investigated whether there are statistically significant differences in extrinsic motivation between boys and girls. The maximum number of claims which were measuring extrinsic motivation was 50. The men achieved an average result of $M = 36.0$ ($SD = 4.4$) while for females the average score was $M = 37.5$ ($SD = 4.0$).

We were interested in whether there are statistically significant differences in the impact of extrinsic motivation on academic achievement due to gender. The results show that there is no statistically significant difference in extrinsic motivation between boys and girls. Furthermore, the aim was to test a statistically significant difference in intrinsic motivation between males and females. The maximum sum of the claims which measured intrinsic motivation was 30, men have achieved an average score $M = 14.3$ ($SD = 4.4$), while for females the average score was $M = 15.3$ ($SD = 3.8$). The results of the Mann-Whitney U test confirmed that there was no statistically significant difference in the elements that make intrinsic motivation regardless of whether it is a male or female respondents.

In continuation of the subject of the analysis was the comparison of elements that relate to praise or punishment of students. The maximum sum of the claims which measured praise and punishment was 20. Based on these results we see that the average score that relates to praise or punishment in male and female subjects is identical and it is $M = 13.6$ ($SD = 3.0$) and at students it is $M = 13.6$ ($SD = 2.1$). Object of interest for us was whether there are significant differences in the application of praise or punishment in male and female subjects. The results show that there is no statistically significant difference in the application of praise and punishment regardless of gender.

In the remainder of this paper, we investigated the effect of extrinsic motivation, depending on which grade of primary school attended respondent. So the biggest impact of extrinsic motivation was reported by respondents who attended seventh grade where the average score was $M = 37.7$ ($SD = 3.4$), while the other lower grades distributed in around a narrow range.

We wanted to examine whether there are significant differences in the impact of the elements of extrinsic motivation in relation to the grade which attends the respondent. In relation to this, the Kruskal Wallis test as non-parametric measure of statistical significance between multiple groups (more than 2 groups). Based on the data we see that $p > 0.05$ there is no statistically significant difference in the impact of certain elements of extrinsic motivation among respondents with respect to which grade of primary school they attend.

When it comes to intrinsic motivation and impact of its elements to the success of students, the highest average grade recorded the eighth grade students where $M = 16.4$ ($SD = 4.3$), while in ninth grade students factors that make intrinsic motivation have the least impact as seen from the lowest average scores that were achieved with $M = 13.6$ ($SD = 3.2$).

Based on the results of Kruskal Wallis test we see that there is no statistically significant difference when it comes to the influence of intrinsic motivation to students unrelated to the grade students attend.

The data shown in the table relating to the praise and punishment shows that the greatest impact of these elements achieved in subjects who attended sixth grade where $M = 14.0$ ($SD = 2.5$), while the other lower grades were distributed in approximately narrow range. Based on these results we can conclude that there is no statistically significant difference in the values of ratings related to the praise and punishments regardless of the grade of primary school which attends the respondent.

In continuation the subject of the analysis was the influence of certain elements of extrinsic motivation on academic achievement of students with regard to their place of residence. In this regard, the greatest impact of extrinsic motivation is present in students who live in the suburbs where the average score was $M = 37.4$ ($SD = 4.9$) and with students who live in rural areas where $M = 37, 4$ ($SD = 4.3$). However with students who live in urban settlement we received a slightly lower average grade $M = 36.5$ ($SD = 3.9$), which indicates a smaller influence of extrinsic motivation.

The results from the application of Kurskal Wallis test show that in this matter also there is no statistically significant difference in the impact of the individual elements of extrinsic motivation on students considering which type of area students live.

Similar to the previous analysis, in this case we also examined how the elements of intrinsic motivation affect the students with regard to whether they live in urban, suburban or rural type of settlement. As we can see in the table the elements of intrinsic motivation largely affect the success of students who live in a rural area, what can be seen from the highest average ratings by these students achieved $M = 16.4$ ($SD = 3.6$).

Based on these results we conclude that $p > 0.05$, which means that there is no statistically significant difference in assessment of intrinsic motivation regardless of the place of residence of the respondents.

When it comes to the application of praise and punishment and its impact on students' academic achievement, we can conclude that students from suburban areas recorded highest average ratings $M = 13.7$ ($SD = 2.3$), based on which we can conclude that elements of praise or punishment most affect the success of students in this type of settlement.

Based on these results we see that there is no statistically significant difference between respondents in each region in terms of the degree of influence of the praise or punishment to success in school.

When it comes to the influence of extrinsic motivation factors on work of students on the basis of the obtained results we can conclude that these factors most affect students who at the end of the school year achieved great success. Therefore, at the 'excellent' grade students was the highest average rating $M = 40.1$ ($SD = 3.7$) which is of course understandable that students with the best school achievement have the largest motivation for success. However, the smallest impact of extrinsic motivation was recorded in students with 'sufficient' success that can be seen from the least average grade which refers to the impact of these factors in the amount of $M = 30.3$ ($SD = 2.5$).

Using the Kruskal Wallis test, we got the results that show that there is a statistically significant difference at the impact of extrinsic motivation factors where the biggest impact has been achieved in students who had 'excellent' grade success at the end of the school year. Below the objects of analysis were intrinsic factors analysis and its impact on school success of students. In relation to this, the results show that with these factors, the biggest impact has been achieved in students with 'excellent' grade success where $M = 19.3$ ($SD = 3.7$) and the smallest in students with 'sufficient' success in which the average rating is $M = 10.7$ ($SD = 2.1$). In this case we were using the Kruskal Wallis test as well to check whether there is a statistically significant difference in the impact of the elements of intrinsic motivation on the school success of students.

According to the results, which are shown in the table we see that the $p < 0.05$, which means that there are statistically significant differences in the impact of intrinsic motivation on the school success of students where the greatest impact has been achieved in students with 'excellent' grade success.

Below we examined are students according to the school success statistically significantly different when it comes to the impact of the praise, or punishment. On the basis of displayed mathematical middle ground we see that they are in students with 'excellent' grade success with praise or penalties achieved the best results of $M = 14.9$ ($SD = 2.3$) and in students whose school success was 'enough' achieved the worst results of $M = 10.0$ ($SD = 2.0$).

Results displayed in the table show that there is a statistically significant difference in the level of influence of the praise, or punishment on the results that students achieve whereby these factors most impact show in students with 'excellent' grade success. As the next topic we questioned the existence of statistically significant difference when it comes to the influence of extrinsic motivation factors on the matter of the final grade from the subject of mathematics that student will achieve. Thus we see that 'excellent' gradestudents achieved significantly higher scores on this issue with an average value of $M = 40,6$ ($SD = 2.4$) with regard to students with 'sufficient' final grade in Math whose average value amounted to $34.8 M = (SD = 5.4)$.

The results of the Mann-Whitney U test confirm that the aforementioned differences are statistically significant ($p < 0.05$), which means that in students with an 'excellent' grade from the mathematics in a statistically significantly greater extent present impact of extrinsic motivation in relation to the students with lower grades in this subject.

In addition, we examined whether there are statistically significant differences in the degree in which the elements of intrinsic motivation have an impact on the final grade in mathematics that students achieve, where again we see that students with an 'excellent' grade have presented the greatest influence of intrinsic motivation in relation to other students $M = 16.1$ ($SD = 3.7$).

However, the difference in the arithmetic environments are not large enough to be statistically significant and this is shown by the results of Kruskal Wallis test where we see that $p > 0.05$, which means that there is no statistically significant difference between subjects with different grades in mathematics in terms of the influence factors of intrinsic motivation.

Furthermore, we investigated whether there are statistically significant differences in the attitude of respondents about how much praise or punishment has an impact on the students according to which final grade is there in Math, where again we see that respondents with 'excellent' grade show the presence of the influence of the praise or punishment to the fullest extent $M = 14.0$ ($SD = 1.6$), unlike students with 'insufficient' grade for which the results show that these measures are having an effect at least $M = 12.6$ ($SD = 3.5$). However, this time too, the results show that these differences cannot be regarded as statistically significant because $p > 0.05$, which means that praise and punishment are not a factor that affects the final grade in Math.

As the next topic we questioned the existence of statistically significant differences when it comes to the influence of extrinsic motivation on students with regard to whether they are punished or not if they get a worse grade. Thus we see that in students who are punished, there was recorded a slightly higher impact of extrinsic motivation factors with an average value of $M = 37.1$ ($SD = 3.8$) compared to students who are not punished $M = 36.5$ ($SD = 4.9$).

However, the results of the Mann-Whitney U test, with which we questioned whether statistically significant differences are mentioned show that $p > 0.05$, which means that there is no statistically significant difference between the students who have been punished and those who are not, when it comes to extrinsic motivation.

In the continuation, we examined whether there are statistically significant differences in the level of influence of intrinsic motivation among the respondents with regard to whether they would be punished or not in the event that in school they get a worse grade. Thus we see that less arithmetic average achieve learners

who are punished for bad grades $M = 14.9$ ($SD = 3.5$), while the larger arithmetic achieve respondents who did not receive a punishment for a lower grade of $M = 15.1$ ($SD = 4.4$).

However, the differences in the environments of the arithmetic are not large enough to be statistically significant and this is shown by the results of the Mann-Whitney U test, where we see that $p > 0.05$, which means that there is no statistically significant difference between the respondents in terms of the level of intrinsic motivation whether they are punished or not for a worse grade.

In addition, we examined whether there are statistically significant differences in the attitude of respondents about how much praise or punishment have an impact on the students according to whether the student is being punished if he gets a worse grade. The results show that we have the same arithmetic average in both cases, which means that with students who are punished, but also with those who pass without punishment there is the same effect on the praise or punishment.

On the basis of the displayed results, we see that there are no statistically significant differences in the level of impact of praise or punishment between students with regard to whether or not they are punished for bad grades and actually both achieve the same or statistically insignificant different results on a scale with which we measured the level of impact of the praise or punishment on students' success.

In the end, we checked whether there are statistically significant differences in the level of extrinsic motivation between the students who have been awarded for good grades and those that are not. On the basis of the view of arithmetic average we see that in average values students do not differ when considering rewards. Thus we see that in students who are rewarded, there was recorded a lesser influence of extrinsic motivation factors with an average value of $M = 36.9$ ($SD = 4.3$) compared to students who were not awarded $M = 37.0$ ($SD = 4.2$).

However the results of the Mann-Whitney U test, with which we examined whether they are the statistically significant differences, show that the $p > 0.05$ which means that there is no statistically significant difference between the students who have been awarded and those that are not, when it comes to extrinsic motivation.

In addition, we examined whether there are statistically significant differences in the level of an influence on intrinsic motivations between the respondents given that they would be rewarded or not in the event that they receive a good grade in school.

Thus we see that less arithmetic average achieve students who are rewarded for good grades $14.7 M = (SD = 3.7)$, while the higher arithmetic average achieve respondents who did not receive a reward for a good grade $= 15.4 M (SD = 4.1)$.

The difference in arithmetic environments are not statistically significant, this is shown by the result of the Mann-Whitney U test, where we see that $p > 0.05$, which means that there are no statistically significant differences in the degree of the influence of intrinsic motivation, when rewarding students for a good grade is considered.

We further examined to see if there are statistically significant differences in the attitude of the students about how much praise or punishment have an impact on them according to whether they are rewarded for a good grade. On the basis of displayed mathematical backgrounds we see that praise, or the punishment have approximately the same effect even with the students who receive a reward ($M = 13.5 SD = 2.2$) and students who are not rewarded for a good grade ($M = 13.8 SD = 2.8$).

According to shown approximate arithmetic environments between rewarded students and those who do not receive the prize, and the results of the Mann-Whitney U test show that there is no statistically significant difference in the level of the impact of the praise or punishment.

Finally, we examined the existence of correlation between the measured variables, or the existence of a correlation between extrinsic, intrinsic motivation, and reward and punishment. To test the correlation Spearman's correlation coefficient was used, since the distribution of the results is not normal which means that nonparametric statistics was used. Thus we see the basis of the presented results a statistically significant correlation between extrinsic and intrinsic motivation does exist (0.537), which is to be expected that students who are more intrinsically motivated are also extrinsically more motivated. Furthermore statistically significant correlation between extrinsic motivation and praise and punishment was found (0.256), which means that students who are more extrinsically motivated greater effect of reward and punishment has on them. Similar results were obtained for intrinsic motivation, where a statistically significant correlation between intrinsic motivation and reward and punishment was found (0.326), which means that students who are more intrinsically motivated are also more influenced by reward and punishment.

DISCUSSION

Results of this study showed us that students in elementary schools have more developed extrinsic motivation than intrinsic motivation when it comes to mathematics. The respondents through answers to the questionnaire survey showed that knowledge of mathematics is not perceived as something that will be useful in everyday life, but are mainly focused on getting good grades in mathematics for grade point average, to facilitate enrollment in high school, or for praise by teachers or parents. These results are consistent with other studies in which it was confirmed that primary school students are aware of mathematics' role in their education and life, but despite this they learn mathematics mainly because of the grade which is their chief and strongest motivator for learning math (Benčeki Marenić, 2006).

Certainly parents play an important role in the development of these attitudes in children, where the results showed that 64% of parents reward their children for good grades and an equal number of parents punish their children when they get a bad grades. Reward and punishment certainly contribute to children developing more extrinsic motivation toward mathematics. If you take into account that many areas of mathematics and many assignments that children face in this case are quite abstract, it is clear that students can not perceive the importance of mathematics in everyday life. In this paper we wanted to examine and determine the socio-demographic factors that affect the motivation of students to learn mathematics and how the math grades affect the motivation of the students. The results showed that the sex of the students does not play a role in the motivation of students. Boys and girls in equal measure are motivated to learn math, and equal factors make them motivated. When it comes to the age of the respondents, older students have more pronounced extrinsic motivation and perceive grade in math as important factor that motivates them. These results are expected if we take into account that older students think more about enrolment in high school, and their grades and grade point average are primary motivators in this period of life. Furthermore, we received the results which have confirmed that the children from suburban and rural villages are more intrinsically motivated compared to children from the urban areas.

If we take into account that parents of children who live in rural settlements, are probably weaker financially and economic in relation to the parents of children who live in urban settlements, we come to the conclusion that rewarding children in urban settlements leads to these children having more expressed their extrinsic motivation which becomes primary, and has as a consequence that the intrinsic motivation is less expressed. In this paper we also observed how GPA affects its students' motivation. The results showed that students with a higher average rating have greater motivation, intrinsic as well as extrinsic. Students who have a lower average rating have lower motivation, intrinsic and extrinsic. Thus, these results show clearly how much is motivation important for learning in children. However, if we look at students based on their rating of their final grade in math, and not only on the basis of the overall average rating, we see that excellent students have significantly more developed extrinsic motivation in relation to intrinsic. These results clearly indicate the importance of the grades in math and their impact on the motivation of students. So the students with better grades in mathematics are more motivated by those grades or for these students grade represents the main motivator who pushes them to study mathematics. On the other hand, we have students who have bad grades in math, and to such students grades cannot act as the motivator. Probably with these students occurs learned helplessness as a consequence of the bad grade in mathematics, because here we are talking about the bad final grades that are long-standing and not on temporary bad grades, as a consequence of bad test or the oral examination of the student. Learned helplessness is one form of acquired conditionality, and refers to the phenomenon that people or animals shall not take action to eliminate the negative or painful situation, if they start to believe that there is no cause-and-effect relationship between their conduct and the outcome of the situation (Zarevski, 1997). Often is cited the example of a math teacher who consistently from day to day gives negative grades, and creates in students learned helplessness. In fact it proved that a failure on cognitive tasks can lead to learned helplessness (Zarevski, 1997). So the teacher with grades can motivate students who have good grades and to whom grade point average is important, while in students with poor grades and GPA, individual score in mathematics cannot start the motivational processes that will have long-term effects in students.

Finally, we wanted to examine how parents' behaviour in terms of punishment or reward of students affects the motivation of students in mathematics. As previously indicated 64% of parents punish their children for bad grades, and rewards them for good grades. However the results of this study show that punishment and reward do not play a role when it comes to intrinsic and extrinsic motivation of students. The results of this research have shown that there are no statistically significant differences in the level of intrinsic and extrinsic motivation of students whose parents reward and punish them and students whose parents are not punishing and not rewarding them for their grades. These results can be explained by the fact that parents reward and punishment are not enforced consistently and methodologically, but they are predictable in their behaviour which has resulted in that the students expect reward or punishment, and as such have no form of motivators that will lead to significant changes in the behaviour of students.

CONCLUSION

The results of the research show that there are no gender differences in the perception of the marks in mathematics as the motivator in learning. So, the boys and girls in equal measures perceive evaluation in mathematics as the motivator for learning.

Due to the age of the students there are statistically significant differences in the perception of the marks in mathematics as the motivator for learning. At the eighth-grade students the most expressed is the intrinsic motivation for learning, while it is the least expressed in students of the seventh and the ninth grade. When it comes to the extrinsic factors of motivation any statistically significant difference was not obtained based on age of the respondents.

Survey confirms that the children from the rural settlements have a higher intrinsic motivation compared to children from urban settlements. When it comes to the extrinsic motivation, rewarding or punishing students did not provide any statistically significant differences between students who live in urban and rural areas.

The research results have shown that the level of extrinsic motivation is growing with an average rating of grades, i.e., that the greatest extrinsic motivation have great students, and the minimum sufficient.

The same results are obtained in the terms of intrinsic motivation as well as in terms of the impact of the reward and punishment as a factor for motivation of students.

When it comes to categorization of students by the final grade in Math, the results of the research show that the highest level of extrinsic motivation have 'great' grade students, and the minimum 'sufficient' grade students. In terms of intrinsic motivation as well as the impact of reward and punishment, any statistically significant differences were not obtained between the students involved who were divided in groups based on the final grade in Math.

No matter whether parents punish children for bad grades in Math or not, this factor does not lead to a change in the level of intrinsic or extrinsic incentives, so that the punishment of parents does not affect the motivation of children in statistically significant measures.

Rewarding students by parents is not a factor that leads to statistically significant differences at the lev-

el of the intrinsic or extrinsic motivation in students. This was shown by the results of this study, where it is not obtained statistically significant difference in the level of intrinsic and extrinsic motivation due to the categorization of the pupils on the basis of whether their parents reward them for good grades or not.

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GENETIC DIFFERENTIATION BETWEEN TWO HUMAN POPULATIONS CONSIDERING ON SOME DYNAMIC AND STATIC MORPHOLOGICAL PROPERTIES

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ABSTRACT

In this paper, we report on the first data connected to the phenotype diversity of the Roma population from north/eastern Bosnia and its genetic relations with neighboring non-Roma populations. Genetic structure of the Roma and non-Roma population was analyzed considering on four the static-morphological and three the dynamic-morphological properties. A total of 847 samples have been collected from unrelated individuals in the area of the north/eastern Bosnia. The investigated parameters of genetic heterogeneity were estimated by: the recessive phenotypes frequency observed property, chi-squared test, exact-test, pairwise F_{ST} and genetic distance analysis. Estimation of genetic variability of the analyzed populations showed significant genetic differentiation between of the Roma and non-Roma population. The basic factors of the found significant genetic differentiation between the Roma and non-Roma population are a result of a high level of endogamy, the reproductive isolation of the Roma population and limited maternal gene flow with neighboring populations.

Key words: Roma population, genetic differentiation, phenotype systems

INTRODUCTION

Linguistic, cultural-anthropological (Fraser, 1992; Marushiakova & Popov, 2001; Ioviță & Shurr, 2004) and genetic studies (Gresham et al., 2001; Mendizabal et al., 2011; Gómez-Carballa et al., 2013; Moorjani et al., 2013) show that the Roma (Gypsy) have originally come from Indian subcontinent 1.5 thousand years ago. Studies have shown that the Roma populations share a common genetic history, as evidenced by classical, mtDNA and Y-chromosomal markers (Kalaydjieva et al., 2001; Chaix et al., 2004; Morar et al., 2004; Zhivotovsky et al., 2004).

The European Roma are a founder population of common origins that has subsequently split into multiple socially divergent and geographically dispersed

groups (Clarke, 1973; Morar et al., 2004; Klarić-Martinović, 2009). A single founder population of the European Roma have high level intergenetic homogeneity as a consequence reproductive isolation and endogamy (Mendizabal et al., 2012; Siváková et al., 1994; Mastana & Papiha 1992). Also, studies of the Roma populations have indicated that the genetic heterogeneity of the Roma is evident in all European countries. The basic factors significant genetic differentiation between different the Roma populations and neighboring non-Roma populations are a result of a high level of endogamy, cultural identity, the reproductive isolation and limited intergroup maternal gene flow.

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Unlike other founder populations, whose genealogy has been extensively documented, the demographic history of the Roma is not fully understood and, given the lack of written records, has to be inferred from current genetic data. Anthropological and genetic studies the Roma populations suggest that cultural identity, endogamy and reproductive isolation have played an important role in preserving genetic isolation and homogeneity of the Roma population. In the recent studies of the genetic structure of the Bosnian human population, the Roma have not been subject of research. This is the first study on the genetic structure of the Bosnian Roma population considering observed the classical genetic markers. Our study primarily focuses on the analysis genetic heterogeneity and genetic diversification of the Roma population with neighboring non-Roma Bosnian populations.

MATERIAL AND METHODS

Population samples

A total of 847 samples have been collected from unrelated individuals in the area of the north/eastern Bosnia. The samples have been contained from two categories: the Roma population and the non-Roma population. The population genetic structure of the populations was analyzed application two phenotype systems with corresponding properties: the

static-morphological properties (form of the earlap, the hairiness secondary digital phalanx, the flexion of the distal phalanx of the little finger, the digital index) and the dynamic-morphological properties (flexibility of the language, extensibility proximal joint of the thumb and extensiveness distal joint of the thumb) (Table 1). Prior to sampling, all participants provided consent for the collection of samples and subsequent analysis.

Population-genetic analyses

Estimation of genetic variability of the Roma population and its comparison with the observed of the non-Roma populations was done using inter- and intragroup genetic indices. Classic population-genetic analyses included: estimation relative frequency of the recessive allele observed phenotype systems and analysis chi-square test using a statistical program SPSS Statistics 17.0 for Windows (SPSS Inc., Chicago, IL, USA). For the assessment of intergroup genetic differentiation pairwise F_{ST} analysis was used (Weir & Cockerham, 1984). The genetic distance between populations was calculated according to Reynolds et al. (1983). As an additional test of interpopulation differentiation, exact-test (Raymond & Rousset, 1995) based on phenotype frequencies was used. The population genetic structure was analysed using methods implemented in the Arlequin ver 3.0 software (Excofier et al., 2005).

Table 1 Observed phenotype systems and their genetic determinants

Phenotype systems	Observed allele	Recessive genotype/phenotype
form of the earlap	$L > l$	ll / coalesced earlap
hairiness digital phalanx finger	$D > d$	dd / no-hairiness phalanx
flexion of the distal phalanx of the little finger	$RCF > rcf$	$rcfrcf$ / curved phalanx
digital index (♂♂)	$LK > ld$	$lklk$ / longer forenfinger
flexibility language	$R > r$	rr / no-flexibility language
extensibility proximal knuckle of the thumb	$DHT > dht$	$dhtdht$ / hyperextensibility proximal knuckle
extensibility distal knuckle of the thumb	$PHT > pht$	$phtpht$ / hyperextensibility distal knuckle

RESULTS

The frequency of the recessive phenotype and the recessive allele of the observed phenotype systems of the Roma population and comparative non-Roma population are showed in Tables (2-8). In our study, the majority of the examined individuals of the Roma origin have recessive phenotype observed the gene locus (Tables 3-7). Graphical display the frequency of the recessive allele at particular phenotypic properties between of the Roma and comparative non-Roma population is showed in Figure 1.

The analysis the chi-square test (Tables 2-8) between of the comparative populations shows significant difference ($p < 0.05$) in distribution recessive phenotype between the Roma and non-Roma population for five

phenotype properties (excluding two: the recessive phenotype "the flexibility language" and "the digital index").

The value of the phenotype diversity in the Roma population (0.7957 ± 0.0041) was lower in relation to the comparative non-Roma population (0.8509 ± 0.0031). For the assessment of intergroup genetic differentiation pairwise F_{ST} analysis (Weir & Cockerham, 1984) and the exact-test (Reymondt & Rousset, 1995) was used. Significant pairwise F_{ST} difference (0.067 , $p < 0.05$) was found between the Roma and non-Roma population. A population differentiation exact test pointed on significant differences in distribution recessive phenotype between the observed populations. Genetic relations of the comparative populations are presented with the values of genetic distance (0.070).

Table 2 Frequency recessive phenotype "form of the earlap", the recessive alleles q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^l	χ^2	p
Non-Roma	472	179	0.38	0.61	149.84	0.001
Roma	375	14	0.03	0.19		

* $p < 0.05$

Table 3 Frequency recessive phenotype "hairiness digital phalanx", the recessive alleles q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^d	χ^2	p
Non-Roma	472	120	0.25	0.50	143.15	0.001
Roma	375	301	0.80	0.89		

* $p < 0.05$

Table 4 Frequency recessive phenotype "flexion of the distal phalanx of the little finger", the recessive allele q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^{lk}	χ^2	p
Non-Roma	221	131	0.59	0.77	0.0	1.0
Roma	187	112	0.60	0.77		

* $p < 0.05$

Table 5 Frequency recessive phenotype "digital index", the recessive allele q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^{lk}	χ^2	p
Non-Roma	221	131	0.59	0.77	0.0	1.0
Roma	187	112	0.60	0.77		

* $p > 0.05$

Table 6 Frequency recessive phenotype "flexibility language", the recessive allele q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^r	χ^2	p
Non-Roma	472	215	0.46	0.67	3.66	0.06
Roma	375	201	0.54	0.73		

* $p > 0.05$

Table 7 Frequency recessive phenotype "extensibility proximal knuckle of the thumb", the recessive allele q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^{pht}	χ^2	p
Non-Roma	472	123	0.26	0.51	145.71	0.001
Roma	375	306	0.82	0.90		

* $p > 0.05$

Table 8 Frequency recessive phenotype "extensibility distal knuckle of the thumb", the recessive allele q and statistical significance of observed differences between comparative populations

Population	N	Rf	R	q^{dht}	χ^2	p
Non-Roma	472	303	0.64	0.80	280.61	0.001
Roma	375	19	0.05	0.22		

* $p > 0.05$

Table 9 Frequency recessive allele observed gene locus in comparative populations

Population	N	l	d	rcf	lk	r	pht	dht
Roma	375	0.19	0.89	0.70	0.77	0.73	0.90	0.22
Non-Roma	472	0.61	0.50	0.63	0.77	0.67	0.51	0.80

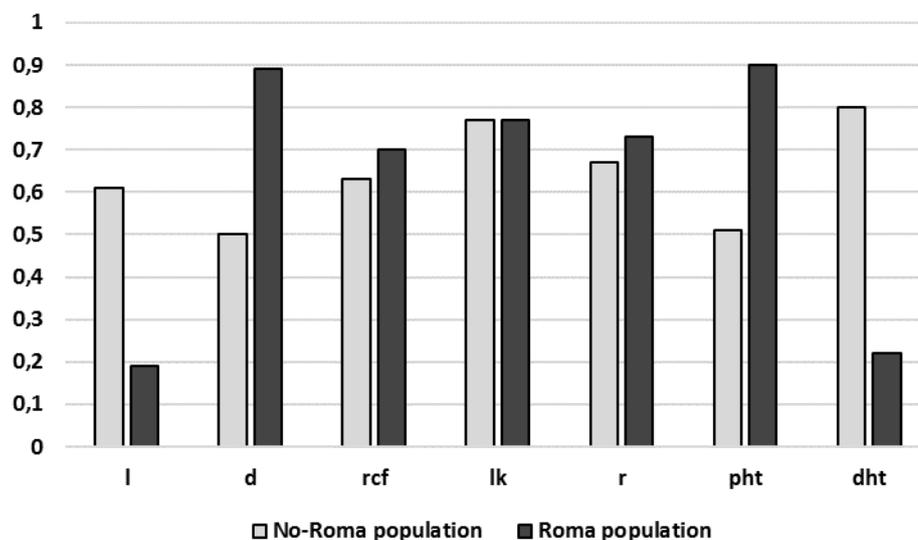


Figure 1 Distribution frequency of the recessive allele at particular phenotypic properties

DISCUSSION

Previous studies based on the analysis of genetic parameters (Siváková et al., 1994; Mastana & Papiha 1992; Tauszik et al., 1984; Bernasovsky et al., 1994) suggest that the Roma populations show reduced intragroup genetic diversity and significant genetic differentiation with other populations. These studies indicated that genetic differentiation among the Roma populations and between Roma and non-Roma populations determined by high rate migration, isolation, genetic drift and inbreeding of the Roma population. Also, recent studies of the Roma populations based on the analysis of molecular data (Gresham et al., 2001; Kalaydjieva et al., 2001; Klarić-Martinović, 2009; Mendizabal et al., 2011; Mendizabal et al., 2012; Gómez-Carballa et al., 2013) have indicated that the genetic homogeneity of the Roma groups is evident in all European countries, as a consequence of reproductive isolation and endogamy and that the demographic history of the Roma is rich and complex.

Special attention in this study was paid to the analysis of genetic structure of the Roma population and its comparison with the observed of the non-Roma populations from the area north/eastern are done using intra and intergroup genetic indices. In our study classic intra-genetic parameters indicated that the majority of the examined individuals of the Roma origin have recessive phenotype observed at the gene locus. The value of the phenotype diversity in the Roma population was lower in relation to the comparative population. The majority of observed phenotype properties have detected significant differences in distribution of recessive phenotype between the Roma and non-Roma population. A relatively high percentage of the recessive phenotypes and reduced phenotype diversity supports a relative higher degree of reproductive isolation and endogamy in the Bosnian Roma population. Lower values of this parameter may be due to slightly higher frequencies of recessive phenotypes that are noted in our study. Our study shows that the Roma population is a rather genetically closed population in relation to the comparative non-Roma population. The data obtained in the study are correspondent with data from previous studies based on the analysis of genetic parameters (Siváková et al., 1994; Mastana & Papiha 1992; Tauszik et al., 1984; Bernasovsky et al., 1994).

In this study, estimation of inter-genetic variability of the analyzed populations showed significant differentiation between the genetic structure of the Roma and non-Roma population. A population differentiation exact-test and pairwise F_{ST} analysis pointed to significant differences in gene pool between the observed populations. Also, the study by Tauszik et al., (1984) based on the analysis of genetic parameters indicates on the interpopulational genetic differentiation of the analyzed population Hungarian Roma and non-Roma population. We suggest that the ba-

sic factors of the found significant genetic differentiation between Roma and the comparative non-Roma population from the area north/eastern are a result of a high level of endogamy, small size population, reproductive isolation of the Roma population, strong drift effect and limited intergroup gene flow with neighboring populations.

CONCLUSION

The data obtained in the study are correspondent with the historical documentation of the Roma, which suggests that the cultural identity, endogamy and reproductive isolation have played an important role in preserving genetic isolation and homogeneity of the Roma population. Consequently, we suggest that important determination and incorporate data about the Roma population in recent Bosnian, regional and European base of the data. Further studies with more dedicated geographical sampling and molecular data would help in defining of gene profile of the Bosnia Roma population, as well as further details of their subsequent history.

Disclosure of interest: The authors report no conflicts of interest.

This study was approved by the Council of Department of Biology Faculty of Natural Sciences, University of Tuzla, Bosnia and Herzegovina. Our study follows the principles of the Declaration of Helsinki and all subjects gave their consent to participate in this study.

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HEALTH SELF-EVALUATION OF ELDERLY PERSONS WITH VISUAL IMPAIRMENTS IN RELATION TO GENDER AND STATE OF HEALTH

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ABSTRACT

Health self-evaluation, as a subjective measure, is related to person's well-being because it encapsulates physical and emotional health evaluation. It has been concluded that subjective health is, for most of people, number one trait of quality of living that is connected to health. Individual is to decide which aspects of objective situation are important for their satisfaction in life. In other words, way in which a person will perceive and react to an objective situation depends on their personal traits. Aim of this research was to examine the differences in relation to gender and health state of visually impaired older persons of that live in institutional accommodation, by self-evaluation. Respondents sample was comprised of 40 visually impaired older persons, both genders (13 male and 27 female) that live in nursing home "Dom penzionera" in Tuzla. Research has been conducted by interview, using questionnaire "Quality of life of adult persons with motoric disabilities in territory of Vojvodina" (Susnjec, 2015). Because of the structure of questions in questionnaire, it was possible to apply it on visually impaired persons as well. Data acquired had been processed with descriptive statistics, hi-square and t – test, in order to determine if there were differences in relation to gender and self-evaluation of physical and social functioning. Results of the research have shown that although means have proven that there are differences in acquired results between respondents of male and female gender, results of t-test have shown that those differences are not statistically significant. Presence of any kind of damage, and visual impairment as well can influence person's psychological and physical integrity.

Keywords: health self-evaluation, visual impairment, elderly

INTRODUCTION

According to newer aging studies, importance of subjective health is more and more articulated. Individuals have information on their health that we cannot obtain from any other source, regardless how profound and detailed it is. Furthermore, they analyze that data and make conclusions of their meaning in ways that are completely unfamiliar (Idler, 1999). Despite large number of definitions and disagreements around the term "Quality of Life", many

authors think that it is about combination of subjective and objective variables (Vuletic & Mujkic, 2002; Fakhoury & Prieve, 2002, according to Coric & Ljubotina, 2013). Demographic variables such as gender, age, degree of education, marital status and socio-economic status can affect some differences in objective life conditions and ways in which individual assess and experiences quality of one's life (Lucev & Tadinac, 2008).

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Subjective health or self-evaluation of health is influenced by numerous biological and non-biological factors: personality, motivation, socio-economic status, availability of health-care, social support network, personal and cultural beliefs and approach to one's health. Health self-evaluation as a subjective measure is related to person's well-being because it covers evaluation of physical and emotional health. Subjective health, for most persons, is number one trait of quality of life, related to health. Therefore it is often considered as an indicator of quality of life related to health and functional ability (Bowling, 1991; Bosworth et al., 1999). Measures of functional abilities are usually based on respondents' self-evaluation and therefore are affected by same influences as other states of respondents conducting self-evaluation. Individual determines for himself which aspects of objective situation are important for their satisfaction in life. In other words, way in which a person will perceive and react to an objective situation depends on their personal traits. In a very unfavorable situation we will have individuals that are relatively or very satisfied with their lives. People with serious health problems can be satisfied with their lives, even with the health state they are in, if their expectations are adjusted to the situation at hand. On the other hand, in objective favorable situations we will have individuals that are relatively unsatisfied with their health and/or life in general (Lucev & Tadinac, 2008). All this implies the fact that self-evaluation, subjective feeling of quality of life and objective life conditions are not linearly correlated and correlation is stronger as objective life conditions are worse (Vuletic & Mujkic, 2002a). According to some authors, quality of life self-evaluation is affected by the way in which person defines their life situation comparing it to their situation in some other time and with situations of other people and no harmony between person's aspirations and reality in some point in time (Fakhoury & Priebe, 2002, according to Coric & Ljubotina, 2013). As an important factor of subjective satisfaction is possibility of alignment of reality and person's aspirations in way of life (Berger & Motl, 2001, according to Lorger, 2011). Vuletic and Mujkic (2002b) point out that every person has different experience of a situation in which they live in, has different aspirations and expectations, in other words they have different value system and therefore different evaluation of their own life.

Eyesight is along hearing and touch main sensor function that connects people with one another and their environment (Wes et al., 1997). Therefore it is

not hard to conclude that eyesight quality is main part of quality of life (Tsai et al., 2004). Reduced sharpness of eyesight is most commonly connected to reduced quality of life. Many authors claim that refraction errors that are not dealt with, glaucoma, cataract, diabetic retinopathy, macular degeneration are all connected to reduced quality of life (Broman et al., 2002; Berman & Brodaty, 2006, according to Pinquart & Pfeiffer, 2011; Navarro Esteban et al., 2008; Fenwick et al., 2012). Franke et al., (2005), according to Maca et al., (2013) claim that uveitis has relation to reduced quality of life. Regardless of time in which visual impairment started, worsening in quality of life is growing as degree of visual impairment is growing with all pathological conditions (Navarro Esteban et al., 2008). Binocular visual impairment is related to twice as risk in functioning ability reduction (West et al., 1997), where in research conducted by Vu et al., (2005), according to Nyman et al., (2008) those persons stated up to four times more that they "do not feel life at its fullest". In other words, persons with visual impairments on one eye are less affected in terms of quality of life than persons with visual impairments on both eyes, which are logical conclusions (Sekeroglu et al., 2012). Aim of this research was to examine differences in self-evaluation of physical and social functioning capabilities, feeling about life and health of elderly people with visual impairments that live in institutional accommodation in relation to gender.

WORK METHODS

Sample of respondents was consisted of 40 visually impaired elderly persons, both genders (13 male and 27 female) living in nursing home "Dom Penzionera" in Tuzla. Research has been conducted via interview in period between September and December 2016, with questionnaire "Quality of life of adult persons with motoric disabilities in territory of Vojvodina" (Susnjevic, 2015). Because of the structure of questions in questionnaire, it was possible to apply it on visually impaired persons as well. Questionnaire had four examination areas: physical functioning (9 variables), social functioning (3 variables), feeling about life scale (10 variables), and health state self-evaluation (1 variable), which is in total 23 variables and the rest of the questions are related to general information about respondents. Data acquired are processed with descriptive statistics, hi-square and t-tests in order to examine differences in relation to gender and self-evaluation of social and physical functioning.

RESULTS

Measurements of tendency and dispersion in relation to applied scales of physical and social evaluation and scales of feelings about life are shown in Table 1. Every scale is consisted of array of questions. In order to get total result transformation has been applied to calculate sum of questions in individual scales and get total result, which is measurement scale of interval type. Scale of physical functioning is consisted of 8 variables and results are in range between 8 and 26 where lower results indicate better physical functioning. Social functioning scale is consisted of 3 variables and

results range between 3 and 12. Scale of feeling about life is consisted of 10 variables and total results range between 10 and 50. Health self-evaluation scale is consisted of one question where results range between 1 and 5. Acquired results show that in relation to variable "Physical functioning" mean is 10.45 ± 3.50 , median 9, modus 8, while minimal and maximal results range between 8 and 24. Mean of variable "Social functioning" is 7.25 ± 2.32 , median 7, modus 7, minimal and maximal results range between 3 and 11. Mean of variable "Scale of feelings about life" is 31.98 ± 22.79 , median 32, modus 13, minimal and maximal results range between 26 and 38 (Table 1).

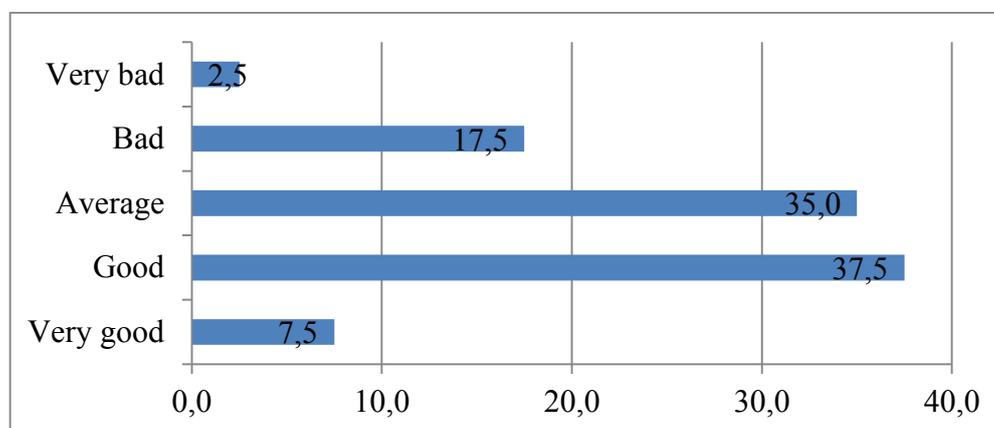
Table 1. Measurements of central tendency and measurements of dispersion

Variables	N	M	SE	Median	Modus	SD	Min	Max
Physical functioning	40	10,45	0,55	9,00	8,00	3,50	8,00	24,00
Social functioning	40	7,25	0,37	7,00	7,00	2,32	3,00	11,00
Feelings about life scale	40	31,98	0,44	32,00	31,00	2,79	26,00	38,00

Respondents' responses distribution in relation to health self-evaluation is shown in Graph 1.

Largest number of respondents evaluates their health

as good (37.5%) and average (35%). Respondents that evaluated their health was 7.5%, while 2.5% and 17.5% evaluate their health as very bad and bad.



Graph 1. Health self-evaluation

T-test results in relation to gender and applied scales estimates are shown in Table 2. From the table we can conclude that male respondents, in comparison to female respondents, have better results in variables of physical and social functioning. Female respondents

show better results in variable "Scale of feelings about life". Although means show there are differences in acquired results between the genders, t-test results have shown that those differences are not statistically significant.

Table 2. T-test results in relation to gender and applied evaluation scales

Variables	Gender	N	M	SD	SE	t	p
Physical functioning	M	13	9.53	2.40	.66	-1,14	.258
	F	27	10.88	3.88	.74		
Social functioning	M	13	7.07	2.78	.77	-.32	.748
	F	27	7.33	2.11	.40		
Feelings about life scale	M	13	32.30	3.22	.89	.51	.607
	F	27	31.81	2.60	.50		

Results acquired in Table 3, show that larger percentage of female respondents evaluate their health as bad and very bad, in comparison to male respondents which evaluate their health as good and very good. Results of hi-square test

have shown that there is no statistically significant difference in relation to gender of respondents with health self-evaluation.

Table 3. Hi-square test results in relation to gender and health

Gender		State of health					Total
		Very Good	Good	Average	Bad	Very Bad	
Male	N	2	7	3	1	0	13
	%	15.4	53.8	23.1	7.7	0.0	100.0
Female	N	1	8	11	6	1	27
	%	3.7	29.6	40.7	22.2	3.7	100.0
Total	N	3	15	14	7	1	40
	%	7.5	37.5	35.0	17.5	2.5	100.0

DISCUSSION

Personal evaluation of satisfaction with life includes subjective thinking in a way, how important certain area is for an individual and how satisfied that individual is with that area (Gojceta et al., 2008). In our research, most respondents have evaluated their health as good and average while 2.5% of respondents with subjective evaluation have estimated their health as very bad. Vuletic and Mujkic (2002a) point out that every person experiences situation they live in differently, has different aspirations and expectations – has different value system and therefore values differently quality of their own life.

Research that was conducted by Susnjevic (2015) in form of study of average on sample of respondents with motoric disabilities older than 18 years (n=226), that are recorded in associations of persons with motoric invalidity, on the same measuring instrument

have shown that average value in domain of physical functioning for male population is 84.2 and for female population 86.0 and that difference in relation to gender is not statistically significant ($p = 0.553$). However, results in scale of social functioning have shown that there is statistically significant difference in relation to gender ($p = 0.003$), while in domain of scale of feelings about life ($p = 0.170$) and scale of self-evaluation ($p = 0.802$), differences in relation to gender are not statistically significant.

In our research, results means have shown that male respondents have shown better results in variables of physical and social functioning in comparison to female respondents. In other hand, female respondents have shown better results in feelings about life variables. However, although means show that there are differences in acquired results comparing female and male respondents, t-test results have shown that those differences are not statistically significant.

Having in mind that our respondents live in institutional accommodation, results can be correlated to other influencing factors such as separation from the family, other illnesses, circumstances with visual impairment, lack of caring for their health, combination of many diseases. In general population researches, it's been proven that, larger social support is related to better dealing with every-day activities (Oxman & Hull, 1997; Jang et al., 2003, according to Tabrett & Latham, 2011). It's been reported that people with visual impairments, bigger support from family members is related to larger restriction in activities that involve eye-sight (Reinhard, 2001, according to Tabrett & Latham, 2011). Therefore, although lower quality of life of these persons is attributed to visual impairment, there is a possibility that it has been influenced more by other, prior mentioned circumstances than impairment itself (Chia et al., 2004).

Research results from Li et al., (2011) that examined relation between quality of life and visual impairment have shown that persons that have more severe visual impairments have equal or better results on some subscales of quality of life than persons with milder visual impairments. As possible reason for those results, authors claim that persons with more severe visual impairments in moment of questioning have had longer time since impairment first appeared and that made it possible for them to accept it and adjust.

CONCLUSION

Quality of life researches with persons with disabilities is gaining more and more of importance in clinical and in population researches because improvements in health and quality of living is most important goal of every society. Papers on quality of life of this population category are rare event in worldly literature and are aiming to comprehend particular components of health and quality of living and not to make global assessments. Quality of living includes physical, mental and social domain of health and it is under the influence of experience, beliefs and perception. By measuring quality of life, Jakovljevic and Grujic (1995) consider that different variables should be included which will give reliable information about symptoms, functional capacity (self-care, every-day activities in and around the house, at work, in the community, hobbies, recreation...), diseases or welfare, patient's expectations, relation between expected and accomplished, emotional function, need for medical and

other services, social and economic consequences of disease. Any kind of disability, therefore visual impairment, can affect person's psychological, physical and social integrity. Researching quality of life of persons with visual impairment is essential because it enables tracking adjustments to disability, functioning in new, every-day situations, mobility and orientation, depending on degree of visual impairment, as well as general welfare and satisfaction with life, but also enables tracking availability healthcare and social care and in the end respect for human rights.

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PRINCIPAL'S LEADERSHIP STYLE, AS PERCEIVED BY TEACHERS, IN RELATION TO TEACHER'S EXPERIENCE FACTOR OF SCHOOL CLIMATE IN ELEMENTARY SCHOOLS

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ABSTRACT

The experience of the environment in which the activity is performed is a significant factor of the outcome of this activity, that is, the efficiency of the work and the degree of achieving the goal. Within the work environment, physical and social conditions can be observed. The first, which includes material and technical means, are mostly static, easily perceivable and measurable. Others, which include social relations, are much more susceptible to change, more difficult to perceive and measure, and their experience with different individuals within the same group can be more distinct. Although all members of the group participate in group dynamics and relationships, not all are equally relevant to these processes. Considering the position that carries the right and responsibility of setting up a vision and mission, setting goals, creating conditions for work, making decisions and providing feedback, the leader is in most cases crucial. This paper analyzes the role of elementary school principals in creating a school climate, as a non - material environment in which educational activity is carried out, and in this sense it is a specific group / work organization. An estimate was used to measure both variables, i.e. teacher's experience. The instruments used are Multifactor Leadership Questionnaire - MLQ (Avolio and Bass) and School Level Environment Questionnaire - SLEQ (Johnson, Stevens and Zvoch). The survey was conducted in elementary schools in the wider city area of Tuzla, on a sample of 467 teachers and 25 principals. In statistical data processing, multiple regression (Ordinary least squares) and direct square discriminatory analysis were applied. The obtained results point to the connection between the perceived leadership style of elementary school principals and the school climate experienced by teachers, especially in the field of innovation in teaching and mutual cooperation.

Keywords: *leadership style; transformational, transactional, laissez-faire leadership; school climate.*

INTRODUCTION

Although leadership as a social phenomenon is very old, the attempt to scientifically describe and understand it is relatively new. A manager or leader is a person who, in his words and / or personal example, influences the behavior, thoughts and / or emotions of a significant number of people. Leadership is discussed in the context of politics, working organizations, and all other social groups. Among the earliest studies in this field are the study

of Lewin, Lippith and White (1939), which pointed to differences in work achievement between groups with different leaders. In the medium and long term, the conclusions of the three authors, the best results are obtained by the democratic behavior of the leader. In the short term, the most effective is autocratic, while Laissez-faire leadership in most cases leads to the lowest achievement (Krech, Crutchfield & Bal-lachey, 1969).

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This classical division into three leadership styles in subsequent research has undergone some changes; styles have, in some cases, been given different names, sometimes they are somewhat differently described, and it is indicated on their transitional variants. Nevertheless, differences in interpersonal relations (relationship leader - employee and employer - employee), emotional, social and working climate, and work performance in groups with different leaders (Bojanović, 2004) remained as constant.

B. M. Bass introduced his theory of leadership in 1985. He talks about *transformational*, *transactional* and *Laissez-faire leadership*. The first contains elements of democratic and the second elements of the autocratic style. Particularly significant for transformational leadership, according to Avolio and Bass (2002), is that it leads to a change in the very employees; raises the level of motivation and morally shapes them. In contrast, transaction leadership is based on the relation "give and take", in which everyone stays in the starting positions; neither individuals nor interpersonal relations change. Laissez-faire style Avolio and Bass (2002) describe almost the same as Lewin, Lippitt and White (1939); it's free leadership. Avolio and Bass also call it passive / avoiding leadership.

Although the school in the form in which we know it today appeared much earlier, the interest of researchers in the field of pedagogy to perceive each institution as a separate institution / community, which has its own history, (in part) its own system of values, the specific relations of its members, and represents a unique social, emotional and working environment, takes swings from the sixties of the last century. Namely, then, the approach to analyze the laws that are equally valid in all schools is left, and emphasis is placed on the importance that *hardly visible* and *intangible factors* have in achieving the goals and tasks of the school. Common to all research from that time, which is mostly the case today, is climate measurement based on perception, or description of school life by teachers and / or pupils (Domović, 2004).

At the same time, the issue of climate is perceived at different levels of organization (school, department) and in different segments of school work (teaching, extracurricular activities). Then, the notion of climate is shifting to the social, emotional and working component, and in our speaking area, with the word climate, the words, *atmosphere*, *tone*, *spirit*, *mood*, *environment*, *ambience* are used, among others. All this has led to very varied and unconstrained terminology, and in the literature terms can be found such

as school climate, class climate, teaching climate, social climate, emotional climate, working climate, psychosocial climate and pedagogical climate. Some of these terms are used as synonyms, although this is not always emphasized, while some have a different meaning. However, clear conceptual delineations are rare. Understanding is further complicated by the use of the term of culture, which in some studies is identified with the term climate, while in others it is clearly separated.

Principals as school leaders

Principals are school leaders, responsible for achieving mission and goals of the school. Pedagogical standards and general norms for primary education (2005) refer to more than 80 tasks performed by the principals and which are divided into the following areas:

1. conceptual - program tasks
2. organizational - material problems
3. pedagogical-instructive work
4. analytical-study work
5. normative legal and financial affairs
6. representing the school
7. pedagogical documentation
8. work registration and record.

The role of school principals, among other things, is determined by the functions and areas of work that need to be covered, the competences he must have, the training he needs to achieve the appropriate competences and professional orientation of the staff's efforts, to the responsibilities for the resources.

Given that this is a non-profit organization with a unique goal and function, the school should also be seen as a specific unit, in which general but also specific organizational rules apply. In this regard Staničić (2011) lists two basic functions of the school: *administrative-technical* and *developmental-pedagogical*. Administrative and technical tasks are in the function of optimal functioning of the school, which, unlike other organizations, achieves educational work. These include monitoring and enforcement of laws and regulations, regulating the status of employees, adopting internal behavioral procedures, personnel issues, health care, administrative work with students, financial business - cost planning, determining sources and obtaining funds, preparation of financial operations reports, tracking spending, purchase of equipment, payment of salaries, etc.

The professional and pedagogical field is connected with the main feature of the school as a specific organization. In relation to the administrative and technical, it is much more complex and a more direct involvement of the principal is expected. It includes developmental and pedagogical work related to: planning and programming, organizing, introducing innovations, monitoring and improving teaching, working with children with disabilities, professional orientation, professional development, analysis of the educational results of the school, etc..

Staničić (2011) states that for most schools the ratio of administrative and technical engagement in relation to the developmental and pedagogical is 80: 20, and should be reversed. A significant improvement would be their equalization. According to Staničić, this can be achieved by turning the school principal into a *pedagogical leader*.

Leithwood, Day, Sammons, Harris and Hopkins (2006) cite four main tasks - areas of principal's activity: setting goals, professional development, organizing school and organizing teaching.

McKeever (2003) also speaks of four areas of activity of school principals: *work tasks* (for their implementation, it is necessary to encourage the development of cooperative relations and positive pedagogical climate, in order to achieve student progress), *team building* (for coordinators of the activities that teachers will conduct in groups, the principals choose dedicated individuals and encourage the strengthening of cooperation through task allocation), *the development of leadership* (the principals encourage the distribution of leadership activities to team leaders, but also demonstrate their own commitment - the distribution of leadership activities is not their escape from obligations), *ensuring lasting support for the work*.

The leadership role of school principals, Blazevic (2004) as well defines the following areas of activity: *motivation, communication, interpersonal relations, school development, introduction of innovations and changes, professional development of school employees, and the reputation of the school in society*.

The concept of leading an educational institution that was created under the influence of corporate management Kovac, Ledić and Rafajac (2002) designate as managerialism. It is characteristic that decision-making power is concentrated in individuals and / or small groups of people at the top. This concept is based on the assumption that it should be reacted quickly and without redundant consultation, in order to improve the position of the institution in a new, competitive environ-

ment. In contrast to managerialism, there is traditional collegialism in leadership. It implies the involvement of all teachers in the institution in decision-making processes through representatives in figures such as councils and commissions. Although it is a concept of leadership in higher education, which is by the level of autonomy and organizational structure different from elementary schools, elements of both practices can be seen in elementary education.

Referring to the OECD (Organization for Economic Co-operation and Development) annual analysis of educational parameters in 2007 (OECD, 2007b) and achievement analysis on PISA Testing in 2006 (OECD, 2007a), Pont, Nusche and Moorman (2008) point to the indirect responsibility of school principals for the improvement of educational outcomes. In order to achieve optimum results, principals need to conceive their leadership in four tasks:

1. *ensure conditions and support for professional development of teachers, and their evaluation;*
2. *setting goals, assessment and responsibility;*
3. *management of financial and human resources;*
4. *creating conditions for improving school practice.*

From all of the above mentioned, it is clear that the role of principals in the elementary school is complex and multi-dimensional. As leaders, the principals are at the place of an intermediary between the (educational) authorities, represented partly through the school committee, and the teachers, or indirectly, the pupils. The principal is responsible for creating material-technical and personnel conditions for the work of the school, creating a vision and mission of the school and its advancement.

Leadership style

Leadership style is a relatively durable/persistent way of behaving of the leader who affects employees and the work process in a particular organization. Most of the definitions of leadership are determined by the role of the leader. „The leader is the person who takes responsibility to influence others through interpersonal behavior.“ (Luft, 1969 according to Bojanović, 2004, p. 156)

The theoretical framework in this paper is the three leadership styles described by Avolio and Bass (2010): *transformational, transactional and Laissez-faire leadership*. Most Bass (Bass and Reggio, 2006), as well as other authors' studies, indicate that leadership style influences work results and performance in achieving group goals.

In addition to the leadership style, for the outcomes, according to Bojanović (2004), are responsible situation in which the employees are located, the nature of the tasks at which they work, and the personality traits of employees. Based on these three factors in practice, the most appropriate leadership style for a particular work organization is determined.

In this paper, the leadership styles of elementary school principals are the subject of research in the context of the school climate. Perceived school climate, therefore, counting that the work tasks are constant, will be taken as an indicator of the appropriateness of the existing leadership style, and by comparative analysis, it will be possible to point to the most productive style.

Transformational leadership, according to Avolio and Bass (2002), leads to changes within individuals and social systems. It raises the level of motivation among employees, morally shapes them and increases their performance. This is accomplished through the following mechanisms: *creating a common identity between the members of the group and the group as a whole; the leader is a model for identifying to employees; the leader understands the needs, strengths and weaknesses of the employees, and gives them tasks that are in line with it.*

Burns (1978) was the first to speak about the leadership style that changes / transforms employees. He called it transformational leadership. According to his definition, transformational leadership is a process in which the leader and employees help one another to achieve a higher level of motivation and morality (Burns, 1978). In contrast to the transformational, Burns defined the transactional leadership, which is based on the mechanism "give and take", more precisely on the exchange mechanism. Transformational and transactional leadership, according to Burns, are mutually exclusive.

Avolio and Bass (2002) expanded Burns theory, replaced the term transforming with transformational, and pointed to the possibility of its measurement. Elements of transformational leadership, according to Avolio and Bass, are measurable by the influence that the leader realizes on employees. On the other hand, the employees feel the admiration, loyalty and respect towards the leader, and because of the quality shown by the leader, they are prepared to invest more effort and achieve better results. Transformational leader encourages employees to present their own ideas and find their own ways to solve problems. Transformational leadership is observed when the leader: 1. encourages colleagues and employees to look at work assignments from a different perspective; 2. encourages the crea-

tion of awareness of the importance and significance of the group; 3. encourages colleagues and employees to develop skills and abilities at a higher level; 4. encourages employees and colleagues to rise above their own interests and look at the interests of the group (Bass & Riggio, 2006).

Transformational leadership according to Bass (1990) is characterized by:

1. individualized care (refers to the attention given by the leader to the employee and his understanding of the employee's needs), 2. intellectual stimulation (the degree to which the leader accepts the ideas of employees and encourages their creative thinking); inspirational motivation (the ability of the leader to articulate goals and gaining employees for their accomplishment), 4. model of identification (the degree to which a leader represents a moral ideal for an employee, receives his respect and trust).

Leithwood and Jantzi (1999) cite the following dimensions of transformational leadership in school as an organization: *1. a high level of performance expectation, 2. building the vision and goals of the school, 3. intellectual stimulation, 4. individualized support, 5. symbolization of professional action and value and 6. development of structures for participation in decision-making on school issues.*

Transformational leadership, if we draw a parallel to the classical division into three types of leadership, would correspond to *democratic leadership*. Viewed through the prism of other theoretical approaches, transformational leadership can recognize *the characteristics of people-centered leadership, participative leadership and integrative leadership* (Bittel, 1997).

Marks and Printy (2003) suggest that transformational leadership, combined with a distributed instructional, is the most optimal model of school leadership. They call such leadership integrative. In their research, which included directors, teachers and students of the 24 American schools, the authors found that an integrative leadership model gave better results in the quality of teaching and student achievement compared to the dominantly transformational or predominantly instructional model. Marks and Printy emphasize that transformational leadership is a necessary, but insufficient prerequisite for instructional leadership. Thus, they deviate from Leithwood's and Jantzi's (1999) findings, according to which the mixing of leadership and teaching process leads to dissatisfaction of both leaders and teachers. They conclude that the integrative model represents the synergistic power of leadership, shared by members of the school organization.

Transactional leadership is based on the principle *give-and-take*. In this case, the leader gives the employees guidelines, acknowledgments and a system of values, and in turn he takes / receives respect and obedience. Transactional leadership is most obvious in cases where the leader relies on passive leadership mechanisms, i. e. he only intervenes when the work procedure is violated or the target has not been achieved. He then threatens or punishes (Bass, 1990). According to Burns (1978), transactional leadership is the most common style, but also a style that does not provide either a leader or an employee with a high level of motivation and intellectual stimulation.

Transactional leadership is recognized in autocratic leadership, task-oriented leadership, direct and dominant leadership (Bittel, 1997).

Laissez-faire leadership style, as described by Lewin, Lippitt and White (1939), implies a minimum involvement of the leaders. Decisions are made by members of the group, taking responsibility for their outcomes. Some authors describe this style in a negative light, while others perceive how it can deliver excellent results in the case of tasks requiring creativity, when there is no high level of coordination among group members, and when group members have a high level of their own responsibility.

Laissez-faire style of leadership in the literature is also referred as deciding through individual freedoms (liberal leadership). „Decision-making through individual freedoms is based on the maximum freedom of all members of the group in deciding. This style is most often used by groups of scientists, characterized by a high degree of individuality. “(Bojanović, 2004, p. 162)

Avolio and Bass (2010) paid less attention to this style of leadership. In their instrument they described it through only one leading component - passive / *avoided leadership*. (This is also the other name Avolio and Bass use for this style of leadership.) Perhaps because in most cases where a conscious, deliberate, and planned activity is expected from the leader, this style of leadership has no place. Nevertheless, its presence in practice has been confirmed by a large number of researches, beginning with the earliest ones conducted by Lewin, Lippitt and White (1939), pointing out the consequences that can be left for interpersonal relationships within the group, and the work achievement.

Cuadrado, Navas, Molero, Ferrer and Morales (2012) investigated differences in the dominant leadership styles with regard to gender and type of organization of leaders. They have come to the conclusion that both

male and female leaders in principle have been equally often self-engaged as transformational, or transactional. Nevertheless, small differences were found with regard to subscales autocratic behavior and negotiation in the perception of leadership style by employees, where male respondents more often evaluated women leaders as prone to autocratic behavior and negotiation. The authors note that these results are contrary to meta-analytical results, which indicate that all employees tend to perceive female leaders as more sensitive to employee needs and interpersonal relationships / more inclined to transactional style of leadership (Eagly et al., 2003; van Engen & Willemsen, 2004 according to Cuadrado et al. 2012).

So far, research has shown that *pure* leadership styles are almost never encountered in practice. Usually, the leader has elements of two, or even three, styles with the dominance of one. That's why it's mostly talked about the *dominant leadership style*.

School climate

The term school climate refers to the invisible dimension of school life, which is the result of the overall relationships of all its employees and students, and each of them experiences subjectively, at the level of one's own emotions, social relations and work environment. It's about climate of the school as a group / organization. For the precise definition of the organizational climate, it is essential, Sušanjanj (2005) states, to understand her. In this sense, from the earliest studies, two directions are evident: objectivistic or realistic, subjectivist or phenomenological. The first understanding implies that the climate exists objectively, as part of the organization's reality. Although it is composed of typical behaviors, attitudes and feelings, climate is an attribute that exists independently of the perception of members of the organization. Contrary to this, according to subjectivist understanding, the climate refers to the perceptual and cognitive structuring of the organizational situation, common to its members. This implies that the climate does not exist objectively and that it represents the result of personal cognitive maps of all members of the organization, which they perceptively and cognitively structure the organizational situations. Nevertheless, Sušanjanj (2005) finds in all of these definitions two common features of the organizational climate: *perception* (experience of the organizational environment) and *descriptiveness* (these are the personal reports of members of the organization on how they perceive the organizational environment).

In defining the school climate, Rafferty puts emphasis on the role of principal and teachers in creating it, not mentioning students in particular. „The school climate is an organizational climate in specific school conditions. It encompasses the whole personality - principals and teachers - in interaction with the social and psychological environment of each school. “(Rafferty, 2003, p. 52)

Bognar and Matijević (2002) speak of educational climate. The climate is examined at the level of teaching and analyzed through two components: social climate and emotional climate. The social climate considers the quality of the overall relations of participants in the educational process. The emotional climate implies a feeling of comfort and discomfort among the participants in the educational process. In the case of emotional climate, the teacher / leader play a crucial role as well.

Taking into consideration all the above mentioned definitions, the school climate can be understood as a psychosocial climate created in the school as a specific organization, which consists of the behaviors, attitudes and feelings of its principals, teachers, professional associates and students.

This paper examines five dimensions of the school climate, defined by Johnson, Stevens and Zvoch (2007): 1. Collaboration, 2. Decision-making, 3. Instructional innovation, 4. Student relations, 5. School resources. Each dimension is described with three to six particles in the instrument. Dimensions are shown in Table 5 in more detail.

METHODOLOGY OF RESEARCH

Research objective

The objective of this paper was to investigate the role of elementary school principals in creating a school climate by critically analyzing, determining and interpreting the relation of the leadership style of principals perceived by teachers and their perceptions of the school climate.

Hypothesis of research

We have assumed that there is a connection between the observed leadership style of the principals of elementary schools with the experience of the school climate by the teachers.

Sample respondents

Teachers and principals of elementary schools in the wider city area of Tuzla made up the universe of testing. The sample included 492 respondents - 467 teachers and 25 principals of elementary schools. The sexual distribution of the respondents in the sample is asymmetrical, reflecting the population inequality - 307 (65.7%) female teachers and 89 (19.1%) male teachers, while for 71 (15.2%) of the respondents there is no registered gender. In the sub-sample of principals, 19 (76%) are male, and 6 (24%) are female. The age of the subjects ranged from 24 to 64 years ($M=43.12$; $Mdn=43$; $\sigma=9.15$; $Sk=0.18$; $K=-0.55$). Differences in age of teaching staff were not revealed ($MF=43.10$; $MM=43.01$; $t=0.07$; $df=370$; $p=0.937$; $FL=2.23$; $pL=0.136$). As well as in length of service ($MF=17.78$; $MM=17.11$; $t=0.55$; $df=370$; $p=0.578$; $FL=0.54$; $pL=0.462$). The average chronological age of principals is marginally different from the age of the teaching staff ($M=44.88$; $Mdn=42$) and the length of service ($M=20.83$; $Mdn=20$). Differences in the age and length of service of male and female principals are not statistically significant (age: $MF=45.80$; $MM=44.63$; $t=0.24$; $df=22$; $p=0.808$; $FL=1.19$; $pL=0.287$); (length of service: $MF=22.40$; $MM=20.42$; $t=0.42$; $df=22$; $p=0.681$; $FL=1.54$; $pL=0.228$). One respondent among the principals did not provide information on sexual affiliation.

Research methods, techniques of data collection and processing

In this research analytical - descriptive method, method of theoretical analysis and survey methods, and surveying and scaling techniques, as well as compiling and statistical data processing were applied.

The analytical - descriptive method provides a deeper insight into the nature of what we are doing with, and an explanation of the problem being investigated. In the case of this research, *the analytical - descriptive method* and the method of theoretical analysis were used to show the most important theoretical considerations and empirical contributions, leadership styles of elementary school principals, and the characteristics of the school climate.

The Survey method is an empirical non-experimental method, whose main characteristic is to address subjects to give opinions or statements about themselves. It is suitable for examining attitudes, opinions, views and knowledge about a problem.

We used it for the purpose of gathering the data needed to respond to the set objective and research tasks related to the leadership styles of elementary school principals and the characteristics of the school climate.

A computational program will be used for *compiling and statistical data processing*, which will, with the application of appropriate procedures of descriptive and inferential statistics, analyze the results of the research. Depending on the distribution of the results obtained, the program will determine their validity, reliability and correlation between variables.

Among the "standard" statistical procedures, in addition to descriptive statistics, multiple regression (OLS) was used, as well as a direct quadratic discriminative analysis that was robust in the heterogeneity of covariates, and was assumed by several authors in relation to linear discriminatory analysis in conditions where the assumptions related to covariance variables (Smithson, 1947; McLachlan, 2004). The discriminative model was implemented in the R environment using the "MASS" package. Graphic solutions are also created in the R environment in the package "CAR".

Research instrument

The research used the *Multifactor Leadership Questionnaire* (MLQ), authored by Avolio and Bass, and the abbreviated version of the *School Level Environment Questionnaire* (SLEQ), by Johnson, Stevens, Zvocha (authors of the original version of the instrument are Rentoul and Fraser).

Multifactor Leadership Questionnaire (MLQ) is used for the study of the *transformational, transactional, and Laissez-faire* (passive / avoiding) leadership style. It consists of 45 particles that identify and measure key leadership behaviors that have been shown to be strongly linked to individual and organizational success in previous researches. A scale of five degrees is used to estimate the frequency of observed behaviors. Nine leadership components are measured along the entire range of leadership styles and three leadership outcomes. The five components describe the transformation; the four components are transactional, while the Laissez-faire leadership is described through one component. In order to evaluate the validity of the measurement model of the leadership questionnaire, the author's hypothesis was examined on the structure of the scale itself. A complete confirmation model was tested with the inclusion of 11 latent dimensions and 45 indicators. Since it was not possible to obtain a convergent solution, the original model was corrected. Subscale *Ideal-*

ized impact had one item removed (mlq 6: "*Speaking of its most important values and beliefs*"), and the *passive leadership* subscale, consisting of 4 items (mlq3, mlq12, mlq17 and mlq20) was removed entirely. The corrected model has an acceptable level of fit ($c2(730)=2709.04$, $p<0.001$; SRMR=0.073, RMSEA=0.075, CFI=0.98, TLI=0.98). General fit indices (SRMR and RMSEA) indicate a relatively low degree of matching with the assumed structure of the questionnaire, while on the other hand comparative fit indices (TLI and CFI) show a significantly better degree of matching.

The School Level Environment Questionnaire (SLEQ) is used to assess the school climate. The original version consists of 56, and the abbreviated, used in this research, of the 21 claims that teachers are exposed to on a seven-hour scale. Each claim belongs to one of the five sub-scales, which describe five dimensions of the school climate. These are *Instructional Innovation, Collaboration, Decision-Making, School Resources and Student Relations*. The paper replicated the model Johnson and associates confirmed in the last "big" revision of the instrument ten years ago (Johnson, Stevens & Zvoch, 2007). The results showed that both general and comparative indices point to a scale with modest factor validity ($\chi^2(179) = 717.08$; SRMR=0.074, RMSEA=0.087, CFI=0.90, TLI=0.89). An additional difficulty was the need to incorporate assumptions about covariates into the model among the factors that the authors of the scale did not have to test. As all the initial estimates indicated that the decision-making factor was particularly problematic, a model with four factors was tested, i.e. a model without the factor *decision-making*, with 18 items included. A significantly more convergent model was obtained ($\chi^2(129) = 465.43$, $p<0.001$; SRMR=0.056, RMSEA=0.058, CFI=0.92, TLI=0.91). Most indices are "at the very edge" of the model with a good fit.

Data analysis

Based on the standard regression analysis (OLS), the magnitude of the contribution of the perceived leadership style of principals on the teacher's experience of pedagogical climate was evaluated. The predicate set of variables consists of eight factors of the leadership scale that relate to the *transformational, transactional and Laissez-faire leadership style* (*Idealized Attributed Impact (IA)*, *Idealized Behavior Impact (IB)*, *Inspirational Motivation (IM)*, *Intellectual Stimulation (IS)*, *Individualized Care (IC)*, *Conditional Reward (CR)*, *Active Management (AM)*).

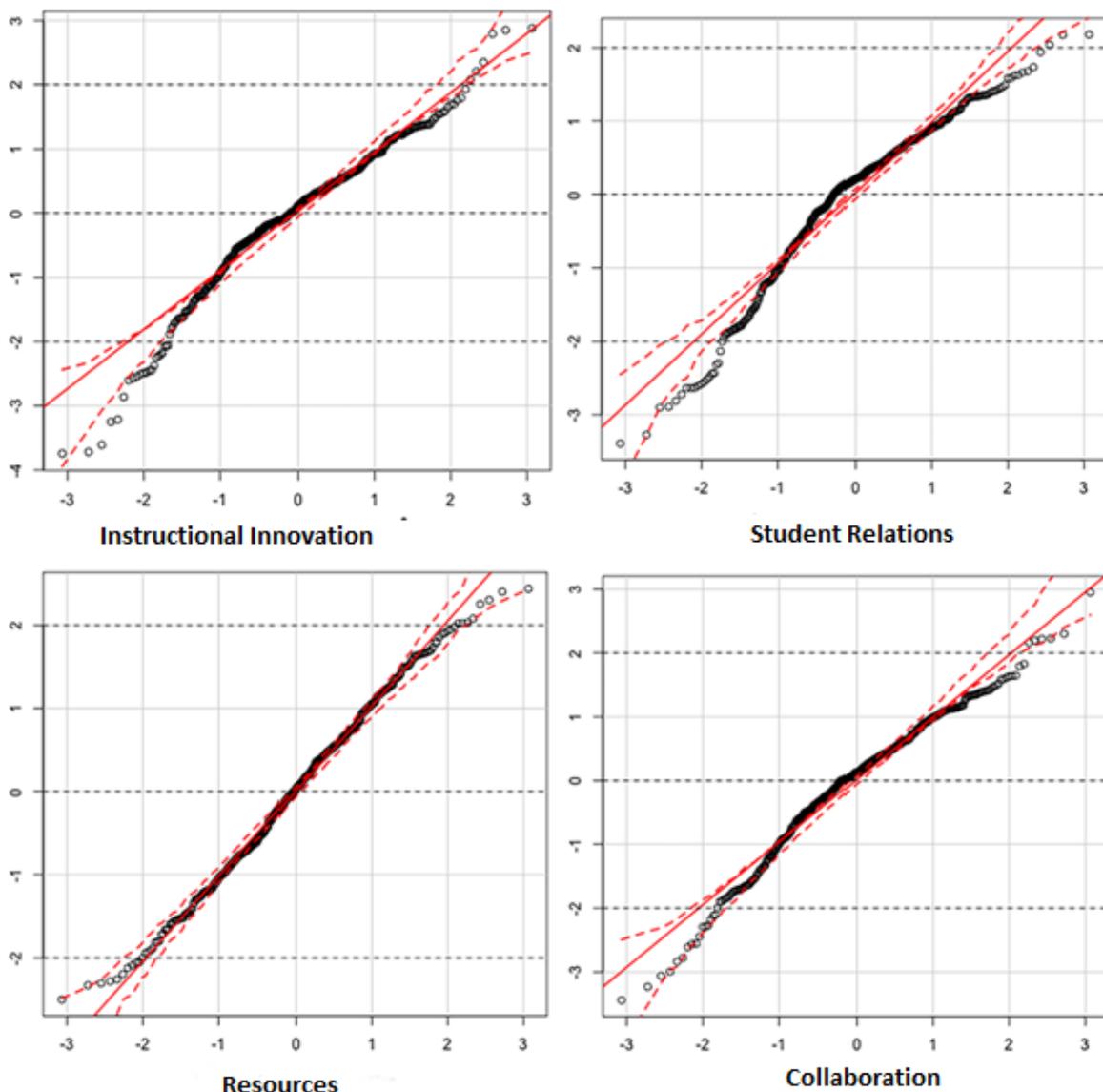
The last two dimensions feature the transactional style of leadership, and the Laissez-faire (LFR) leadership style is presented through a unique dimension composed of four items. Criterion variables make up four dimensions of the questionnaire of the school environment - climate: *Instructional Innovation*, *Collaboration*, *Resources*, *Student Relations*. A separate regression model is created for each criterion variable.

All variables in the regression model are decomposed onto the first main component, and the factor scores are expressed in the form of regression scores. Based on the correlation matrix for the set of included variables in the regression model it has been established that all predictor variables statistically significantly correlate with the dimensions of the perceived school climate. Although the registered correlations are statistically significant, it should be emphasized that the magnitude of the association is relatively modest. Thus *Instructional Innovation* poorly to moderately correlate with the set of MLQ variables (0.40 - 0.48), *Collaboration* correlates

relatively low (0.26 - 0.43). The same is true with the variable *Resources* that has a modest association with a set of variables that represent perceived leadership styles (0.21-0.35), and especially interesting is the very low association of the dimension *Teacher Relations* with a set of predictors whose correlations do not exceed the order of 0.10. This could point to a paradox that relationships with students are independent of the teacher's perception of leadership.

All variables that represent leadership styles statistically correlate significantly with each other. Although there are conditions for violating the criteria of multicollinearity, recommendation of the leading authors to include all the variables in the regression model that do not share more than half of the common variance was followed (Tabachnik & Fidell, 2012).

Data consistency in relation to the normal distribution density model, as well as the assumption of the normal distribution of residuals, is plotted graphically on a diagram of the normal likelihood of the residual (Picture 1).



Picture 1. "Integral" graphic representation of the probability of normal distribution of residuals on criterion variables from the SLEQ set- teachers' experience of the pedagogical climate

All four distribution residues do not indicate significant deviations from the normal distribution model of residuals, and there is no fear of breaking the prerequisites for regression analysis.

Since subscales during the psychometric evaluation have been somewhat corrected (some items have been deleted), the descriptive indicators for the predictor

and criterion variables (Table 1) were derived under simple summation models and under the model of average scaled values to facilitate comparison of results in regard to earlier research. The averaging and deviation measures for factor scores are not shown because they are expressed through standard regression scores ($M=0$; $\sigma=1$).

Table 1 Average values and standard deviations for the subscales of the questionnaires MLQ and SLEQ

subscales	M		σ	
	jlk	psv	jlk	psv
Idealized Attributed Impact	10.77	2.69	4.10	1.02
Idealized Behavior Impact	9.01	2.73	3.07	0.81
Inspirational Motivation	11.99	2.99	3.97	0.99
Intellectual Stimulation	11.40	2.85	3.90	0.97
Individualized Care	11.92	2.98	4.02	1.05
Conditional Reward	11.31	2.82	4.01	1.00
Active Management	11.38	2.84	3.64	0.91
Laissez-faire style	4.06	1.01	4.22	1.05
Instructional Innovation	14.64	3.66	2.88	0.72
Collaboration	19.41	3.80	3.57	0.71
Resources	11.20	2.80	3.63	0.90
Student Relations	15.09	3.77	3.20	0.80

Note. M-arithmetic mean; σ -standard deviation; jlk-summatic score created as a simple summation; psv-average scalar value

Taking the theoretical scale of scoring on sub-scales, it can be established that all scales have a relatively moderate and uniform scattering level. To a lesser extent of this trend deviates from the subscales of Idealized Attributed Impact, which compared to other scales in the model and has a somewhat higher degree of fluctuation in the results. The highest average values on the pedagogical climate experience scale are registered on subscales: Collaboration ($M=3.80$), Student Relations ($M=3.77$) i Instructional Innovation ($M=3.66$), While on the scale of perceived leadership the highest scores are registered on the subscales: Inspirational Motivation ($M=2.99$); Individualized Care ($M=2.98$) i Intellectual Stimulation ($M=2.85$). Since the maximum theoretical average scalar value of both scales 4, it is obvious that the scales separated have an above average value. The lowest scores on the leadership scales are registered with Laissez-faire leadership style ($M = 1.01$), and on the subscale Idealized

Attributed Impact ($M=2.69$). As was expected and "the modest" was the perceived pedagogical climate that is tied to the material equipment of the school (Resources $M=2.80$).

Since high correlations were found in a set of prediction variables (order 0.60 and 0.70), special care is devoted to the diagnosis of colinearity. In accordance with the recommendations of leading authors in the field (Myers, 1990; Menard, 1995; Tabachnick and Fidell, 2012), a regression model with tolerance coefficient values of less than 0.20 and values of the factor of increase of the explained variance greater than 10 can be considered unreliable due to high intercorrelation of the predictor variables. Since neither of the four regression models have registered any significant cases of disruption of the multicollinearity conditions, the obtained models can be treated as reliable. A detailed overview of the colinearity diagnosis is presented in Table 2.

Table 2 Multicollinear Diagnostics: Tolerance coefficients and variance increase factors for regression models of the assessment of the aspect of the pedagogical climate

	Prediction variables							
	IA	IB	IM	IS	IC	CR	AM	LFR
Tolerance	0.264	0.119	0.148	0.133	0.107	0.189	0.235	0.577
VIF	3.788	8.406	6.776	7.494	9.339	5.299	4.250	1.732

Note. IA– Idealized Attributed Impact; IB– Idealized Behavior Impact;IM– Inspirational Motivation;IS– Intellectual stimulation; IC– Individualized Care; CR– Conditional Reward; AM– Active Management; LFR – Laissez-faire leadership style

The basic question regarding the relation of leadership dimensions registered over the MLQ questionnaire scale and the perception of the pedagogical climate estimated through the SLEQ questionnaire is how well knowledge of information on leadership styles contributes to the possibility of forecasting the level of pedagogical climate. In order to answer the question, four successive models were created with the simultaneous use of the predictor variables. Since

the average correlation (Instructional Innovation $r = 0.43$, Collaboration $r = 0.36$, Student Relations $r = 0.13$ i Resources $r = 0.31$) of predictor variables with a criterion is relatively low, and two sets of variables have a modest amount of common variance, so the expected predictive potentials of the model are limited. A detailed overview of the general efficiency of the model is shown in Table 3.

Table 3 General indicators of efficiency of regression models: Coefficients of multiple correlation and multiple determination

Model	R	R ²	ΔR ²	Standard error
1 Instructional innovation	0.50	0.27	0.24	0.87
2 Collaboration	0.45	0.21	0.19	0.92
3 Resources	0.37	0.14	0.12	0.93
4 Student relations	0.18	0.03	0.02	0.98

Note. R – coefficient of multiple correlation; R²– coefficient of multiple determination; ΔR²– corrected R²

The most effective model was the regression solution for the prediction scores model on the Instructional Innovation dimension, where about 24% of the variance of the perception of the school climate which refers to the aspect of Instructional Innovation was explained (R=0.50; R²=0.24, 95% IP from 0.16 to 0.30; Cohens f²=0.31, p<0.001). The regression model that addresses the issue of Collaboration prediction as a school climate aspect is less useful than the previous model (R=0.45; R²=0.19, 95% IP from 0.11 to 0.24; Cohens f²=0.23, p<0.001), and about 1/5 of the variance of the school climate was explained. A regression model that challenges the climate prediction from the point of view of the Resources (R=0.37; R²=0.12, 95% IP from 0.05 to 0.15; Cohens f²=0.13,

p<0.001), about 12% of the school climate variation is explained. The least useful regression solution in the prediction of the school climate was the aspect of Student Relations. Although the model is statistically significant in practical terms, the model is extremely marginal (R=0.18; R²=0.02, 95% IP from 0.00 to 0.03; Cohens f²=0.02, p<0.001). The model explains only about 2% of the school climate variation related to student relations. According to the Cohen's convention interpretations f² as a measure of magnitude of the effect in multiple regression of f² values from 0.02 to 0.14 indicate a small effect, at a moderate effect of values from 0.15 to 0.35, and to a large effect of a value greater than 0.35.

Accordingly moderate effects have models Instructional Innovation and Collaboration, while models for School resources and Student Relations have a small effect.

The summarized results of variance analysis with the most relevant information for all four tested models are shown in Table 4.

Table 4 Summary indicators of variance analysis for the tested regression models

Model		SS	df	MS	F	p
Instructional Innovation	Regression	117.34	8	14.66	19.26	0.001
	Residual	348.65	458	0.76		
	ukupno	466.00	466			
Collaboration	Regression	96.69	8	12.08	14.98	0.001
	Residual	369.30	458	0.81		
	Total	466.000	466			
Resources	Regression	63.82	8	7.97	9.08	0.001
	Residual	402.17	458	0.87		
	Total	466.000	466			
Student Relations	Regression	16.22	8	2.02	2.06	0.03
	Residual	449.77	458	0.982		
	Total	466.00	466			

Note. SS– sums of squares; df– degrees of freedom;MS–average square F–Fisher's F ratio

Partial i.e. the individual contribution of variables to the regression model is estimated through standardized regression coefficients β . To the first regression model (Instructional Innovation) significantly contribute only two variables Idealized Attributed Impact –Behavior ($\beta=0.24$, $t=2.06$, $p<0.05$) and the variable Laissez-faire leadership ($\beta=-0.11$, $t=2.25$, $p<0.05$). The same predictors also contribute significantly to the explanation of the second regression model Collaboration: Idealized Attributed Impact –Behavior ($\beta=0.27$, $t=2.25$, $p<0.05$);

i Laissez-faire leadership ($\beta=-0.29$, $t=5.24$, $p<0.05$), while the individual contribution of the remaining variables is trivial. The third regression model did not result in any single statistically significant predictor, and this is particularly true for the fourth model. Due to the extremely modest partial contribution of the predictor, only a reduced table with significant regression coefficients for the first two models was included. The complete printing of tables with regression coefficients for all four models is found in Table 5.

Table 5 Partial contribution of predictor variables from the set perceptible leadership style to the forecast of the pedagogical climate by teachers

Model		B	Std. Error	β	sr ²	t	p
Instructional Innovation	Constant	6.380E-17	0.040			0.000	1.000
	Idealized Impact - Behavior	0.242	0.117	0.242	>0.01	2.065	0.040
	Laissez-faire leadership	-0.114	0.053	-0.114	>0.01	-2.140	0.033
Collaboration	Constant	1.827E-17	0.042			0.000	1.000
	Idealized Impact - Behavior	0.272	0.121	0.272	>0.01	2.253	0.025
	Laissez-faire leadership	-0.287	0.055	-0.287	0.04	-5.245	0.000

Note. B – Non-standardized regression coefficient; β – standardized beta coefficient; sr² – square coefficient of semi-partial correlation; t – Student's t test.

It should be emphasized that, although the regression coefficients are statistically significant, their magnitudes are not remarkable. However, it should be kept in mind that leadership styles are a relatively small and homogeneous set of predictors, and therefore their impact is relatively modest. The direction of the forecast agrees with the assumed model: a more favorable perception of idealized behavioral effects leads to a more favorable experience of the school climate in aspects Instructional Innovation and Collaboration. The opposite is by the predictor of the Laissez-faire leadership, where the perception of the multiple presence of the Laissez-faire style of leadership is more in line with less favorable perceptions Instructional Innovation and Collaboration.

Based on the results of a multiple regression analysis carried out on 8 predicate variables from the leadership style, representing the experienced leadership style of the principals, and the dimension of the SLEQ scale that presents the school climate as dependent variables, using a regression model with the simultaneous inclusion of the predictor, four statistically significant regression functions stand out. The obtained models explain from 2 to 24% of the variance of perceived school climate through the MLQ leadership

dimension. The most useful was the predictor's solution for the criterion Instructional Innovation, and the least suitable was the prediction Student Relations, which turned out to be completely independent of the style of leadership. The partial contribution of the predictor in all the solutions is negligible and in no case does it exceed the increment of 5% variance.

DISCUSSION

As pointed out above, the purpose of this paper was to investigate the perceived leadership style of the principals and the teachers' experience of the school climate in elementary school, in total and in each dimension of the individual climate. From this formulated task, the assumption is that there is a connection between the leadership style of the principal and the experience of the school climate by teachers, that is, that the statistically and practically significant part of the climate experience variance, in total and in every dimension, can be explained by the style of leadership. Also, it is assumed that teachers, which will mostly perceive the principals as transformational, will also perceive the school climate as more favorable.

By analyzing the obtained data, the research hypothesis has been largely confirmed. The coefficient of multiple correlation between the seven dimensions of leadership style, on the one hand, and the four dimensions of the school climate, on the other hand, ranges from 0.18 to 0.50² (i.e. The corrected determination coefficient ranges from 0.02 to 0.24³), and in the case of three out of a total of four models, it indicates an association. In other words, up to 24% of the variance of the climate experience of teachers can be explained by the style of leadership the teachers see. Taking into account the obtained predictor value of the variables, the preferred leadership style is the transformational.

The strongest link was found between the style of leadership of principals, as perceived by teachers, and Instructional Innovation as the dimensions of the climate experience. $R=0.50$ ($R^2=0.24$) is located on the upper boundary weak to moderate to good association. Although Instructional Innovations are in correlation with the leadership style of principals in general, only the dimensions Idealized Impact - behavior and variables Laissez-faire (the sign in the case of Laissez-faire leadership is negative) have a predictor value in this relation. As the Idealized Impact - Behavior is a dimension that describes the transformational style of leadership, it can be concluded that teachers who largely school principals perceive as transformational leaders - who speak of their most important values and beliefs, clarify the importance of owning a strong sense of meaning and purpose, take care about the moral and ethical consequences of decisions, and emphasize the importance of having common goals, be more inclined to try new and different ideas, more often introduce new contents into curricula (within the limits where teachers allow it), prefer to apply new approaches to teaching work, and will be more inclined to evaluate their colleagues and themselves as innovative.

²The boundary values for the coefficient of correlation are the following: 0 – ± 0.25 – no association; ±0.26 – ±0.50 – poor association; ±0.51 – ± 0.75 – moderate to good association; ±0.76 – ±1 very good to great association; ±1 – mathematical association.

³The boundary values for the coefficient of correlation are the following (Chaddock's scale): 0 – absence of link; 0,00 – 0,25 – weak link; 0.25 – 0.64 – medium-power link; 0.64 – 1 – strong link; 1 – complete link

Since the Idealized Impact is a dimension of the transformational leadership, we can conclude that this style is preferred in the case of introducing teacher-based innovation in teaching in relation to the other two styles; especially in relation to the Laissez-faire style of leadership. Namely, given the negative sign in relation to Instructional Innovation - Laissez-faire leadership, we conclude that teachers who largely perceive their principals who avoid to include when important questions arise, that they are absent when they are most needed, to avoid making decisions, and to postpone answering urgent questions, be inclined to evaluate the teaching work of their colleagues as less innovative.

Although statistically significant, and on the edge of a moderate to good association, such a result can be rendered unsatisfactory. In other words, it can be done how the principal's role in teacher innovation is below expectations. Before accepting such a conclusion, however, it is necessary to take into account that the issue of introducing innovations in teaching is complex, and that it depends not only on a multitude of potential factors within the school, of which the principal is only one, but also from those from outside. It is therefore possible to assume that with 24% variance, the principal in any case represents one of the most important factors of innovation in teaching. However, in order to make a firm conclusion on this trail, it would be necessary to carry out a comprehensive factorial analysis on the same or similar sample. Nachmias, Mioduser, Cohen, Tubin and Forkosh – Baruch (2004) pointed out to the number of factors that influence innovation. In a survey conducted in Israeli schools, the principal (together with the leading staff in charge of technical support and leading teachers) is the second most important factor in the implementation of pedagogical innovations related to computer technology (with a weight of 3.8), immediately after the information infrastructure (4.1), and before past practices in introducing innovations (3.7), state and local information policies (3.6), professional teacher training (3.4), "significant external" factors, including the Ministry of Education, local authorities, parents, sectorial experts and "intervening" factors common weight 3.0) and the number of classes and student structure (common weight 1.8). This issue will be discussed below, in the context of a common interpretation of the link between the dimensions of the climate with the style of leadership.

Interestingly, the Idealized Impact (Attributed) and Idealized Impact (Behavior) have been shown to be the only predictor variables in relation to the school climate and in the research conducted by Allen, Grigsby, and Peters (2015). Both idealized impacts, in addition to the predictor value, have shown a relatively high relation to all seven dimensions of the school climate: order, leadership, environment, inclusiveness, teaching, expectations and cooperation, with an explanation of variance from 16% to as much as 62%.

At almost the same association (obtained in our research) between the observed transformational style of school principals (MLQ) and Instructional Innovation (SLEQ) as the dimensions of the school climate ($R^2 = 0.26$), point out Tajasom and Ahmad (2011). Their results are based on a sample of 170 teachers from 17 Malaysian high schools. On the other hand, the same research found the link between the transaction style of leadership and Instructional Innovation, for which the determining factor is $R^2=0.21$.

The second strongest link of the perceived leadership style of the principal was achieved with the subscale of Mutual Teacher Collaboration. The correlation factor of $R = 0.45$ in this case as well indicates a weak association of the dependent variable with an independent while the determining factor $R^2 = 0.19$ suggests that 19% of the variance of the mutual teacher collaboration can be explained with the leadership style of the principal. Like Instructive Innovation, the Idealized Impact-Behavior and Laissez-faire style (which is negative again) proved to be significant predictors of Collaboration. This means that teachers who are more likely to notice that their principals are talking about their most important values and beliefs, clarify the importance of owning a strong sense of purpose and purpose, take into account the moral and ethical consequences of decisions and emphasize the importance of having common goals, more often and more commonly adapt / operationalize curricula, communicate better with each other, collaborate better, talk about the individual needs of students, adjust their work on the choice of teaching content and the dynamics of their realization, and notice the higher level of team work of teachers. Since the idealized impact is a dimension of transformational leadership, we conclude, that based on the perception of teachers, transformational leadership contributes more to the realization of cooperation and development of collaborative relationships among teachers in comparison with transactional and especially Laissez-faire

leadership (and thus the preferred style). Namely, due to the negative sign in the relationship of Collaboration - Laissez-faire leadership, we will exclude that teachers who notice their principals avoiding to be involved when important questions arise, that they are absent when they are most needed, to avoid decision making, and postpone answering urgent questions, be inclined to evaluate the work of their colleagues as less cooperative.

Given that the perceived leadership style explains 15% of the variance of teacher collaboration, it is clear that the role of the principal in creating this dimension of the school climate is lower than in the case of Instructional Innovation in teaching. A possible explanation for this result lies in the fact that relations among teachers are a more dynamic category of innovation, and as such is largely conditioned by teachers themselves, and less by external factors, including the principal.

DuPont (2009) found a stronger relationship ($R = 0.60$) between the principal's style of leadership and mutual teacher collaboration, in a case study conducted at the International School at the US Embassy in New Delhi. In his research, as much as 35% of the variance of mutual teacher collaboration was explained by the style of teachers' leadership. A possible reason for a 20% difference in variance is the fact that DuPont conducted a survey in a school where teachers rated the principals as highly instructive; The arithmetic mean of the response on a scale of 1 to 5 has exceeded 3.5 of each of the nine dimensions of instructive leadership, while in some cases it climbed above 4.1. In support of this interpretation, there are also relatively high variances found in relation to the style of leadership of principals and other dimensions of the school climate, as perceived by teachers: Professional development ($R^2=0.27$), Unification in achieving the mission of the school ($R^2=0.32$), Collegial support ($R^2=0.28$), Partnership in learning ($R^2=0.32$), External factors ($R^2= 0.20$). In explaining high scores, both on instructive leadership scale and in terms of variance, account should also be taken of the specific nature of the school itself, which was established to educate children of Americans in the diplomatic mission in India, due to the structure of students, teaching and leadership personnel, and environment (this is an extraterritorial school). On the other hand, statistically significant but very low correlation between the dimensions of the instructive leadership style and teacher collaboration was found by Gumus, Bulut and Bellibas (2013).

A survey of 2970 respondents in 183 schools found that 10% of teachers' collaboration variance explains the principal's follow-up of the teaching process, while giving feedback, while 7.2% of the variance is explained by clear setting and expressing common goals. The authors, however, warn of the big differences in the results obtained, depending on the school and the structure of the respondents. This shed light on additional factors that are related to the degree of (self) observed collaboration among teachers, for which a statistically significant coefficient of determination was obtained: gender ($R^2=0.054$), working status ($R^2=0.051$), school type ($R^2=0.21$). The results showed that female teachers are more interested in cooperation than male teachers that teachers with specific contracts are also more likely to work together more closely than teachers with contracts on an indefinite basis, and that teachers in private schools are more likely to cooperate than teachers from public schools. This shows that the issue of collaboration among teachers is also a rather complex construct, as well as innovation in teaching, and it is not realistic to expect that any single factor, including the principal, achieves high association.

At a somewhat similar correlation when it comes to the principal's role in the collaboration of teachers, as was obtained in this study, Silva, Amante and Morgado (2017) pointed out. They have explored the role of elementary school principals, looking at four dimensions of support (support for professional development of teachers, instrumental support / encouragement, support for innovation, and emotional and intelligence support) in the cooperation of teachers. The results showed that 29% of the variance of teachers' collaboration in the field of recreational and educational activities is explained by the role of the principal (through the collective action of all four dimensions of support), 13% of the variance of cooperation in activities related to the development of the curriculum and 13% of the variance of cooperation in interdisciplinary activities.

Using the MLQ to describe the perception of the leadership style of principals, and a somewhat different instrument for obtaining data on the teacher's perception of mutual collaboration, as the dimension of the school climate (SCI-R) Allen, Grigsby and Peters (2015), they also found the connection and predictor value of the idealized impact (attributed) ($R^2 = 0.433$) and the idealized impact (behavior) ($R^2 = 0.445$) with the style of leadership of school principals.

Slightly weaker, but still statistically significant, with the perceived style of leadership of the principal is related part of the pedagogical climate that refers to school resources ($R=0.37$; $R^2=0.12$). This means that 12% of the variance of school resource perception can be explained by the leadership style of the principal. Considering that no leadership dimension has proven to be a significant predictor of the dependent variable, we conclude that the perception of equipping the school library with books and textbooks, school equipment with teaching resources and aids, video equipment and video content, and the perception of their availability will generally be related to the perceived leadership style of the principal.

The lower correlation between the leadership style of school principals and school resources could result from the fact that schools are not profit-oriented organizations with market orientation, the success of which leaders could be measured, among other things, by material and technical equipment. Although they can be held responsible for the availability of existing resources, to which they referred to two out of a total of four in the instrument, teachers are aware that the school building, working and student residence rooms are maintained from budgetary funds, which, according to the pre-established criteria, are assigned by the founder. Equally it applies to the purchase of teaching resources and supplies. It is true that with their own initiative, through the involvement of schools in various projects of government and non-governmental, domestic and foreign sectors, principals can to some extent contribute to equipping schools, to which teachers have indicated their answers. This leads us to conclude that the principal's role is unquestionable, but less significant for securing resources in relation to the role it plays in teaching and teacher-related innovation. The significance of the role of the principal in creating this dimension of the school climate, probably due to its low connection with the style of leadership, is inferred in only one of all the above studies. Only Tajasom and Ahmad (2011) between transformational leadership style of principals in secondary schools (MLQ), perceived by teachers, and resources as school climate dimensions (SLEQ), found the factor of determination $R^2=0.16$. On the other hand, there is only a slight negative link between transactional style and school resources, for which the determining factor is $R^2=0.034$. This result is similar to the result of our study.

The relationship between the perceived leadership style and the dimension of the school climate Student Relations has only statistical significance, while there is no practical value, and detailed discussion of the previous cases of connection is detailed, and detailed discussion is unnecessary. We will only emphasize that the relationship between the principal's style of leadership and the relationship teachers have with students was not found in any other analyzes. Although they are an integral part of an instrument that measures the overall climate of the school, the issues contained in the dimension "Student Relations" are directed exclusively to students' behavior towards teachers (most students are respected by teachers; most students are ready to cooperate and provide assistance to teachers; in my school students are well-behaved, most students are motivated to learn), and it was not realistic to expect that they will significantly contribute directly to the overall picture of the school climate. That the climate at the class level and as the dimension of the teaching process does not exist in a vacuum, but in the context of the overall climate of the school, tells at least a slight association, which strives to a weak one ($R=0.18$). Perhaps, for this reason, these results should be taken into account in some future revision of the instrument, and adjust the particles so as to more clearly focus on the relationship of teachers and students in the context of the overall pedagogical climate of the school.

CONCLUSION

The results obtained in this study indicate the relationship between the perceived leadership style of principals and the experiences of the school climate by teachers. The strongest connection was found in the case of innovation in the work of teachers and their mutual collaboration, as well as climate dimension, with an idealized impact - behavior (dimension of transformational leadership) and Laissez-faire leadership. In addition, the link with Laissez-faire style has a negative sign. The highest explained degree of variance of 24% indicates that these are two complex variables, which, besides being interconnected, are also conditioned by numerous other factors. Among these, the position of the principals of a elementary school / public institution, which is strongly determined from the outside (the influence of the founders, the way of financing, the obligation of the public work, etc.). However, the results of the research also show that each school is a specific environment, with somewhat different relationships and dynamics of communi-

cation and interaction, and it is important to bear in mind the role of the principal in their design, in order to ensure optimal functioning of the school. The most suitable of the three explored leadership styles is the transformational style.

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REAL CONVERGENCE OF BOSNIA AND HERZEGOVINA TOWARDS THE EUROPEAN UNION

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ABSTRACT

The entire process of Bosnia and Herzegovina's path to European integration so far, is mostly limited to the problems of achieving political consensus, neglecting the essence and purpose of the integration process, which is primarily reflected in achieving the real convergence of Bosnia and Herzegovina towards the EU. The absence of real convergence, and adequate preparation in terms of competitiveness of the economy of Bosnia and Herzegovina for the EU membership, can cause negative effects of integration. Considering that there has not yet been written any paper that questions the lack of real convergence, primarily GDP p.c., and that a complete analysis of economic criteria is reduced to the Progress Reports of Bosnia and Herzegovina towards the EU, which summarize the fulfillment of the economic criteria of Bosnia and Herzegovina for the EU membership without concrete suggestions for improvement, this paper analyzes the real convergence of Bosnia and Herzegovina towards the European Union, observed through the income level p.c., prices and productivity of the labor force. The analysis showed that there is a sigma convergence of Bosnia and Herzegovina towards the EU in the movement of GDP p.c., which is reflected in the reduction of the coefficient of variation of the observed parameter in the period from 2000 to 2015 from 89.8% to 85.3%, which is a decrease in the coefficient of variation for 4, 5 p.p. for 16 years. In the observed period there was an increase in the absolute GDP p.c. gap, which means that Bosnia and Herzegovina must increase the rate of economic growth in the coming period, in order to stop the relative decrease in the standard of living in relation to the EU. In addition, the analysis of sigma convergence has shown that there are sigma divergent trends in the movement of productivity and price level of Bosnia and Herzegovina in relation to productivity and price level at the EU level. It is expected that the price level in Bosnia and Herzegovina will increase in the coming period as a result of the activation of the Stabilization and Association Agreement and a higher degree of trade integration with the EU.

Keywords: real convergence, Bosnia and Herzegovina, GDP p.c., productivity, price level.

JEL: F 15; F 43

INTRODUCTION

The purpose of implementing the process of a nominal convention towards the EU, observed through the meeting of the Copenhagen and Maastricht criteria, is to achieve a real convergence, which involves converging the economic parameters of the participants in the convergence process, in order to reduce regional differences in the degree of development, and

to make a equitable distribution of wealth. In order to achieve real convergence, it is necessary to provide institutional convergence, but also a similarity of economic structures, which will enable the creation of a complete development infrastructure by the convergence of the countries, involved and, based on that, reach a real convergence.

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However, the analysis of real convergence needs to be approached analytically both by territorial and economic criteria. The analytical approach to real convergence implies that an analysis needs to be made according to each of the criteria of real convergence, which should show the following: the achieved level of convergence, the factors that limit the convergence, or cause divergent movements, and the preparation of the action plan of economic policy measures for the improvement of the convergence process, monitoring the implementation of planned activities and timely implementation of corrective actions in case of significant deviations. Less developed countries in a tendency to reach acceptable level of competitiveness, and real convergence, in relation to developed countries, can often cause intraregional divergent trends, which include the creation of differences in development within different regions of a country, and thus are in the trade-off situation between international convergence and interregional divergence (more details: Hallet, 2002, Marelli, 2007). Of course, it is much easier to solve the problem of intraregional divergence in relation to international divergent movements, since the authorities within their own country control economic instruments, and in this way they can work towards reducing differences in regional (in) development, if that is their goal, while in the case of international convergence coordination of economic activities with the convergence of the countries involved is required. An important aspect of real convergence is certainly convergence in the performance of the labor market, given that GDP per capita, as the best representative of real convergence, depends on the labor market trends, i.e. the convergence / divergence of these markets and trends in the unemployment rates of the observed countries.

Regarding the transition countries which are in the process of joining the European Union, a significant factor in the process of real convergence is the completion of the process of transition of the business system, in order to provide all the necessary conditions for economic activity at the level of the developed industrial countries, thus creating the basis for realization of real convergence. The real convergence of these countries depends on many specific factors, such as the avoidance of macroeconomic crises, the development of the financial sector, high investment rates and many others (Bilas, 2005).

It is important to emphasize that the lack of real convergence and the adequate preparation for the competitiveness of the economy of Bosnia and Herzegovina for EU membership can cause the negative effects of integration and that the level of benefits that will be achieved through integration in the EU depends on the degree of

real convergence of Bosnia and Herzegovina towards the EU. Therefore, this paper analyzes the real convergence of Bosnia and Herzegovina towards the EU in order to point out the chaotic situation of the economy of Bosnia and Herzegovina, and to draw attention to the need for an offensive approach to meeting the economic convergence criteria. Real convergence, in this paper, is analyzed using the sigma convergence through 3 criteria: the level of GDP p.c., the price level and productivity of Bosnia and Herzegovina compared to the value of these parameters at the EU level.

A THEORETICAL REVIEW ON REAL CONVERGENCE AND THE METHODOLOGY OF RESEARCH

The criteria of real convergence

The criteria of real convergence reduce the mutual convergence of the following economic parameters between the observed countries: GDP p.c. level, level of nominal wages, real exchange rate equilibrium, price level, level of productivity. These criteria are analyzed in relation to the developed countries, and in the context of European integration, in relation to the average value of the individual criteria at the level of the European Union. However, it is not uncommon for cyclical economic trends to have certain divergent trends that only prolong the period of real convergence, all of which means that the convergence process can not be easily controlled, because of systemic risks, or there is no corresponding level of readiness of developed economies, bearers of European integrations, to realize a process of real convergence. For the convergence of each of these variables, a longer period of time is required which should be the result of structural and institutional convergences, and in particular the result of a successful nominal convergence that will create a functioning market economy and an economy strong enough to deal with competitive forces within the European Union. Also, in order to accelerate the process of real convergence, trade integration between candidate countries and potential EU member states with EU members is particularly important, which could intensify the cooperation from which other positive effects could contribute to the process of real convergence, such as transfer of technology and FDI from developed countries to less developed countries, but all in the context of macroeconomic stability and economic competitiveness for ease of doing business (according to reports by international financial institutions, eg Doing Business - World Bank Report).

Nominal vs. Real convergence

In the previous text about the problem of nominal and real convergence, it was emphasized that the goal of implementing nominal convergence is the realization of real convergence. Therefore, this would mean that first it is necessary to meet the criteria of nominal convergence, in order to ultimately have the approximation of the standard of living of the participating countries in the convergence process as a final result. The ratio of nominal and real convergence can be twofold, i.e. nominal convergence can lead to real convergence, and real convergence can support the realization of nominal convergence in certain segments, on the one hand, while, on the other hand, a conflict can occur in the pursuit of simultaneous achievement of the real and nominal convergence.

Meeting the nominal convergence criteria contributes to real convergence in the following:

a) Meeting the price stability criteria and achieving fiscal discipline positively affects the stabilization of overall macroeconomic conditions, which positively influences the decline in interest rates (Bilas, 2005). The decline in interest rates implies cheaper funds, which, at the net present value, as one of the methods of estimating the efficiency of investments, implies a greater number of projects with a positive net present value. A larger number of positive NPV projects (net present value) means a greater number of cost-effective projects that will be realized, and this ultimately involves greater investment, which leads to employment growth and total production, which is the goal of real convergence.

b) Realizing the stability of the exchange rate, as one of the criteria of nominal convergence, contributes to the reduction of foreign exchange risk in international business, which positively influences the strengthening of export activity, which, again, positively reflects on the total volume of production, i.e. GDP p.c. growth, *ceteris paribus*.

The realization of real convergence, primarily the growth of gross domestic product, contributes to meeting the criteria of nominal convergence. Economic growth creates the basis for increasing wages, but without inflation, and contributes to fiscal consolidation, since, only in the case of an efficient state apparatus and financial control authorities, the budget side is increasing, which positively influences the decline of the budget deficit and reduces the need for more intensive public borrowing.

As stated above, nominal and real convergence can mutually contribute to achieving the goals of both, but they can also end up in a conflict. The confrontation of nominal and real convergence is reflected in the following (Gaspar, 2001):

- Higher inflation rates are usually associated with higher growth rates;
- The expectation of price convergence and future membership in the monetary union can lead to a decline in long-term interest rates, but short-term converge gradually, reflecting macroeconomic instability and risks in transition countries. This can result in higher nominal interest rates over a longer period; the inability to simultaneously meet the criteria of the exchange rate and inflation. Considering the link between prices and the exchange rate with output, this would mean again a conflict of real and nominal convergence;
- The objective of exchange rate stability can lead to an unsustainable current account balance if it is fixed at an inappropriate level (imbalanced);
- The objective of real convergence - achieving a higher degree of productivity can cause inflation²;
- Rapid GDP growth, capital inflows and fiscal consolidation can lead to a slowdown in the convergence of interest rates, as high interest rates will be needed to increase domestic savings in order to reduce the reliance on foreign savings and current account vulnerability and
- Capital inflows, a high real and financial openness can lead to the volatility of the nominal exchange rate.

METHODOLOGY OF RESEARCH

For the analysis of real convergence, sigma convergence will be used which implies decreasing the dispersion of the observed variable over time, and as a measure the coefficient of variation of the given variable over time is used, and if there is a decrease in the observed variation coefficient among the observed group of countries then it can be said that there is a sigma convergence among the observed countries, and otherwise there is sigma divergence. Sigma convergence exists if:

$$\sigma_{t+n} < \sigma_t$$

Sigma Convergence is a concept by which it is examined whether the differences between regions measured by income per capita, or some other parameter, are reduced over time.

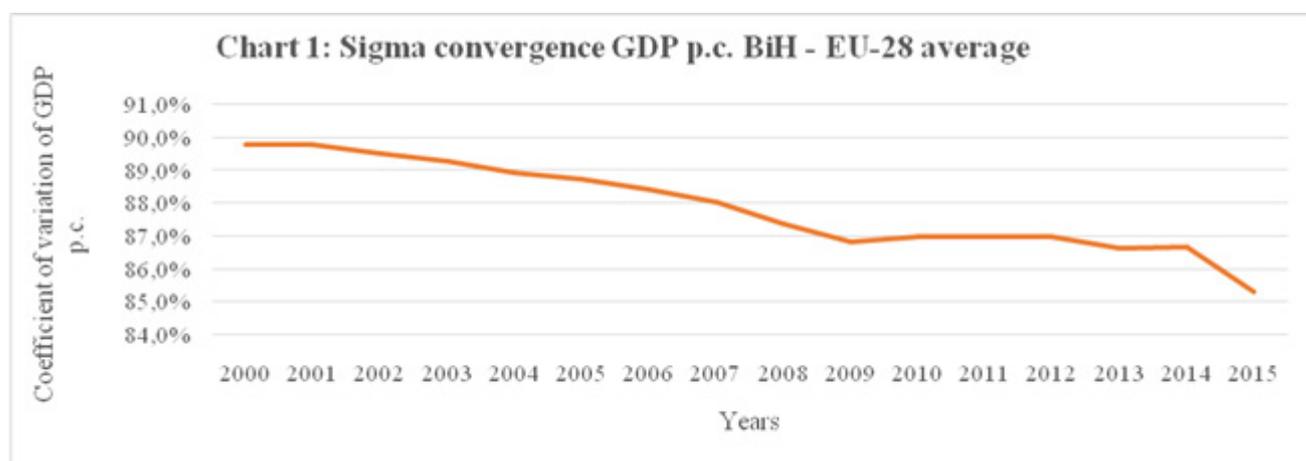
²Balassa – Samuelson effect

RESULTS

As stated in the theoretical coverage of real convergence, real convergence, in the context of European integration, implies bringing the value of economic parameters, primarily GDP p.c., to the average values of these parameters at the EU level. Particular emphasis in this section will be put on the income convergence, in order to determine whether per capita income in Bosnia and Herzegovina is approaching the EU average, ie whether there are convergent or divergent movements, and how to accelerate the process of income convergence. In addition to GDP p.c., the convergence of productivity and price levels of Bosnia and Herzegovina against the same EU indicators will be analyzed. Analysis of the convergence of these variables according to the same at the EU level will be carried out using the sigma convergence. Sigma con-

vergence implies reducing the dispersion of observed variables over time between the observed territories, that is, the analysis of the movement of regional differences through observed economic variables (divergence or convergence).

Chart 1 shows the variation coefficient movement of GDP p.c. of Bosnia and Herzegovina towards the average GDP p.c. of the EU - 28 for the period 2000 - 2015, in order to determine the existence of sigma convergence, i.e. the movement of income distribution. The dispersion of income per capita in the observed period has decreased from 89.8% to 85.3%, which means that there is a sigma convergence, which also means, that the dispersion of the income of Bosnia and Herzegovina in relation to the EU-28 average is decreasing. The decrease of income dispersion is the result of a higher average growth rate in Bosnia and Herzegovina compared to the growth rate of the EU-28.³



Source: authors' calculation, data: <http://ec.europa.eu/eurostat>; <Http://data.worldbank.org> (accessed 15.7.2017)

The results of the sigma convergence shown in Chart 1 should not lead us to a wrong conclusion. Namely, the dispersion of income per capita is decreasing, however, the initial average deviation is 89.8%, and after 16 years, the relative average deviation of income per inhabitant of B&H in relation to the EU-28 average is 85.3%, which indicates the slow process of decrease of the dispersion of income, i.e., the slowness in the development of sigma convergence. Considering the average higher growth rate of Bosnia and Herzegovina, and the fact that in the forthcoming period this growth rate could be decreased due to an increase in the base (GDP absolute value growth), as is the case with Croatia (whose average growth rate in the last ten-year period was 0% and the growth rate in 2015 was 1.6%, which is less than the EU-28 average growth rate of 2.2%), the question is how long the process of income convergence will take, and whether the approximation of income per capita of Bosnia and Herzegovina to the average income of the EU-28 will ever be fully realized.

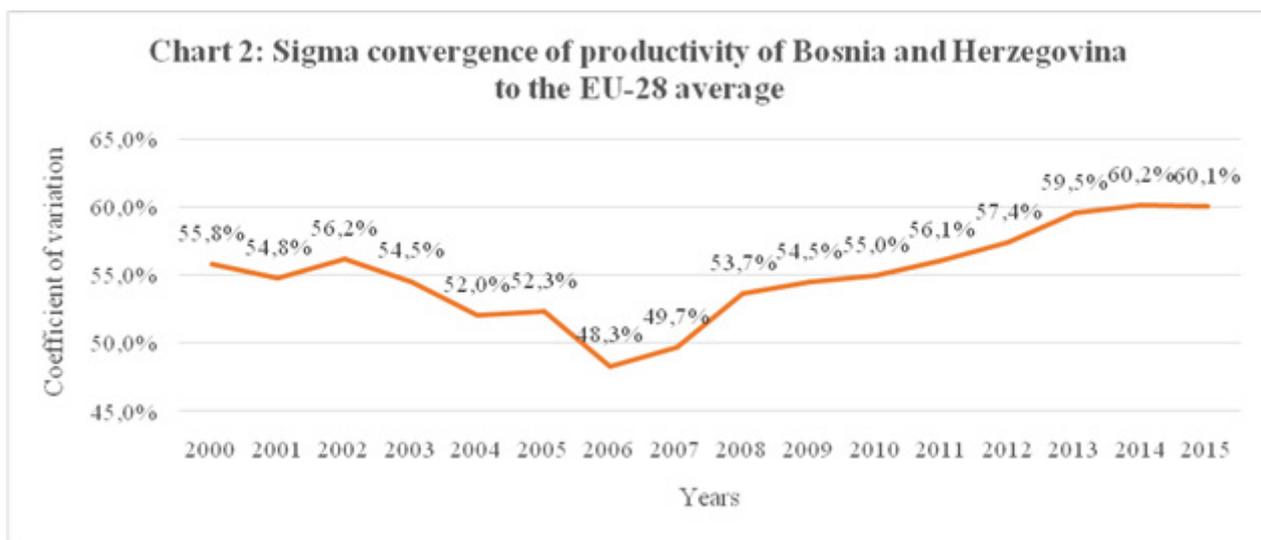
It should also be noted that the sigma convergence is an indicator of relative dispersion, and that, in the observed period, the GDP p.c. gap in absolute amount has increased from 20,550 EUR / c. (2000), to 22,600 EUR / c. (2015), which means a 10% growth in the absolute GDP gap, which means that there are divergent movements, that is, the increase in regional disproportions in per capita income. Similar economic trends in terms of real GDP p.c. also has Croatia, since from 2000 to 2015 there is a continuously positive trend of absolute GDP p.c. gap growth (in 2000 the absolute GDP p.c. gap amounted to 14,900 EUR / c. and in 2015 16,100 EUR / c).

³EU-28 in the observed period grew at an average rate of 0.9%, while Bosnia and Herzegovina at an average rate of 2.9%.

Thus, Croatia has not yet reached the level of 50% GDP p.c. EU-28, and records negative developments in this regard even after EU membership, which can be a lesson for Bosnia and Herzegovina, that membership alone does not mean a growth in the standard of living. When it comes to Bosnia and Herzegovina, due to the significant deviation of GDP p.c. from the EU-28 average, it is certain that GDP p.c. will grow and the coefficient of variation of per capita income will decrease, currently at 85.3%, but due to the limited availability of capital and the concentration of low-cumulative economic branches and the underde-

velopment of capital markets, income convergence will take a long time, and the question is whether it will ever completely happen.

A particularly significant issue of real convergence is the level of productivity, given that the level of productivity has a direct impact on the overall GDP level. Chart 2 shows the movement of the coefficient of variation, as the relative measure of dispersion, productivity of Bosnia and Herzegovina against the average productivity of the EU-28 for the period from 2000 to 2015.



Source: author's calculation; Data: <http://data.worldbank.org>; <https://data.oecd.org/> (accessed: 17.7.2017)

The movement of the coefficient of variation in productivity indicates the existence of sigma convergence of productivity in the period from 2000 to 2006, when the dispersion of productivity from 55.8% to 48.3% of the EU average had decreased. Since 2007 there have been divergent movements in productivity, so that from the initial 48.3% in 2006, the relative measure of productivity dispersion (coefficient of variation) was 60.1%, indicating the existence of sigma divergence. On the one hand, the increased level of GDP p.c., and, on the other hand, the decrease in productivity indicates that the level of GDP p.c. increased thanks to the increased employment rate, but that there are declining yields to the labor force. Also, the reason for the decrease in productivity can be the reduced inflow of Foreign Direct Investment, and the lower level of technical equipment in comparison with the EU - 28 averages. In addition, reduced productivity in relation to the EU-28 average is the result of a higher percentage share of low-cumulative activity in the GDP structure, which results in a decrease in the value of output per worker (for example, in the

GDP structure of Bosnia and Herzegovina the only high-cumulative activity that has significantly contributed to the creation of GDP is the processing industry with 11.64%, while wholesale and retail trade, repair of motor vehicles and motorcycles participated with 13.45%, followed by public administration and defense with 8.65%, agriculture, fishing and forestry with 6.23%). The analysis of the experience of Croatia after EU membership shows that, according to the World Bank, labor productivity fell from \$ 54,253.69 in 2013 to \$ 53,601.74 in 2014

In order to assess the real convergence and for the very process of the accession of Bosnia and Herzegovina to the European Union, it is important to analyze price level movement in relation to the EU-28 average, in order to assess the pressure of increasing prices by the act of joining the EU common market. Table 1 shows the average percentage deviation from the average of prices at EU-28 level of "new" EU member states (countries from the Enlargement of the EU, Romania, Bulgaria and Croatia), and Bosnia and Herzegovina.

Table 1 Coefficient of variation of prices in Bosnia and Herzegovina and new EU member states compared to the EU-28 average

Years	Bosnia and Herzegovina	Čzech Republic	Cyprus	Estonia	Hungary	Latvia	Lithuania
2005	50,0%	41,7%	11,6%	37,6%	37,5%	44,0%	46,8%
2006	48,3%	37,5%	10,6%	33,6%	39,9%	37,6%	43,7%
2007	47,9%	37,0%	13,4%	30,2%	33,6%	31,6%	41,3%
2008	44,5%	27,7%	11,4%	26,3%	31,5%	24,4%	35,7%
2009	43,9%	31,2%	8,3%	26,9%	37,2%	25,8%	34,7%
2010	45,0%	28,4%	6,7%	28,3%	36,6%	31,4%	36,9%
2011	45,2%	26,5%	5,5%	27,2%	38,1%	28,8%	35,9%
2012	46,7%	28,8%	6,2%	26,9%	39,4%	28,5%	36,6%
2013	47,1%	31,8%	6,7%	25,4%	40,6%	29,5%	37,1%
2014	47,6%	37,1%	8,8%	25,6%	42,3%	29,4%	37,6%
2015	49,2%	37,4%	12,3%	27,1%	43,2%	31,2%	39,6%

Continuation of the table 1.

Years	Malta	Poland	Slovakia	Slovenia	Bulgaria	Romania	Croatia
2005	28,0%	40,7%	46,0%	25,4%	59,2%	48,9%	29,5%
2006	25,1%	39,1%	42,5%	24,3%	56,2%	45,4%	29,1%
2007	25,5%	39,3%	36,7%	22,3%	54,2%	39,4%	29,5%
2008	22,6%	32,6%	30,8%	19,0%	49,9%	40,9%	26,8%
2009	20,4%	42,9%	27,5%	13,4%	47,0%	45,9%	26,1%
2010	22,0%	40,4%	30,6%	14,7%	48,0%	46,3%	26,6%
2011	20,8%	42,3%	30,0%	15,6%	48,9%	46,0%	28,5%
2012	21,2%	44,3%	30,4%	17,2%	49,9%	48,7%	31,2%
2013	18,6%	44,3%	31,4%	16,9%	50,6%	46,8%	31,9%
2014	19,2%	44,2%	32,2%	18,7%	52,0%	47,3%	34,0%
2015	19,8%	45,8%	33,8%	20,5%	53,1%	48,9%	35,1%

Source: Authors' calculations based on Eurostat data

The analysis of the coefficient of variation of prices of the "new members" in relation to the EU-28 average shows that in the years following the accession to the EU there was a decrease in the coefficient of variation of prices and that means that the sigma convergence of prices is present. This means that membership in the EU, in the event that the country has a lower price level than the EU average before membership, inevitably leads to an increase in prices or a reduction in the dispersion of prices, but that in years after membership there may also be divergent movements, as in the case of Poland and Hungary. In Croatia, after the membership, there was a decrease in the price level in relation to the EU-28 average, which is the result of a lower degree of trade integration with the EU com-

pared to other member states, and an increase in price levels can be expected with joining the monetary union, which is best seen on the example of Slovenia, whose coefficient of variation of prices at the beginning of the observed period in 2005 was 25.4%, and at the end of the period, 20.5%, despite the divergent trends since 2009. Given that the price level in Bosnia and Herzegovina is currently at about 50% of the EU-28 level, it is expected that, as a result of the activation of the Stabilization and Association Agreement of Bosnia and Herzegovina with the EU, and a higher degree of trade integration, prices will increase and the coefficient of variation will decrease, because of all the countries observed in the previous table, Bosnia and Herzegovina has the lowest price level.

Chart 3 shows the movement of the price level of Bosnia and Herzegovina in relation to the EU-28 average. The specified analysis shows that in the period from 2005-2009, sigma convergence of the price level of Bosnia and Herzegovina in relation to the EU-28 average was realized, but since 2009 there have been divergent trends, as is the case with Slovenia. Divergent price movements were mainly caused by a price drop

of petroleum products and food products, but also by a higher absolute growth of GDP p.c. EU - 28 in relation to countries where price drops are present. It is to be expected that the price level in Bosnia and Herzegovina will increase in the coming period, given the high degree of trade integration with the EU-28 (71.8% participation in Bosnia and Herzegovina exports, and 60.85% in Bosnia and Herzegovina imports)⁴.



Source: Authors' calculations based on Eurostat data

The lack of data in the Eurostat reports for a comparative overview of prices by activities of Bosnia and Herzegovina in relation to the price level by activities at the EU-28 level is a limitation of a more detailed analysis of the pressure on price increase for certain activities. It remains to be hoped that in the forthcoming period, Eurostat reports will also include price analysis by activities in Bosnia and Herzegovina, so that an assessment of the impact on price increase by product groups can be made after the integration of Bosnia and Herzegovina into the EU.

One of the criteria of real convergence is also the balance of the real exchange rate. Since Bosnia and Herzegovina has fixed its currency to the Euro, it means accepting the policy of the ECB, which ensures the balance of the real exchange rate KM \longleftrightarrow Euro.

CONCLUSION

In total, Bosnia and Herzegovina, by virtue of all the criteria of real convergence, except from the balance of the real exchange rate, is far from the real convergence to the average of economic parameters at the EU-28 level. There is a sigma convergence only in per capita income, but there is an increase in the absolute GDP p.c. gap, which means the absence of real convergence, due to the low rate of economic growth. Due to significant deviation of the GDP p.c. compared to the EU-28 average, it is certain that GDP p.c. will grow, and that the coefficient of variation of per capita income will reduce, currently at

85.3%, but due to the limited availability of capital and the concentration of low-cumulative economic branches and the underdevelopment of capital markets, income convergence will take a long time, and the question is whether it will ever fully accomplish. There is sigma divergence in the level of productivity, as well as divergent movements in the price level of Bosnia and Herzegovina in relation to the EU-28 average. It is imminent that as a consequence of the continuous increase in trade integration with the EU, prices will increase, which, in the absence of an increase in the rate of economic growth, could, primarily, negatively affect the standard of living in Bosnia and Herzegovina. Based on that, Bosnia and Herzegovina must make efforts to meet the criteria of nominal convergence, first of all, to establish a functioning market economy, but also to create an adequate business environment in order to improve its position in the competitiveness reports of international financial institutions, and thus, with a higher degree of political stability, directly influence the increase in both domestic and foreign direct investments, which through technology transfer would have a direct impact on the level of productivity of the labor force, and ultimately directly accelerating the real convergence of Bosnia and Herzegovina towards the EU.

⁴According to: http://www.mvteo.gov.ba/izvjestaji_publicacije/izvjestaji/default.aspx?id=7897&langTag=bs-BA (accessed 11.7.2017.)

It is especially important to emphasize that a systemic approach at the state level is needed to meet the economic criteria of convergence, which will result in concrete measures and activities, which will then be implemented vertically at lower levels of government. Otherwise, the problems of achieving political consensus on the European path of Bosnia and Herzegovina, ignoring the economic criteria of convergence, can result in negative effects of integration, which certainly should not be the aim of Bosnia and Herzegovina. It is also necessary to complete the transition of the business system in order to provide a functioning market economy and create the preconditions for the growth of the competitiveness of the economy of Bosnia and Herzegovina in the European environment.

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MULTI-CRITERIA PROGRAMMING METHODS AND PRODUCTION PLAN OPTIMIZATION PROBLEM SOLVING IN METAL INDUSTRY

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ABSTRACT

This paper presents the production plan optimization in the metal industry considered as a multi-criteria programming problem. We first provided the definition of the multi-criteria programming problem and classification of the multi-criteria programming methods. Then we applied two multi-criteria programming methods (the STEM method and the PROMETHEE method) in solving a problem of multi-criteria optimization production plan in a company from the metal industry. The obtained results indicate a high efficiency of the applied methods in solving the problem.

INTRODUCTION

Multi criteria programming is a complex process of determining non-dominated (efficient) solutions from a set of feasible solutions and determining the preferred solution from a set of non-dominated solutions. The basic stages of multi-criteria programming are:

1. Defining system goals and determining ways to achieve these goals
2. Mathematical description of the system and definition of the method of evaluation of the criteria functions
3. Application of existing multi criteria programming methods
4. Making a final decision
5. If the final solution is not accepted, retrieving new information and repeating the process from stage 2 by redefining the task (Opricović, 1986).

When solving problems with multi criteria functions, which are at the same time conflicting, decision maker wishes to achieve more than by using only one criterion in selecting of the course of action, satisfying the conditions dictated by the environment, processes, and resources (Perić, 2008).

The multi criteria programming is one of the most stud-

ied areas of operational research. Numerous methods of multi-criteria programming have been developed, however, we still have a small number of real-world applications of multi-criteria programming. The multi criteria programming is a process with active participation of the decision maker who should recognize the best solution or give some information of his preferences connected to criteria functions. Our goal is to show that we can apply multicriteria programming methods to solve the problems of production planning in the metal industry in a situation where the decision maker is unable to identify the best non-dominated solution and provide additional information about preferences of criteria functions.

This paper investigates the possibility and efficiency of application of two multi-criteria programming methods (STEM and PROMETHEE) in order to optimize the production plan in a firm from metal industry: the STEM method is used to form the set of non-dominated solutions, while the PROMETHEE method is used to choose the preferred solution from the set of non-dominated solutions.

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The rest of the paper is organized as follows. In the section 2 the methodology of multi criteria programming used in the section 3 is presented. In section 3 an application of the two multi criteria programming methods is given. At the end the conclusion and references are given.

METHODOLOGY OF MULTI-CRITERIA PROGRAMMING

Solving the problem of maximizing/minimizing multiple criteria functions on a set of feasible solutions requires the formation of a multi-criteria programming model.

Multicriteria programming model defines a programming model with two or more criteria functions on a set of feasible solutions. The mathematical form of this model can be presented in the following way:

$$\max_{\mathbf{x} \in S} \mathbf{f}(\mathbf{x}) = (f_1(\mathbf{x}), f_2(\mathbf{x}), \dots, f_K(\mathbf{x}))^T \quad (K \geq 2) \quad (1)$$

where

$S = \{\mathbf{x} : \mathbf{g}(\mathbf{x}) = (g_1(\mathbf{x}), g_2(\mathbf{x}), \dots, g_m(\mathbf{x}))^T \leq \mathbf{o}\}$, $\mathbf{x} = (x_1, x_2, \dots, x_n)^T$, and \mathbf{o} is a m -dimensional null-vector.

From the relation (1) we can see that in the multi criteria programming model there exist a set of K criteria functions which should be maximized (if we have the functions that need to be minimized in the model, it is enough to multiply these functions by -1), m constraints and n variables. If the multi criteria model contains only linear functions $\mathbf{f}(\mathbf{x})$ and $\mathbf{g}(\mathbf{x})$ than we have multi criteria linear programming model. However, if some of these functions are non-linear, it is a non-linear multi criteria programming model (Perić, 2008).

The decision maker has a key role in solving the multi criteria programming problems. Solving a multi criteria programming problem requires the cooperation of the decision maker and an analyst. The analyst is a person or a computer program responsible for the mathematical aspect of the solution process. "The analyst generates information for the decision maker to consider and the solution is selected according to the preferences of the decision maker" (Miettinen, 1998).

The main multi criteria programming terms

In the literature dealing with multi criteria programming we encounter the following terms:

Definition 1: The feasible set S

The feasible set S is the set of \mathbf{x} vectors, $\mathbf{x} \in \mathbf{R}^n$,

which satisfy the constraints $\mathbf{g}(\mathbf{x}) \leq \mathbf{o}$

$\mathbf{g} \in \mathbf{R}^m$, i.e. $S = \{\mathbf{x} : \mathbf{g}(\mathbf{x}) \leq \mathbf{o}\}$.

Definition 2: The criteria set F

Each element of S is associated with the vector $\mathbf{f}(\mathbf{x})$, meaning that it is possible to map S , $S \subset \mathbf{R}^n$, to F , $F \subset \mathbf{R}^K$, in the criterion function space. F is a criteria set that can be defined as $F = \{\mathbf{f}(\mathbf{x}) : \mathbf{x} \in S\}$.

Definition 3: Optimal (marginal) solution

Optimal (marginal) solution represents the maximum of each component of the vector $\mathbf{f}(\mathbf{x})$ on a set of feasible solutions S , i.e.

$$\max_{\mathbf{x} \in S} f_k(\mathbf{x}) = f_k(\mathbf{x}^{k*}) = f_k^*$$

Definition 4. The perfect solution

The perfect solution of the multi criteria programming model is one that simultaneously gives the maximal value of each criteria function on the given set S . So \mathbf{x}^* is the perfect solution of the given model if and only if $\mathbf{x}^* \in S$ and $\mathbf{f}(\mathbf{x}^*) \geq \mathbf{f}(\mathbf{x})$ for each $\mathbf{x} \in S$. Since it is in the nature of the multi criteria programming models that have conflicting goals, they generally do not have the perfect solution, respectively it is unfeasible.

Definition 5. The ideal value of the vector function $\mathbf{f}(\mathbf{x})$ (ideal)

The vector $\mathbf{f}^*(\mathbf{x}) = (f_1^*(\mathbf{x}), f_2^*(\mathbf{x}), \dots, f_K^*(\mathbf{x}))$ whose k^{th} component is the extreme value of the function $f_k(\mathbf{x})$, $k = 1, \dots, K$, at the set S , is called the ideal value of the vector function $\mathbf{f}(\mathbf{x})$.

Definition 6. Non-dominated and weakly non-dominated solution

$\mathbf{f}^* \in F$ is non-dominated if and only if does not exist another $\mathbf{f} \in F$ such that $\mathbf{f} \geq \mathbf{f}^*$ and $\mathbf{f} \neq \mathbf{f}^*$ (i.e. $f_k \geq f_k^*$ for all $k = 1, \dots, K$ and $f_k \neq f_k^*$ for some k).

$\mathbf{f}^* \in F$ is weakly non-dominated if and only if does not exist another $\mathbf{f} \in F$ such that $\mathbf{f} > \mathbf{f}^*$ (i.e. $f_k > f_k^*$, $k = 1, \dots, K$).

Definition 7. Efficient and weakly efficient solution

$\mathbf{x}^* \in S$ is efficient if and only if there does not exist another $\mathbf{x} \in S$ such that $\mathbf{f}(\mathbf{x}) \geq \mathbf{f}(\mathbf{x}^*)$ and $\mathbf{f}(\mathbf{x}) \neq \mathbf{f}(\mathbf{x}^*)$.

$\mathbf{x}^* \in S$ is weakly efficient if and only if there does not exist another $\mathbf{x} \in S$ such that $\mathbf{f}(\mathbf{x}) > \mathbf{f}(\mathbf{x}^*)$.

Definition 8. Preferred solution

The preferred solution is a non-dominated solution chosen by the decision maker, by using of some other criteria, as final.

As such, it lies in an acceptable area for the value of all the criteria functions of the given model. The preferred solution is known as the ‘best compromise solution’ (Perić, 2008).

Multi-criteria programming methods

To solve multi criteria programming models there are many different methods. The most of the existing methods involve active participation of the decision maker in the solving process. The obtained preferred solution depends on the information received from the decision maker. There are many classifications of multi criteria programming methods in the literature. The most important review of methods and their classifications are given in: Hwang and Masud (1979), Zionts (1980), Chankong and Himes (1983), Steuer (1985), Lai and Hwang (1996), Perić (2008).

All known classifications are essentially different because they are based on a different set of methods and different classification criteria.

According to the nature of variables in the system to be optimized all multi criteria programming methods can be divided into deterministic and stochastic ones. According to the quality of elementary activities, all multi criteria programming methods can be classified as methods with continuous variables and as those with discrete variables, and according to the criterion of linearity of criteria functions and constraints on linear and nonlinear multi-criteria programming methods (Perić, 2008).

According to the number of possible solutions, we can divide the deterministic multi criteria programming methods into: (1) methods for determining one or more non-dominated solutions and (2) methods for selecting a preferred solution from the final set of non-dominated solutions.

According to the criterion of the existence and character of the preferences of the decision-maker, we can classify the deterministic multi criteria programming methods with continuous variables for determining one or more non-dominated solutions into four groups:

1. Methods where there is no clearly expressed preference of the decision maker
2. Methods where there is a clearly expressed preference of the decision-maker
3. Interactive methods
4. Methods with *a posteriori* expressed preference of the decision maker (Perić, 2008).

Particularly interesting are interactive methods that

we can combine with methods for selecting a preferred solution from a set of non-dominated solutions. Here, we will present the STEM method as an interactive method of forming a set of non-dominated solutions and PROMETHEE method as a method for selecting a preferred solution from a set of non-dominated solutions.

The STEM Method

The STEM method was proposed by Benayoun, de Montgolfier, Tergny, and Larichev (1971). It is an interactive method intended to solve multi-criteria linear programming models.

In the STEM method each iteration (cycle) contains two phases: (1) calculation phase and (2) decision phase. In the calculation phase in the cycle p we should find a feasible solution which is the “closest” to the ideal solution f_k^* ($k = 1, 2, \dots, K$) by solving the following linear programming model:

$$\min_{(x, \lambda) \in S_p} \lambda, \quad (2)$$

where

$$S_p = \{(x, \lambda) \in \mathbf{R}^{n+1} : x \in S; \lambda \geq |f_k^* - f_k(x)| \cdot \pi_k, \lambda \geq 0, k = 1, 2, \dots, K\}$$

$$\pi_k = \alpha_k / \sum_{k=1}^K \alpha_k, \quad \alpha_k = \frac{f_k^* - f_k^{\min}}{f_k^*} \left[1 / \sqrt{\sum_{j=1}^n (c_{kj})^2} \right], \quad \text{if } f_k^* > 0$$

$$\alpha_k = \frac{f_k^{\min} - f_k^*}{f_k^{\min}} \left[1 / \sqrt{\sum_{j=1}^n (c_{kj})^2} \right], \quad \text{if } f_k^* < 0.$$

The obtained compromise solution x_p in the *decision phase* is presented to the DM who compare their criteria function f_k with the ideal criteria function value f_k^* . If some of the criteria functions are satisfied, the decision maker must reduce the level of the satisfied criteria function in the amount to allow improving of the unsatisfactory criteria functions in the next step of the method. The decision maker gives Δz_k as the amount of the acceptable alleviation.

For the next iterative cycle the feasible set is modified to

$$S_{p+1} = \{(x, \lambda) \in S_p; f_k(x) \geq f_k(x^p) - \Delta f_k; f_i(x) \geq f_i(x^p), k \neq i; k, i = 1, \dots, K\}.$$

$\pi_k = 0$ is determined and then starts the calculation phase of the cycle $p + 1$. In the calculation phase the analyst can solve several linear programming problems with the feasible S_p taking Δf_k inputs so that $0 < \Delta f_k^1 < \Delta f_k^2 < \dots < \Delta f_k^c$. A large number of efficient solutions can be obtained in this way.

The set of efficient solutions is presented to the DMs, out of which they can choose the preferred one (Hwang and Masud (1979)).

PROMETHEE Method

The PROMETHEE method (Preference Ranking Method for Enrichment Evaluations) was developed by Brans and Vincke (1984). This method is intended to rank the solutions within the final set of non-dominated solutions (alternatives) (Perić, 2008).

The algorithm of the PROMETHEE method consists of three segments:

The first segment:

Creating the preference of the decision-maker, whereby for each criterion, six possible inclusions based on the intensity of preference are observed. The inclusion of the criteria is based on introducing the preference function, which represents the decision-maker's preference for the solution (alternative) x^1 in relation to the solution (alternative) x^2 . The preference func-

tion is defined for each criteria function separately, and its value ranges from 0 to 1. As this value is closer to 1, the preference of the decision-maker is greater, and the lesser the value of this function, the greater the indifference it has.

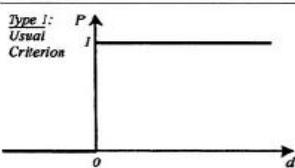
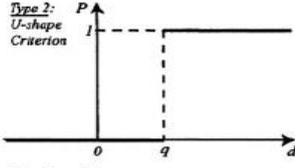
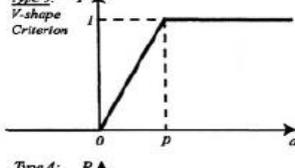
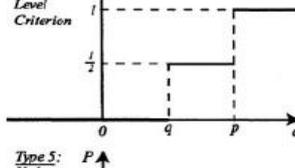
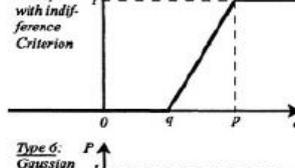
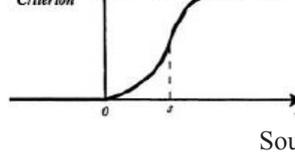
Let $f(\cdot)$ denote a criteria function, and x^1 and x^2 are two solutions from the set S . The associated preference function $P(x^1, x^2)$ of x^1 in relation to x^2 is defined as:

$$P(x^1, x^2) = \begin{cases} 0 & \text{if } f(x^1) \leq f(x^2) \\ P(f(x^1), f(x^2)) = P(f(x^1) - f(x^2)) & \text{if } f(x^1) > f(x^2). \end{cases}$$

Studies have shown that six types of functions, presented in Table 1, cover the most practical cases for which the maximum of two parameters have to be defined by the decision maker, which is simply since each parameter has a real economic significance. In order to have a better overview of the indifference area, we can observe the function $H(d)$, ($d = f(x^1) - f(x^2)$) that is directly related to the preference function P as follows:

$$H(d) = \begin{cases} P(x^1, x^2) & d \geq 0 \\ P(x^2, x^1) & d \leq 0. \end{cases}$$

Table 1 Types of generalised criteria ($P(d)$: Preference function)

Generalised criterion	Definition	Parameters to fix
 <p>Type 1: Usual Criterion</p>	$P(d) = \begin{cases} 0 & d \leq 0 \\ 1 & d > 0 \end{cases}$	-
 <p>Type 2: U-shape Criterion</p>	$P(d) = \begin{cases} 0 & d \leq q \\ 1 & d > q \end{cases}$	q
 <p>Type 3: V-shape Criterion</p>	$P(d) = \begin{cases} 0 & d \leq 0 \\ \frac{d}{p} & 0 \leq d \leq p \\ 1 & d > p \end{cases}$	p
 <p>Type 4: Level Criterion</p>	$P(d) = \begin{cases} 0 & d \leq q \\ \frac{1}{2} & q < d \leq p \\ 1 & d > p \end{cases}$	p, q
 <p>Type 5: V-shape with Indif- ference Criterion</p>	$P(d) = \begin{cases} 0 & d \leq q \\ \frac{d-q}{p-q} & q < d \leq p \\ 1 & d > p \end{cases}$	p, q
 <p>Type 6: Gaussian Criterion</p>	$P(d) = \begin{cases} 0 & d \leq 0 \\ 1 - e^{-\frac{d^2}{2s^2}} & d > 0 \end{cases}$	s

Source: Brans and Mareschal (2005)

Multi-criteria programming model solving

We first solved the model as a linear integer programming problem, by using Excel Solver software to

maximize each of the criteria functions individually on a given set of feasible solutions.

The following solutions are obtained:

Tabele 2 Optimal (marginal) solutions

Solution	Variable values	Ceiteria function values	
		f_1	f_2
\mathbf{x}^1	$x_1=3074, x_2= 2120, x_3= 106, x_4= 288$ $x_5= 36, x_6= 396, x_7= 59$	6079	8660865
\mathbf{x}^2	$x_1= 2291, x_2= 1580, x_3= 79, x_4= 784$ $x_5= 98, x_6= 1078, x_7= 100$	6010	10108543

Source: Mandić (2016)

Table 1 shows that by maximizing the function f_1 , the maximum value obtained for this function differs significantly from the value obtained when the function f_2 is maximized. Even greater difference in the criteria function values exists when the other criteria function f_2 is maximized. This results indicate a lack of linear integer programming application in the optimization of the production program, as well as the necessity to apply a multi criteria programming method. By solving the presented model with the multi criteria programming methods, a compromise solution will be

obtained that will give the acceptable values of the criteria functions for the decision maker.

Solving the model by STEM method

According the algorithm presented in the section 2.2., first we solved the following model

$$\min_{(\mathbf{x}, \lambda) \in S_1} \lambda \tag{12}$$

using the calculated

$$\alpha_1 = 0.00429, \alpha_2 = 0.0000207248, \pi_1 = 0.995 \text{ and } \pi_2 = 0.005, \text{ where}$$

$$S_1 = \{(\mathbf{x}, \lambda) \in \mathbf{R}^{n+1} : \mathbf{x} \in S; \lambda \geq |6079 - f_1(\mathbf{x})| \cdot 0.995; \lambda \geq |10108543 - f_2(\mathbf{x})| \cdot 0.005; \lambda \geq 0\}$$

The following solution has been obtained: $f_1 = 6010, f_2 = 10108543$.

In the second step of the STEM method we used the following inputs: $\pi_1 = 1, \pi_2 = 0$

The DM was not satisfied with the obtained value for the criteria function f_1 .

$$\Delta f_2^c = \left\{ \begin{matrix} 208543; 308543; 408543; 508543; 608543; 708543; 808543; \\ 908543; 1008543; 1108543; 1288543; c = 1, \dots, 11 \end{matrix} \right\} \dots \text{Therefore the following}$$

models are solved:

$$\min_{(\mathbf{x}, \lambda) \in S_2^c} \lambda, \tag{4}$$

where

$$S_2^c = \{(\mathbf{x}, \lambda) \in \mathbf{R}^{n+1} : \mathbf{x} \in S; \lambda \geq 6079 - f_1(\mathbf{x}); f_2(\mathbf{x}) \geq 10108543 - \Delta f_2^c; f_1(\mathbf{x}) \geq 6010; \lambda \geq 0\}.$$

The obtained results are presented in Table 3.

Table 3 Results after step 2 of the STEM method

Solution	Δf_2^c	nd f_1	nd f_2
I	208543	6019	9957800
II	308543	6027	9802716
III	408543	6030	9702164
IV	508543	6035	9647632
V	608543	6040	9555762
VI	708543	6049	9405019
VII	808543	6050	9333123
VIII	908543	6056	9245594
IX	1008543	6060	9110484
X	1108543	6070	9002981
XI	1208543	6072	8935426

Source: Authors' calculations

From the set of non-dominated solutions presented in Table 2, the decision maker should choose the preferred solution. However, if the decision maker is not sure about which solution is the best for him, he can give some information to the analyst who will apply the PROMETHEE method and help the decision maker to choose the preferred solution.

Solving the model by PROMETHEE method

Table 3 presents the set of 11 non-dominated solutions. To help the decision maker to choose the best (preferring) solution from the given set we used the Decision Lab Software. The decision maker chose type 6 of criteria for both criteria functions with $s = 3$ and the weight coefficient $w_1 = w_2 = 1$.

The obtained results are given in the figure 1.

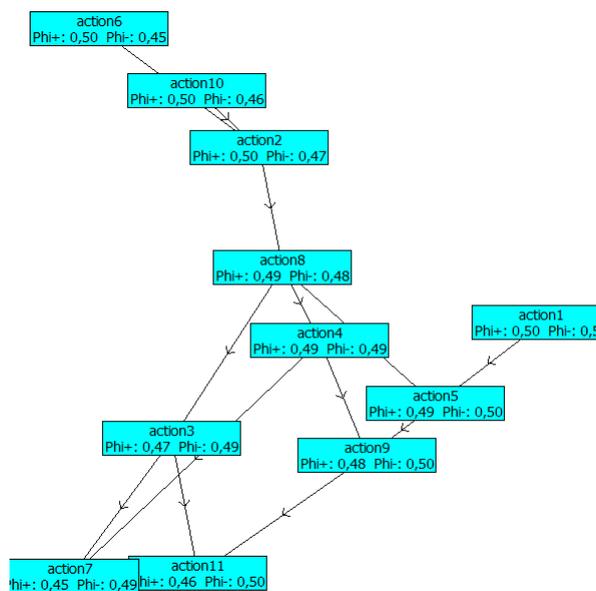


Figure 1. PROMETHEE network

From the Figure 1 we can see that the solution (action) x^6 has the biggest net flow (0.03) and the solutions x^{10} , x^2 and x^8 have positive net flow. Therefore, the action 6 is the best for the decision maker.

The Decision Labsoftware allows us to analyze the sensitivity of the solutions obtained by changing the parameter s , changing the function type and their parameters q and p for the criteria functions and changing the coefficients w_1 and w_2 . We conducted the analysis with regard to the value of the coefficients w_1 and w_2 , and we concluded that regardless of the change in coefficient values w_1 and w_2 , the solution x_6 always has rank 1.

CONCLUSIONS

The application of STEM and PROMETHEE methods in solving the problem of optimization of the production plan in the metal industry indicates the possibility of their efficient application. We applied the STEM method to create a set of non-dominated solutions, while we used the PROMETHEE method to select a preferred solution from a set of non-dominated solutions. The STEM method allows creating a large number of non-dominated solutions without the active participation of the decision maker. The PROMETHEE method allows the choice of the best (preferred) solution from a set of non-dominated solutions, whereby the decision maker is required to determine the type of criteria that would match the particular criteria function and the parameters of indifference and preference if the decision maker can determine it.

The PROMETHEE method allows the analysis of the sensitivity of the rank of the obtained solutions in relation to the changes in the weights of the criteria functions. In addition, the method analyzes sensitivity of the changes of the function types related to the particular criteria function and the change of parameters of indifference and preference, which significantly

helps the decision maker when choosing the preferred solution.

Based on the presented research we can conclude that the application of the STEM and PROMETHEE methods has a high application efficiency of the production plan optimization of the company from the metal industry.

The investigation of application efficiency of multi-criteria programming methods in solving complex multi-criteria programming models with a big number of variables and constraints, we propose for the future research.

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A LOOK INSIDE COOPERATION BETWEEN PROSECUTORS AND LAW ENFORCEMENT DURING CRIME SCENE INVESTIGATION

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ABSTRACT

The paper deals with crime scene investigation as a measure of inquiry, conceptually and substantially, subjects of investigation, as well as their mutual relations. The analysis of the existing legal framework suggests that the current Criminal Procedure Code of Bosnia and Herzegovina offers the appropriate basis for the cooperation between prosecutors and law enforcement. However, previous practice indicates certain shortcomings in the cooperation and coordination between prosecutors and law enforcement. With this paper, the authors wanted to examine the opinions of direct actors on this matter. The results show that they are satisfied with the legal regulation of their mutual relations during investigations, and they express positive opinions in terms of their cooperation. Of course, the possibility of improving that cooperation is also noted, and the methods of achieving it should be identified in further research.²

Key words: *Dubrovnik, Renaissance, Marin Držić, identity, new historicism, subversive literature, self-fashioning*

INTRODUCTION

Conceptual and substantive definition of crime scene investigation

Theoretically, there is not a unique definition of crime scene investigation. It is not surprising if we take into consideration the fact that it is a composite

investigation with complex law-enforcement matter (Petrović, 2006, p. 115). However, “they can be divided into those which from the law enforcement and criminal-procedural aspect define the term ‘crime scene investigation’” (Milidragović, 2008, p.72).

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During the preparation of the paper, a great number of definitions from various regional experts in this field were consulted including: Vodinelić³, Vasiljević⁴, Bayer⁵, Modly, Šuperina and Korajlić⁶, Aleksić and Škulić⁷, Pavišić, Modly and Veić⁸, Sijerčić-Čolić⁹ and Bubalović and Pivić¹⁰. Analyzing their interpretations related to the term 'crime scene investigation', from both criminal-procedural and law enforcement aspect, crime scene investigation can be defined as the evidence-gathering process which is used by crime scene investigators, together with appropriate law enforcement and criminal-procedural matters and their own observations, to scientifically process and document facts that are important for criminal proceedings¹¹, i.e. it can be stated that crime scene investigation is the evidence-collecting process which consists of direct observations of changes on-site at a crime¹² scene inspected by law enforcement.

³Vodinelić, V. (1977), *Revidirani pojam uviđaja – uvjet uspješne forenzične djelatnosti*, *Jugoslavenska revija za kriminologiju i krivično pravo*, 3, p. 82.

⁴Vasiljević T. (1981), *Sistem krivičnog procesnog prava SFRJ*, treće izmjenjeno i dopunjeno izdanje, Beograd, p. 341.

⁵Bayer V., (1987), *Zakon o krivično postupku Jugoslavije, sa komentarom i sudskom praksom*, Zagreb, p. 50.

⁶Modly D., Šuperina M. and Korajlić N., (2007), *Rječnik kriminalistike*, Strukovna udruga kriminalista, Zagreb, p. 494.

⁷Aleksić Ž. and Škulić M. (2011), *Kriminalistika* (osmo izdanje), Pravni fakultet Univerziteta u Beogradu, Beograd, p. 38

⁸Pavišić B., Modly D. and Veić P. (2006), *Kriminalistika* (knjiga prva), Golden marketing – Tehnička knjiga, Zagreb, p. 439

⁹Sijerčić-Čolić H. (2012), *Krivično procesno pravo* (Knjiga I – Krivičnoprocesni subjekti i krivičnoprocesne radnje) – treće izmjenjeno i dopunjeno izdanje, Pravni fakultet Univerziteta u Sarajevu, Sarajevo, p. 413 and Sijerčić-Čolić H., et al. (2005), *Komentari krivičnih/kaznenih procesnih zakona*, VE, Sarajevo, pp. 273-275

¹⁰Bubalović T. and Pivić N. (2016), *Krivično procesno pravo – Opći dio*, Pravni fakultet univerziteta u Zenici, Zenica, p. 281

¹¹Žarković M., Bjelović I., Kesić T., (2012), *Kriminalističko postupanje na mestu događaja i kredibilitet naučnih dokaza*, Beograd, p. 63.

¹²Crime scene investigation, as an evidence-gathering activity, is not limited to in-situ at a crime scene, and it can be conducted at any other place where with direct observation the investigator can establish facts which are being determined in the investigation. Regarding the places of crime scene investigation, they can be indoors or outdoors depending on a criminal proceeding for which crime scene investigation is conducted. In the case of investigations of indoor crime scene (for example: an apartment), it must be taken into consideration that this evidentiary activity is different from a search of an apartment, because their objectives differ (see more in: Sijerčić-Čolić H., et al. (2005), op.cit., p. 273).

Furthermore, it can be said that crime scene investigation is a system of law enforcement's intellectual, practical and instrumental activities under the Criminal Procedure Code which are, together with criminalistics-technical and tactical methods and means, used to find, preserve from destruction and secure law enforcement and legally-relevant material information (related to objects or traces of crime) for the purpose of potential criminal proceedings.

Also, from their definition of the term 'crime scene investigation', its elements can be determined:

- Crime scene investigation is a system of criminalistics-tactical and technical activities which are conducted in situ at a crime scene under the Criminal Procedure Code and principles of criminalistics,
- Direct sensory observation is achieved on-site at a crime scene by crime scene investigation,
- Finding and analyzing material objects and traces, as well as interpreting criminal activity are accomplished through intellectual activities using planning and verifying criminalistic versions and mental reconstruction of a crime, and
- The entire situation is secured on-site by crime scene investigation.

Therefore, it is wrong to investigate a crime scene only in specific cases depending on the type and gravity of criminal activity. A crime scene needs to be investigated whenever there is any possibility that such practise will enable finding material changes caused by a criminal activity (Žarković et al. 2012, p. 45), i.e. the purpose of crime scene investigation is not only to collect the material for the decision whether to charge or not, but also, in case of pressing charges and presenting the matter at the main hearing, to facilitate the main hearing by the collected evidence which will eliminate unnecessary and useless material from the main hearing¹³.

Subjects participating in crime scene investigation and their cooperation

Crime scene investigation as an evidentiary activity in a criminal proceeding can be conducted at various stages of a criminal proceeding, and taking that into account, different subjects of a criminal proceeding can participate in an investigation.

¹³See more in: Simović M., (2009), *Krivičnoprocesno pravo*, III izmijenjeno i dopunjeno izdanje, Fakultet za bezbjednost i zaštitu Banja Luka, Banja Luka, p. 316.

Taking into consideration the fact that it is mostly conducted as a pre-investigation and investigation action, the most frequent among them are prosecutors and law enforcement.

Status issues of these bodies in Bosnia and Herzegovina are regulated by specific law on the Prosecutor's Office at the entity and national level, i.e. law on internal affairs at the entity, national and cantonal level. The relationship and cooperation between prosecutors and law enforcement during a criminal proceeding is regulated by a number of provisions contained in Criminal Procedure Code of Bosnia and Herzegovina¹⁴ and Instruction on the procedure and cooperation between law enforcement and prosecutors in conducting evidentiary activities during the investigation (hereinafter: Instruction)¹⁵.

In fact, by the analysis of the existing legislative framework, it can be concluded that the applicable laws on Criminal Procedure Code in Bosnia and Herzegovina offer the basis for the cooperation between prosecutors and law enforcement. However, previous practice indicates certain shortcomings in the cooperation and coordination between prosecutors and law enforcement.

In term of legal regulation, this cooperation is evident in the duty of law enforcement to take the necessary measures if they suspect a criminal offence was committed punishable by a term of imprisonment of at least five years or in case of the postponement risk, in order to find the offender, prevent escape of the suspect or accomplice, discover and secure traces of a criminal activity and objects that can serve as evidence and collect all the information that can be useful in a criminal proceeding.¹⁶ Law enforcement shall immediately inform the prosecutor on the undertaken action and submit the gathered items that may serve as evidence.¹⁷

¹⁴Criminal Procedure Code of Bosnia and Herzegovina ("Official Gazette" of Bosnia and Herzegovina nos. 3/03, 32/03, 36/03, 26/04, 63/04, 13/05, 48/05, 46/06, 76/06, 29/07, 32/07, 53/07, 76/07, 15/08, 58/08, 12/09, 16/09, 93/09, 72/13), Articles 35, 218 and analogous provisions of Criminal Procedure Code of the Entities and the District of Brčko.

¹⁵Adopted by SIPA Director and the Prosecutor General of Bosnia and Herzegovina 12 October 2005 number: 1441/05, Sarajevo.

¹⁶Criminal Procedure Code of Bosnia and Herzegovina, Article 21, and analogous law articles of the Entities and the District of Brčko.

¹⁷loc. cit and Instruction on procedure and cooperation of law enforcement (police officers) and the prosecutor in conducting evidentiary activities during the investigation, Article 2

The material condition for the mentioned measures by law enforcement is the postponement risk, i.e. the necessity for immediate-urgent action. These are the actions that are by nature unique (as in case of crime scene investigation), but it is necessary to objectively and restrictively interpret the existence of urgency, given that these are exceptions established for the purpose of a proceeding and should not become the rule (Kulić, 2008, pp. 373-401).

Based on the previously mentioned, it can be concluded that from the moment the prosecutor is informed, further activities of law enforcement shall be under the supervision of the prosecutor.¹⁸ On the other hand, until the moment they inform the prosecutor about a criminal offence, the action of law enforcement is their own responsibility as well as the responsibility of the departments under which they operate (Kulić, 2008, p. 386).

The prosecutor's supervision over the work of law enforcement is reflected in the following:

- a) The prosecutor provides professional support and interpretation of the criminal justice regulations, including the substantive and procedural criminal law, and takes into account the application and protection of human rights of citizens during actions conducted by law enforcement, then
- b) The prosecutor issues the necessary orders and instructions related to the legal collection of information and evidence to law enforcement during the investigation so that it would be legally valid before the Court, and
- c) During the investigation, the prosecutor participates in the necessary actions and other procedures related to the involvement of law enforcement.¹⁹

The mentioned implies that the relationship between the prosecutor and law enforcement is hierarchical, where the prosecutor is a hierarchical superior that directs the crime scene investigation, whereas law enforcement comply with his orders. That relationship may imply law enforcement's direct action management (direct management of crime scene investigation).

¹⁸Instruction on procedure and cooperation of law enforcement (police officers) and the prosecutor in conducting evidentiary activities during the investigation, Articles 3 and 4

¹⁹V. Jurčević M. and Huremagić R., (2003), "*Uloga tužitelja u istrazi sa posebnim osvrtom na nadzor tužitelja na radom ovlaštenih službenih osoba*", Stručni rad, pp. 227-236, http://www.tuzilastvobih.gov.ba/files/docs/uloga_tuzitelja_u_istrazi.pdf (accessed on 5 April 2014).

However, in practice, the most frequent one is the prosecutor's supervision over the work of law enforcement, as a more compromising and passive approach which, on the one hand, ensures relative independence (and creativity) in work of law enforcement, while, on the other hand, enables the prosecutor to focus on other activities and at the same time supervise the actions and results of law enforcement. In practical sense, both prosecutors and law enforcement express the shortcomings in their joint actions during crime scene investigation. In informal conversations with prosecutors²⁰, with regard to their cooperation, they note:

- Law enforcement issue requests for conducting certain actions without prior consultations with the prosecutor,
- They suggest conducting actions for which they are not materially-equipped and do not have the required staff,
- Due to insufficient education of the prosecutor as well as law enforcement, there are concerns that law enforcement might encourage to criminal activities, without the agreement on how to avoid those situations,
- The insufficient number of law enforcement educated for conducting crime scene investigations, and deficiency in material-technical resources,
- Law enforcement make certain errors in record-keeping (minutes, issuing certificates, taking statements and collecting evidence, etc.),
- Submitting reports on the activities that are not crime offences to the Prosecutor's Office, which weighs heavily on the work of the Prosecutor's Office.

Law enforcement²¹ are also not completely satisfied with the relationship of the Prosecutor's Office to them, and note the following:

- A lack of active communication between the prosecutor and law enforcement
- Issuing generalized instructions for acting, without going into details,
- Institutional conflicts and a lack of understanding,
- No teamwork,
- Insufficient commitment in planning crime scene investigation by the prosecutor,

- Avoiding the submission of certain orders in written form,
- They are not available to law enforcement when they need specific instructions (stand-by duties).

In the absence of research in this area, especially the quantitative one, and with the intention of learning their opinions on the legal regulation and cooperation during crime scene investigation, it has been decided to conduct an empirical research.

The main hypothesis of this paper has been postulated for the purpose of achieving this objective which reads as follows: *Adequately and completely legally regulated procedural action of crime scene investigation in the criminal-procedural legislation of Bosnia and Herzegovina leads to successful cooperation between law enforcement and the prosecutor, and in that way contributes to providing high-quality as well as sufficient evidence for a successful conduction of criminal proceedings.*

The supporting hypotheses have been proposed, too:

H1: *Cooperation between prosecutors and law enforcement needs to be legally regulated,*

H2: *Cooperation between prosecutors and law enforcement is not at the level that might contribute to more efficient and quality conduction of crime scene investigation.*

METHODS

Respondent sample

The sample consisted of 45 respondents, divided into two subsamples for the purpose of the research. The first deliberately chosen subsample of respondents included prosecutors (n=15) employed in the Cantonal Prosecutor's Office of Canton Tuzla. The other subsample of respondents included law enforcement (n=30), chosen by the method of random selection, who work in Police Administration of Canton Tuzla. Different law enforcement categories participated: police officers, inspectors, and investigators. The sample included respondents of both gender, different professional qualifications in the case of law enforcement as well as different work experience in conducting crime scene investigations.

²⁰Interviews with the prosecutors employed in the Cantonal Prosecutor's Office of Canton Tuzla were done in January and February of 2015 at the Municipal Court in Gračanica.

²¹ Interviews with law enforcement employed in Police Administration Gračanica, Police Station Gračanica were done between May and July 2015 at the Municipal Court in Gračanica, and one part of interviews was done in April 2016.

Measuring instruments and procedure of conducting research

The research was conducted using the modified measuring instrument – Questionnaire on procedure and cooperation of the prosecutor and law enforcement in conducting crime scene investigation²², which is used for the evaluation of the quality and method of conducting crime scene investigation and the cooperation between the prosecutor and law enforcement. The questionnaire consists of two parts. The first part contains modal independent variables, which cover the data about the sample (institution, i.e. workplace, position in the service, duration of work experience in conducting crime scene investigations and gender). The other part of the questionnaire contains dependent variables which were used to learn the opinions of prosecutors and law enforcement in Tuzla Canton. They are divided to examine the opinions of prosecutors and law enforcement according to the research objectives which are: “*Legal regulation and conduction of crime scene investigation*” (LEGAL REGULATION) and “*Obstacles in the cooperation between the prosecutor and law enforcement in conducting crime scene investigation*” (COOPERATION).

The dependent variables were analyzed using estimation scales with a number of statements for which the respondents had to choose one acceptable answer. The answers were distributed using the Likert-type scale, which consisted of five categories.

The research commenced at the beginning of 2014 and ended in 2016. The central part of the research – the collection of data by surveying the respondents, ended at the beginning of 2016. Surveying prosecutors and law enforcement was conducted in a way that they were distributed the questionnaires with instructions and filled them by themselves. The survey was anonymous so that the results could be more objective.

²²The measuring instrument is the result of the modification of measuring instruments *Questionnaire on procedure and cooperation of law enforcement and the prosecutor in detecting criminal offences and criminal offender and conducting evidentiary activities* and *Questionnaire on procedure and cooperation of the prosecutor and law enforcement in detecting criminal offences and criminal offender and conducting evidentiary activities*, see more in: Sijerčić-Čolić H. and Mahmutović Dž., (2014), *Prepreke za otkrivanje i dokazivanje krivičnih djela i efikasno odvijanje istrage – Rezultati empirijskog istraživanja u Bosni i Hercegovini*, Pravo i pravda, godine XIII, no. 1, Sarajevo, pp. 243-264

Data processing methods

The research data were processed using the descriptive analysis. In the first phase, the distribution of frequencies and answer percentages for all statements were determined using the obtained data. The summary of the data for certain variables was done in the second phase, and, based on the total result, basic statistical parameters were calculated including: arithmetic mean, standard deviation, minimum, maximum, and sum. With regard to the type of data, sample size and normality of distribution, the Mann-Whitney U test was used to evaluate the differences of mean values for two dependant variables (LEGAL REGULATION and COOPERATION) of prosecutors and law enforcement. The Pearson correlation coefficient was measured to determine the connection between work experience and dependent variables. The data collected during the research were processed using the software package SPSS for Windows.

RESULTS AND DISCUSSION

Frequencies and percentages of the research results for the variables of crime scene investigation process

Table 1 indicates distribution of frequencies and percentages of the answers given by prosecutors when expressing their agreement with the statements for the variable “Legal regulation and conduction of the process of crime scene investigation” (LEGAL REGULATION). When the coding of answers is taken into consideration, the tendency is visible of positive opinions for most statements referring to the legal regulation and conduction of crime scene investigation. In over 90% of the answers, the respondents completely or mainly agree with the statements that positively assess the legal regulation and conduction of crime scene investigation while over 60% of them completely or mainly disagree with the statements that negatively assess the legal regulation and conduction of crime scene investigation. For four statements that additionally check the cooperation between prosecutors and law enforcement (*Cooperation between prosecutors and law enforcement needs to be legally regulated, Better communication is needed between prosecutors and law enforcement, There is distrust, misunderstanding and professional disrespect between the prosecutor and the law enforcement officer, and I find personal cooperation with the prosecutor/authorized law enforcement officers successful*), negative opinions are evident.

In terms of answer coding, most prosecutors completely or mainly agree with the statements while a significant percentage is indecisive.

The prosecutors had different opinions towards the statement *There is appropriate education of law en-*

forcement officers in charge of crime scene investigation in criminal cases. This is evident from the equally distributed answers (agreement and disagreement) related to this statement.

Table 1 Distribution of frequencies and percentages of answers for the variable LEGAL REGULATION - prosecutors

LEGAL REGULATION	Completely agree		Mainly agree		Indecisive		Mainly disagree		Completely disagree	
	f	%	f	%	f	%	f	%	f	%
Appropriate measures and activities of law enforcement	1	6.7	14	93.3	0	.0	0	.0	0	0,0
Appropriate role of the prosecutor/law enforcement officer	9	60.0	6	40.0	0	.0	0	.0	0	0,0
Prosecutor has sufficient knowledge in criminology	5	33.3	8	53.3	0	.0	2	13.3	0	.0
The process of crime scene investigation is appropriately legally regulated	1	6.7	13	86.7	0	.0	0	.0	1	6.7
Cooperation between prosecutors and law enforcement needs to be legally regulated	6	40.0	8	53.3	1	6.7	0	.0	0	.0
I give/receive instructions on taking activities of crime scene investigation	9	60.0	5	33.3	1	6.7	0	.0	0	.0
Crime scene investigation takes too long	0	.0	2	13.3	1	6.7	10	66,7	2	13,3
Quality of crime scene investigation is satisfactory	4	26.7	11	73.3	0	.0	0	.0	0	.0
Better communication is needed between prosecutors and law enforcement	8	53.3	6	40.0	0	.0	1	6.7	0	.0
Existing regulations cause misunderstanding between prosecutor's office and law enforcement	0	.0	2	13.3	3	20.0	9	60.0	1	6.7
Existing regulations cause inappropriate reaction of law enforcement	0	.0	0	.0	5	33.3	9	60.0	1	6.7
There is distrust, misunderstanding and professional disrespect between the prosecutor and the law enforcement officer	1	6.7	4	26.7	4	26.7	6	40.0	0	.0
There is appropriate education of law enforcement officers in charge of crime scene investigation in criminal cases	0	.0	3	20.0	7	46.7	4	26.7	1	6.7
I find personal cooperation with the prosecutor/authorized law enforcement officers successful	2	13.3	5	33.3	7	46.7	1	6.7	0	.0

Table 2 shows distribution of frequencies and percentages of answers given by law enforcement, when expressing their agreement with the statements for the variable LEGAL REGULATION. For all the statements related to legal regulation and crime scene investigation, these respondents gave similar affirmative answers as did the prosecutors, with slightly more indecisive answers.

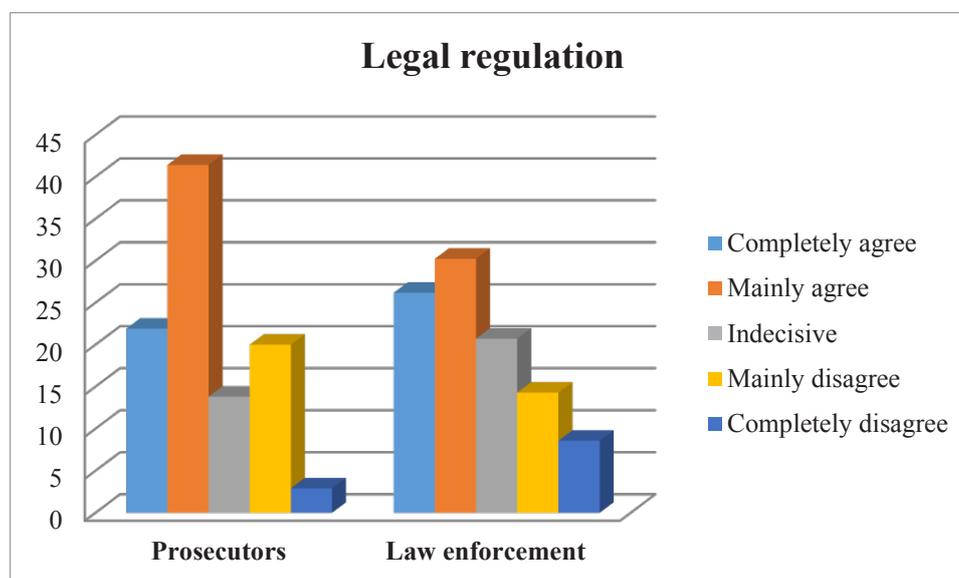
When it comes to the statement *There is appropriate education of law enforcement officers in charge of crime scene investigation in criminal cases*, law enforcement officers mainly expressed negative opinions and over 70% of them completely or mainly disagree with this statement.

Table 2 Distribution of frequencies and percentages of answers for the variable LEGAL REGULATION – law enforcement

LEGAL REGULATION	Completely agree		Mainly agree		Indecisive		Mainly disagree		Completely disagree	
	f	%	f	%	f	%	f	%	f	%
Appropriate measures and activities of law enforcement	21	70.0	9	30.0	0	.0	0	.0	0	.0
Appropriate role of the prosecutor/law enforcement officer	16	53.3	10	33.3	2	6.7	2	6.7	0	.0
Prosecutor has sufficient knowledge in criminology	3	10.0	10	33.3	13	43.3	4	13.3	0	.0
The process of crime scene investigation is appropriately legally regulated	6	20.0	18	60.0	4	13.3	1	3.3	1	3.3
Cooperation between prosecutors and law enforcement needs to be legally regulated	16	53.3	11	36.7	1	3.3	2	6.7	0	.0
I give/receive instructions on taking activities of crime scene investigation	8	26.7	17	56.7	2	6.7	3	10.0	0	.0
Crime scene investigation takes too long	0	.0	0	.0	11	36.7	10	33.3	9	30.0
Quality of crime scene investigation is satisfactory	6	20.0	11	36.7	11	36.7	2	6.7	0	.0
Better communication is needed between prosecutors and law enforcement	17	56.7	10	33.3	1	3.3	2	6.7	0	.0
Existing regulations cause misunderstanding between prosecutor's office and law enforcement	5	16.7	7	23.3	10	33.3	6	20.0	2	6.7
Existing regulations cause inappropriate reaction of law enforcement	3	10.0	5	16.7	7	23.3	10	33.3	5	16.7
There is distrust, misunderstanding and professional disrespect between the prosecutor and the law enforcement officer	3	10.0	7	23.3	7	23.3	6	20.0	7	23.3
There is appropriate education of law enforcement officers in charge of crime scene investigation in criminal cases	1	3.3	2	6.7	5	16.7	10	33.3	12	40.0
I find personal cooperation with the prosecutor/authorized law enforcement officers successful	5	16.7	10	33.3	13	43.3	2	6.7	0	.0

Graph 1 brings the visual comparative presentation of the percentage share of the total answers given by the respondents for the statements related to the variable LEGAL REGULATION. When compared to the tables, the graph clearly indicates that out of five meas-

urement categories, according to answer coding, most frequent answers in both subsamples of the respondents were "Completely agree" and "Mainly agree", which mostly reflect positive opinions towards the statements for this variable.



Graph 1 Percentage of the total answers for the variable LEGAL REGULATION

Table 3 shows distribution of frequencies and percentages of answers given by prosecutors when stating their agreement with the statements for the variable “Obstacles to cooperation between the prosecutor and law enforcement during the process of crime scene investigation” (COOPERATION). In terms of answer coding, there is a tendency of positive opinions as most answers given were “Partly affects” and “Does not affect” (over 50%), except for the statement Inadequate investigating abilities, where nega-

tive opinions were expressed in over 70% of the cases with the answers “Critically affects” and “Rather affects”. Based on such opinions of the prosecutors, it is evident that apart from inadequate investigating abilities, there are no other obstacles significantly affecting cooperation between the prosecutor and law enforcement during crime scene investigation process. However, a certain percentage of negative opinions for other statements still indicates that this **cooperation should be improved**.

Table 3 Distribution of frequencies and percentages of answers for the variable COOPERATION – prosecutors

COOPERATION	Critically affects		Rather affects		Mainly affects		Partly affects		Does not affect	
	f	%	f	%	f	%	f	%	f	%
Inadequate investigating abilities	8	53.3	3	20.0	2	13.3	2	13.3	0	.0
No joint training organized	0	.0	5	33.3	2	13.3	5	33.3	3	20.0
Insufficient number of law enforcement	1	6.7	3	20.0	4	26.7	4	26.7	3	20.0
Inappropriate legal regulation of the process of crime scene investigation	1	6.7	1	6.7	3	20.0	6	40.0	4	26.7
Other	0	.0	1	6.7	0	.0	4	26.7	10	66.7

Table 4 indicates distribution of frequencies and percentages of the answers given by law enforcement when expressing their agreement with the statements for the variable COOPERATION. Somewhat different answers are evident for this group of respondents when compared to the answers given by prosecutors. Most answers are neutral with the tendency towards positive opinions. In other words, most answers given by the respondents are distributed into the categories “Partly affects” and “Mainly affects” (over 60% of

the answers for four statements) and over 90% for the statement “Other”, which undoubtedly confirms positive opinions.

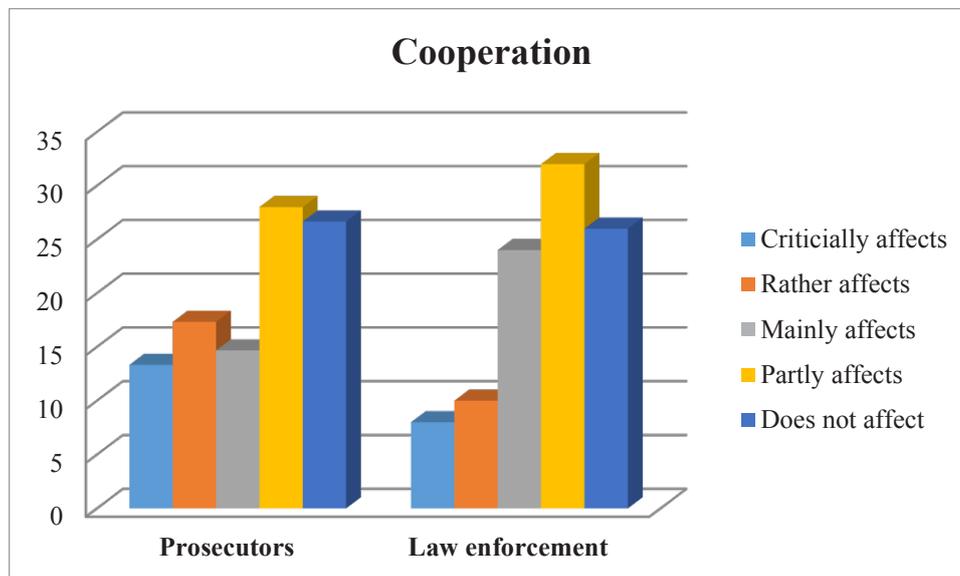
Based on such opinions of law enforcement, it is evident that there are almost no obstacles significantly affecting cooperation between the prosecutor and law enforcement during crime scene investigation process. However, a certain percentage of negative opinions of law enforcement for all the statements still indicates that this **cooperation might be better**.

Table 4 Distribution of frequencies and percentages of answers for the variable COOPERATION– law enforcement

COOPERATION	Critically affects		Rather affects		Mainly affects		Partly affects		Does not affect	
	f	%	f	%	f	%	f	%	f	%
Inadequate investigating abilities	3	10.0	1	3.3	7	23.3	13	43.3	6	20.0
No joint training organized	2	6.7	6	20.0	10	33.3	11	36.7	1	3.3
Insufficient number of law enforcement	5	16.7	5	16.7	11	36.7	7	23.3	2	6.7
Inappropriate legal regulation of the process of crime scene investigation	2	6.7	3	10.0	8	26.7	14	46.7	3	10.0
Other	0	.0	0	.0	0	.0	3	10	27	90.0

Graph 2 brings the visual comparative presentation of the percentage share of the total answers given by the respondents for the statements related to the variable COOPERATION. When compared to the tables, the graph clearly indicates that out of five measurement

categories, according to answer coding, most frequent answers in both subsamples of the respondents were “Partly affects” and “Does not affect”, which mostly reflect positive opinions towards the statements for this variable.



Graph 2 Percentage of the total answers for the variable COOPERATION

Basic statistical parameters of the research results for the variables related to crime scene investigation

The fact that the sample included two subsamples (prosecutors and law enforcement) with different roles the respondents have during crime scene investigation served to justify the argumentation of differ-

ences in the opinions of these subsamples for the total results for the variables LEGAL REGULATION and COOPERATION.

Table 5 presents the basic statistical parameters and gives evidence to certain differences in these parameters for both variables, which was evident in individual results through the distribution of frequencies and percentages.

Table 5 Basic statistical parameters of the results for the opinions of prosecutors and law enforcement

Variables	Sample	Min	Max	M	SD	Sum
Legal regulation	Prosecutors	41	54	50.0	3.96	752
	Law enforcement	41	62	49.0	5.05	1470
Cooperation	Prosecutors	9	21	13.1	3.80	197
	Law enforcement	5	17	12.1	2.96	340

Mann-Witney U test of the differences in the research results for the variables regarding the conduction of crime scene investigation

As the descriptive analysis showed certain differences between the subsamples of prosecutors and law enforcement for the variables used to examine

the opinions on legal regulation and conduction of crime scene investigation, the Mann-Witney U test was used to check the statistical significance of these differences. It was established that there is not statistically significant difference for the variables LEGAL REGULATION and COOPERATION.

Table 6 Mann-Witney U test of the differences in answers given by prosecutors and law enforcement

Variables	Protocol	Mean Rank	Sum of Ranks	Median	Mann-Whitney U	Z	Sig.
Legal regulation	Prosecutor	26.60	399.00	51.00	171.00	-1.31	.19
	Law enforcement	21.20	636.00	48.50			
Cooperation	Prosecutor	23.93	359.00	11.00	211.00	-.34	.74
	Law enforcement	22.53	676.00	11.50			

Correlation of variables regarding the conduction of crime scene investigation

Besides confirming the differences, there was also a need for examining the correlation between the years of work experience in the service and the variables that define the respondents' opinions towards the conduction of crime scene investigation (LEGAL REGULATION, COOPERATION). The results of

the Pearson correlation coefficient, determined for the entire sample of the respondents, indicate that there is no correlation between the length of work experience and other variables. This means that the years of work experience of prosecutors and law enforcement do not significantly affect the opinions regarding the conduction of crime scene investigation, which additionally confirms the above presented research results (Table 7).

Table 7 Correlation of variables related to the conduction of crime scene investigation

		Legal regulation	Cooperation
Length of work experience	r	-.194	-.152
	p	.201	.320

The obtained research results confirm the hypotheses "Cooperation between prosecutors and law enforcement needs to be legally regulated" and "Cooperation between prosecutors and law enforcement is not at the level that might contribute to more efficient and quality conduction of crime scene investigation" as the negative opinions were registered and according to answer coding most respondents "completely agree" or "mainly agree" with the statements along with a significant percentage of undecided answers. Still, we should not undermine the results that indicate that cooperation might be better and that it should be improved.

The main hypothesis of the paper, "Adequately and completely legally regulated procedural action of crime scene investigation in the criminal-procedural legislation of Bosnia and Herzegovina leads to successful cooperation between law enforcement and the prosecutor, and in that way contributes to providing high-quality as well as sufficient evidence for a successful conduction of criminal proceedings." can thus be **confirmed**.

CONCLUSION

Furthermore, it can be said that crime scene investi-

gation is a system of law enforcement's intellectual, practical and instrumental activities under the Criminal Procedure Code which are, together with criminalistics-technical and tactical methods and means, used to find, preserve from destruction and secure law enforcement and legally-relevant material information (related to objects or traces of crime) for the purpose of potential criminal proceedings.

Crime scene investigation as an evidentiary activity in a criminal proceeding can be conducted at various stages of a criminal proceeding, and taking that into account, different subjects of a criminal proceeding can participate in an investigation. Taking into consideration the fact that it is mostly conducted as a pre-investigation and investigation action, the most frequent among them are prosecutors and law enforcement.

Their relationship and cooperation are of vital interest for successful carrying out this activity. The analysis of the existing legal framework leads to the conclusion that the current criminal procedure codes in BiH provide the appropriate basis for the cooperation of prosecutors and law enforcement. However, previous practice indicates certain shortcomings in the cooperation and coordination between the prosecutors and law enforcement.

The research shows that prosecutors are somewhat dissatisfied by the relationship the prosecutor-law enforcement. The results indicate that over 70% of the prosecutors believe one of the main obstacles in cooperation between the prosecutor and law enforcement in conducting crime scene investigation to be inadequate investigating abilities of law enforcement. On the other hand, the research showed that most answers given by law enforcement are neutral with the tendency towards positive opinions. Most of their opinions are evidently positive, which leads to the conclusion that there are almost no obstacles significantly affecting cooperation between the prosecutor and law enforcement in conducting crime scene investigation. However, a minor percentage of negative answers of law enforcement is present for all the statements, which suggests that **cooperation might be better**.

When these research results are considered, the research should be continued with the focus on the definition of the main directions for the improvement of the legal regulation framework and cooperation between prosecutors and law enforcement during crime scene investigation.

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APPLICATION OF SOFTWARE IN THE DIAGNOSIS OF HEARING IMPAIRMENT

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ABSTRACT

Aim of this paper was to examine effectiveness and efficiency of examination of hearing status of persons with hearing impairment in form of applicable diagnostic software, in relation to classical approach. Sample was comprised of 90 respondents and was formed out of two subsamples. First subsample was comprised of 45 students with hearing impairment with a degree of impairment of over 80 dB, both genders, age from 6 to 15 years and without any other disabilities. Second subsample was comprised of 45 students (absolvents) from department of audiology. For data gathering, audiogram, applicable diagnostic software and scale for evaluation of attention and cooperation were used. Data was processed with descriptive analysis, McNemar and Wilcoxon tests. Results of the research confirmed that applicable diagnostic software provide more effective and more efficient diagnostic procedures for examining hearing status of persons with hearing impairment in relation to classical approach.

Key words: hearing status, effectiveness, efficiency, diagnostic software

INTRODUCTION

Hearing impairment in childhood represents serious problem from stand point of audiology, education and sociology.

Early and reliable diagnosis of hearing impairment is necessary in order to reduce eventual delays that could be caused by impairment and to reduce its negative impact to development (Grant, 2000; Yoshinaga-Itano, Coulter & Thomson, 2001; Kennedy, 2006; American Academy of Pediatrics (AAP), 2007).

Different ways of conducting diagnostic procedures, from the aspect of procedure organization and technical support, have very important impact on setting clear and right diagnosis. Efficiency and effectiveness of those methods depend on duration, velocity of data gathering and evaluation, accuracy and precision of the data, velocity and method of archiving that data, velocity and method of data flow, level of general state of the respondent during the evaluation (attention, focus, and cooperation), ability of continual evaluation

and tracking rehabilitation program realization.

According to Gillard, Bailey, and Nolan (2008), technology is truly everywhere and its widespread adoption and application has changed the way each and every one of us lives and makes a living in modern society.

Scientific activities, in last thirty years and more, conditions noticeable and frequent technological and technical improvements. Information technologies impact the knowledge in sense that it is becoming dynamic development resource, the driver of functional application of science aiming to discover new knowledge. Process of preparation, transmission and reception of information – knowledge, and manifestation of education and rehabilitation, seem unimaginable and almost impossible without information and communication technologies although traditional – pen and paper method is important if not dominant in these processes.

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According to Yoshinaga-Itano (2004) and Nicholas and Geers (2006), technological improvement has significantly influenced diagnosis and treatment of paediatric hearing loss and provided better development of their listening and oral language skills.

Dornan (2010) emphasizes that significant technological developments have included newborn hearing screening, new objective diagnostic tests, digital hearing aids, cochlear implants and auditory signal processing. Along with these advancements, a confluence of research from many other sciences is occurring, creating previously unimagined options for the treatment of paediatric hearing loss.

New technologies in area of rehabilitation, listening and speech and their functionality of increasing earshot and better understanding of speech have significantly contributed to better hearing and oral communication of deaf persons, which from aspects of functionality, audiology and speech-language aspect implies successful socialization, education and professional emancipation of deaf persons in society. Technical and technological advances in electroacoustic, with an emphasis on manufacturing and application of modern hearing apparatus, demands application of carefully selected methods and programs in very complex and responsible professional work with deaf persons. At the same time, higher forms of cognitive abilities are stimulated and that means more efficient influence on general development of personality (Kurtagic & Hasanbegovic, 2004).

Considering that information technology is already a reality for professionals and for persons with hearing impairments, especially in area of evaluation of hearing status and speech-language development, which would improve efficiency and effectiveness of diagnostic in harmony with real technological capabilities, it can significantly improve whole education-rehabilitation process.

Developing software for deafness diagnosis, using model equations, numerical schemes, Dunmade, A. O., Dunmade, A. D., Taiwo, Tomori, and Komolafe, (2009) emphasize importance of computer technologies in the process of diagnosis, claiming that this software is an important tool for medical practitioner - otorhinolaryngologists because it helps in determining severity of deafness in each individual patient case.

Dolinay, Zlinksy, and Vasek (2005) have developed computer program that aids doctors and audiologists for automatic calculation of percentage of hearing loss per Fowler-Sabine, calculation of average hear-

ing loss and can display audiometric curve, which can alongside others, be stored as a picture and can be archived for future queries.

Aim of this research was to examine effectiveness and efficiency of hearing status examination of persons with hearing impairment in form of applicable diagnostic software in relation to classical approach. We have assumed that there is significant advantage in favor of applying diagnostic software in effectiveness of diagnostic procedures, considering hearing status and efficiency of the procedures considering evaluation time, attention and cooperation of respondents.

METHODS

Sample of respondents

Research was conducted on the sample of 90 respondents, which has been formed from two subsamples, for the needs of the research. First subsample, which was used to examine effectiveness and efficiency of diagnostic software, in relation to classical approach, was formed of 45 respondents from the population of students with hearing impairments based on following criteria: degree of impairment above 80 dB, age from 6 to 15 years without any other disabilities. Second subsample was comprised of 45 students (absolvents) from the department of audiology. Subsample of absolvents was used to determine: time and accuracy of developing audiogram, kind of hearing impairment, time and accuracy of calculation of the degree of hearing impairment and percentage of hearing loss according to Fowler Sabine.

Measuring instruments and sample of variables

For conducting this research following tools were used: audiogram, diagnostic software and numerical scale for evaluating attention and cooperation of respondents. Audiogram was used in two different forms (mediums): first, classic (pen and paper) form, where diagnostic form with audiogram and scale for evaluating percentage of hearing loss Fowler-Sabine, was on paper; second – digital form, where whole material was stored into form of applicable diagnostic software. Diagnostic software represented digital-diagnostic product, which was developed for needs of this research and was used for diagnostic purposes, but it can be also used in rehabilitation purposes in the process of rehabilitation of speech and listening.

It was arranged in form of diagnostic procedures (measuring instruments) and database for storing, querying and printing stored evaluation results through findings, opinions or, if needed, in some other form. Program has four segments, which, combined together comprise unique diagnostic whole. When it comes to evaluating hearing status, it has been programmed to enter data into two tables that appear on monitor for hearing thresholds (dB in value) acquired by audio-metrics, and based on those, program will, by the press of a button, draw according curves of areal and bone conductivity, calculate degree of hearing impairment and percentage of hearing loss according to Fowler-Sabine. Patter appears on the monitor, showing findings of evaluation results, with an empty column for descriptions and audiologist's opinion. Variables from tonal audiogram that were used for effectiveness evaluation were: *degree of hearing impairment accuracy, percentage of hearing loss according to Fowler-Sabine accuracy*, and for efficiency: *time needed to evaluate hearing status*. Numerical Scale for attention and cooperation evaluation during examining effectiveness and efficiency was scale of 10 degrees on which examiners graded these two criteria. Variables sample from this Scale were: *attention during evaluation and cooperation during evaluation*.

Research conducting manner

Examining hearing status in a classical manner was conducted by students of audiology were given tasks based on decibel values, that were gather from audiometrics from deaf and heavy hearing impaired persons. Students had to develop an audiogram, examine the kind of hearing impairment and calculate degree of hearing impairment and percentage of hearing loss according to Fowler-Sabine. Results were entered on special for, including beginning time and ending time. With examination via diagnostic software, same students were entering decibel values into the program and it automatically showed results. Results for efficiency with classical approach, which are time dependent, team member, had to manually enter results, while with software approach it was done automatically. Other variables for efficiency evaluation (attention and cooperation), in both evaluation manners, and based on observing respondents while examination was conducted, were evaluated subjectively by every team member. Results were obtained using evaluation scale and average result was taken into account.

Data processing methods

SPSS for Windows was used to process data. In order to make decision on conducting adequate tests and analysis, Shapiro-Wilk test ($N < 50$) was used for evaluation of normal distribution. Data was processed by descriptive analysis and tests of non-parametric statistics. Frequencies distribution, percentages, and basic statistical parameters were established. For differences in results of evaluation of hearing status testing, effectiveness of diagnostic program i.e. evaluating accuracy of results McNemar test was used. Wilcoxon test was used to test efficiency of diagnostic procedures i.e. significance of differences of evaluation of average time of diagnostic procedures, attention and cooperation of deaf and heavy hearing impaired students.

RESULTS AND DISCUSSION

Timely, adequate and continuous evaluation and treatment of children and older persons with hearing impairment are important for every individual, in person development and affirmation and for the community. Yoshinaga-Itano (2003) emphasizes that quality of medical, audiological, and educational intervention services most likely impacts developmental outcome. New technical and technological accomplishments should be used to constantly aid and track, in order to reduce possibility of lagging behind in development of persons with hearing impairment, and with that unnecessary expenses that community is exposed to in order to take care of these individuals.

The Better Hearing Institute in the U.S. made a similar estimate of the societal costs. BHI estimated the annual cost of untreated hearing loss to be US\$56 billion in the United States and 92 billion euro in the EU, mainly due to lost productivity. According to the study, the estimated societal costs of not treating hearing loss in Europe in the years 2001 to 2005 amounted to a staggering 400 billion euro (Garrett, 2010).

Evaluation of all segments of hearing status and speech and language development should be continuous process. Reason for that is application of treatments that are intended to continually cause change in all development aspects, which is, why it is important to do checks, tracking and evaluation on them all the time. Continuous tracking gives insight into levels of development, but it also evaluates treatments that should me continued, modified or completely changed.

Procedures in diagnostic process, besides that, cannot become purpose of their own. They too, need to be checked and questioned regarding applied contents, timeliness, evaluation manners, effectiveness and efficiency of conducting in all individual development areas.

Research results of effectiveness diagnostic procedures when evaluating hearing status

In Table 1, frequency distribution and percentage of results of hearing status research, for variables accuracy of degree of hearing impairment evaluation and percentage of hearing loss according to Fowler-Sabine, for evaluation of deaf and heavy hearing impaired respondents in two different ways of evaluation, are

shown. In both programs, respondents' frequency, on both variables is in favor of diagnostic software, and not in favor of classical approach. Evaluating with diagnostic software, complete accuracy was observed for evaluation of hearing status (without repetition), with all respondents (45 respondents or 100%), in both variables (hearing impairment degree accuracy and percentage of hearing loss according to Fowler-Sabine accuracy). Classical approach, in first evaluation of hearing status, in degree of hearing impairment, was accurate for 41 respondents or 91%, and wrong for 4 respondents of 8.9%, while in percentage of hearing loss according to Fowler-Sabine accuracy was observed for 33 evaluations or 73.3% and inaccurate for 12 or 26.7%, which is large and significant difference if evaluation is not repeated.

Table 1 Degree of hearing impairment and percentage of hearing loss according to Fowler-Sabine evaluations

Variables	Response	Classical		Software	
		f	%	f	%
Degree of hearing impairment evaluation accuracy	Yes	41	91.1	45	100.0
	No	4	8.9	0	.0
Percentage of hearing loss FS evaluation accuracy	Yes	33	73.3	45	100.0
	No	12	26.7	0	.0

To test differences in evaluation results for hearing status, when evaluating effectiveness of diagnostic software, i.e. accuracy of evaluation results, McNemar test was used for dependent samples. Test results have shown that differences got from descriptive analysis are statistically significant, with

percentage of hearing loss according to Fowler-Sabine ($p = .00$) in favor of diagnostic software, and for degree of hearing impairment evaluation accuracy we have no statistically significant difference ($p = .13$), applying two different evaluation manners (Table 2).

Table 2 McNemar's test results

Variables	N	p
Degree of hearing impairment evaluation accuracy	45	.13
Percentage of hearing loss FS evaluation accuracy	45	.00

Evaluation of degree of hearing impairment is mostly used for selecting adequate hearing apparatus and classification of respondents for developing rehabilitation program for speech and listening, while percentage of hearing loss evaluation is used to determine degree of invalidity in order for person to obtain educational and social rights. Every mistake in accurate evaluation for respondents in first phase can cause delay of adequate professional action at best, and rest of the consequences is unpredictable.

Based on the presented research results, we can clearly see significance of software enhancements in diagnostics. Humans are, in such evaluation, prone to errors, which were proven during the research. Establishing listed parameters, via diagnostic software, on basis of formulas and values from table for evaluating percentage of hearing loss according to Fowler-Sabine, in relation to classical methods (even using calculator), shows advantages that should influence better diagnostics.

That should be taken into account, as well as that in evaluation results, no statistically significant differences were observed when evaluating degree of hearing impairment.

According to Dunmade et al. (2009), in the process of developing a software, the scientists and engineers study various are as and techniques of designing software with a view to efficiently and effectively sorting and retrieving information. Many factors must be put into consideration when writing a software. For instance, since computers have only a limited amount of memory, the designers must limit the number of features included in the program so as not to exceed the requirements of the system it is designed for. This software was written using Visual Prolog. For this work, the PTA Test is used as a means of identifying and classifying the severity and type of deafness in a patient, and suggesting a likely solution to the problem. Using the model equations, a numerical scheme was used to develop a software capable of diagnos-

ing deafness. It is important to note that this software helps the medical practitioner- the otorhinolaryngologist in his task of determining the severity of deafness in each individual patient case.

Research results of efficiency of diagnostic procedures when evaluating hearing status

For comparing the results acquired by two different ways of evaluation, in Table 3 are shown basic statistical parameters for efficiency of diagnostic procedures evaluation. Brief information for every variable for evaluation of time needed for evaluating hearing status, attention and cooperation, can be observed.

Insight in results shows that inside every individual evaluation manner, there are significant deviations of respondents in answers for every variable, and there are significant differences of basic statistical parameters between two evaluation manners.

Table 3 Basic statistical parameters for determining efficiency of diagnostic procedures

Variables	Evaluation type	Min	Max	M	SD
Attention	Classical	3.25	7.00	5.34	1.13
	Software	8.00	10.00	9.27	.64
Cooperation	Classical	2.00	7.00	5.26	1.24
	Software	8.00	10.00	9.33	0.64
Time	Classical	6.00	21.00	11.22	3.59
	Software	3.00	5.00	3.82	.58

Wilcoxon test was used to test significance of the difference in results of evaluating objective parameters of efficiency (duration of diagnostic procedure and time focused on contents during evaluation), acquired by two different manners of evaluation and testing differences of results on the scale of subjective evaluation of attention and cooperation of deaf and heavy hearing impaired persons by audiologists. Establishing significance was done for: time needed to determine hearing status ($Z = -5.85$), evaluating attention ($Z = -5.86$) and cooperation ($Z = -5.85$), where every variable has statistically significant difference in favor of diagnostic software on the level of significance $p = .00$. Value of impact magnitude (r) for these differences, according to Koenov criterion is large, $r = -.62$ (Table 4).

According to Dolinay, Zlinsky, and Vasek (2005), without utilization of computers the calculation of

the Fowler number is rather slow. It is not because it would be complicated. The whole algorithm is to find measured value in a table and then use simple equation to get final result. In present, still a large number of doctors do this manually or use simple programs which create another request: patients already have electronic medical history record and it would be suitable to save the results from audiometric investigation into this record also. Not only Fowler number but all measured hearable intensity should be saved. For better understanding, let's describe the doctor's routine during investigation. First they have to do measurement, and then retype whole data into a program to calculate Fowler number. After that they have to retype data into patient history record. The purpose of this work is to save doctor's time, at least to omit one data retyping.

To reach that purpose we created a simple program. Measured data should be typed into this program, which is instantly calculating Fowler number. If doctor requires graphical output, program must be able to show audiogram and also save it into the file. Program also must be able to transfer data into extern database program. In cooperation with practical doctors the application has been created. The program is C++ language, dialog based application. (Kruglinski, 1997). When program starts the main window is shown. The left side of the window contains controls for "Tuning fork investigation" with pre-set default settings. In this case default means patient without problems. This investigation is mostly used as a preventive. If the patient is without complications subsequent investigation are not needed and in this case doctor just need to press button to transfer results into patient's database record. If audiometric investigation is required, than doctor or skilled nurse will type measured data from audiometer into program. Those data can also be transferred into patient record. When audiometric investigation is done and all data are entered the audiogram can be shown or saved as an image file into shared directory. Supported file formats include: bmp, jpg, gif tiff, pnf. If also patient age is entered in the left bottom part of the main window, the patient is categorized into possible risky class.

As was already mentioned the program has several fundamental outputs. First is Fowler number as a result of audiometric investigation. Next output is audiogram and classification diagram based on Fowler number and patient age. The program allows doctors to simply and quickly enter the data obtained during patient hearing examination and automatically calculate the hearing loss coefficient by Fowler for one or both ears, calculation of middle value sound intensity in decibels from all entered frequencies air and bonds transition for left and

right ear or both together. Program also provides tool for preventive hearing investigation of persons working in hearing-damage risky places. This tool according to patient age and entered measured volumes places the patient into risky groups. This placement can be shown in simple diagram. The diagram can be saved as an image file. All diagrams if needed can be searched depending on patient identification number or his\her insurance number. If pre-set information are filled program is able to create complete after-examination record. For audiometric investigation, when all necessary information is typed, program offers the possibility to create audiometric curve, which can be saved and also later searched by above mentioned patient data. If the curve fulfills all requirements, such as number of necessary frequencies and so on, it can be imported into image module of ambulant program or saved in program archive and later use as a proof of investigation for insurance company.

In favor to those research goes Larson's statements (2000), who emphasizes that although most language teachers today stress the development of oral skills in their teaching, it is very difficult for them to find time to assess these skills. The general consensus in foreign-and second-language education is that oral skill development is a high priority, indeed in many cases, the top priority. If, in fact, speaking is emphasized, it should also be tested periodically. However, assessing oral skills requires a significant commitment of time and energy on the part of language teachers. In an effort to mitigate this testing burden, testing software has been developed that allows teachers to construct computerized oral tests, to administer them, and to assess students' responses with relative ease. Using this kind of software in conjunction with an appropriate scoring technique, teachers can assess their students' oral performance on a relatively frequent basis with a minimal loss of classroom time.

Table 4 Wilcoxon test rang results when examining efficiency of diagnostic procedures

Variables	Z	p	r
Time needed to determine hearing status	-5,85	.00	-.62
Attention during evaluation	-5,85	.00	-.62
Cooperation during evaluation	-5,86	.00	-.62

All variables, that are related to efficiency of diagnostic procedures, and which have statistically significant differences in favor of application of diagnostic software in relation to classical evaluation, are a proof for need of digitalization of diagnostic procedures in audiology. Variables that are related to time, impact

the most important factor in education-rehabilitation process, and that is "acting early", which along with adequate scientific research and practical application has provided good results with efficiency (reduction in time) and effectiveness (accuracy of results) of diagnostic procedures.

CONCLUSION

Diagnostic software provide more effective and efficient application of diagnostic procedures for examining hearing status of persons with hearing and speech impairments compared to classical approach. Significantly better effectiveness of conducting diagnostic procedures in favor of diagnostic software has been confirmed with evaluating percentage of hearing loss according to Fowler-Sabine and degree of hearing impairment, while presence of significantly better efficiency is confirmed on evaluated indicators: time, attention and cooperation of students during evaluation of hearing status.

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INFLUENCE FACTORS OF PROFESSIONAL ORIENTATION OF DEAF PEOPLE IN BOSNIA AND HERZEGOVINA

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ABSTRACT

This paper presents the research of attitudes of deaf people and educational workers in order to determine and isolate factors that influence the efficiency of professional information process and the professional orientation of deaf people. The first subsample consisted of deaf participants who have completed the process of professional orientation and rehabilitation, and the other subsample of educational workers, who work at professional training of deaf people. Factor analysis was used to evaluate the results. Based on the results of the research, three essential factors were isolated, which indicate that there are gaps in the implementation of professional orientation of deaf population, which also points to the strategy of action in order to improve its effectiveness.

Key words: *professional information, professional orientation, educational workers, deaf people*

INTRODUCTION

Due to heterogeneous characteristics, in terms of different types of hearing impairment and other psycho-social factors, people with hearing impairment can also be characterized as people with communication problems, and as such, people with some kind of social isolation. Social isolation can be alleviated and competence can be improved with adequate work socialization, or adequate choice of profession, where deaf people will be able to work and provide for themselves. Work integration is conditioned by greater social engagement of every individual, including the deaf people, which can improve communicational skills in relation to deaf people society and vice versa. According to Boutin (2010), hearing impairment significantly affects communication, educational achievement and social interaction of deaf people. The mode of communication of deaf people most often determines their form of education and vocational training, with the basic problem being a limited choice of jobs offered to deaf pupils during professional ori-

entation procedures, resulting in a low employment rate, as well as low paid jobs which are inconsistent with their acquired professional qualifications. Vocational training for the deaf children in Bosnia and Herzegovina is carried out within their high school education and specialized centers for education and rehabilitation of deaf children, as stated by Gersten et al. (2001), the support of the management in educational institutions has a strong influence on the quality of work in educational and professional rehabilitation. The choice of high school and profession is carried out through a professional orientation procedure. Professional orientation leads to directing the individual into the profession that best suit individual differences and abilities, specific psychophysical demands of the workplace and educational programs of individual schools. In order for this process to be successful, it is necessary to direct the deaf individual towards those professions that correspond to her/his psycho-physical abilities acquired knowledge and expressed interests.

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However, when conducting an evaluation, there is a tendency to ignore the individual qualities of the deaf person, and mainly take into account the hearing impairment (Punch et al., 2004). Professional counseling is aimed at informing people about occupations that fit their psycho-physical abilities and needs of the labor market. Well informed pupils, have a greater degree of freedom when choosing a profession, as well as recognition of their own professional interests. If professional informing is not a continuous process, adequately providing enough information to deaf children about their possibilities within certain occupations, it may result in a wrong choice of profession. Although the process of professional orientation of deaf children requires the involvement of both educational and profit sector, in order to ensure a good quality of occupations and their later employment, in practice, this type of procedure often does not exist. Kramer (2008) cites the effectiveness of the implementation of protocols for the professional development of deaf people, which directly involve a number of experts, headed by an audiologist, who conducts an evaluation of job positions for the deaf, assesses their psycho-physical abilities and opportunities, and makes a recommendation for their guidance, based on interests that best match the profile of that deaf person, with the ultimate goal of finding and retaining the right job. Stauffer and Boone (2007) talk about difficulties in the professional rehabilitation process of deaf people, which relate to inadequate communication skills associated with an inefficient educational system, resulting in insufficient practical work and acquired work experience, as well as limited family support. Research by Parasnis et al. (1996) and DeCaro et al. (2001), which included parents of deaf children and professionals engaged in vocational training, on the occupational competencies of deaf children, indicated that participants expressed the opinion that deaf people have reduced ability to perform certain occupations, and participants showing a tendency to limit the scope of occupations which this population can perform. Studies by Schroedel and Carnahan (1991) show that parents of deaf children express the views that deafness limits their choices, as well as their working abilities, and that their deaf children cannot be as successful as their hearing peers. With a strong competition in the labor market, deaf people, according to Danermark (2005), represent a vulnerable group, taking into account the challenges of finding and keeping a job. Punch et al. (2004) state that young deaf people may have difficulty choosing an adequate occupation, which is why they need to have

high quality selection and career planning in order to minimize potential shortcomings and to avoid unemployment or low employment rates, which are characteristic for a high percentage of deaf people (Bullis et al., 1990, Schildroth et al., 1991), with which MacLeod-Gallinger (1992) and Schroedel and Geyer (2000) agree, while Luft (2000) and Winn (2007) state that deaf people often earn less money and have less opportunities to progress in the workplace than their hearing peers. These studies indicate that it is necessary to examine factors that have a direct impact on the process of professional orientation of deaf people, in order to be able to act and enable deaf people with good and efficient professional training.

Objective of research: To determine the factors that influence the process of professional orientation of deaf people

Methods

Sample of participants

A sample consisted of deaf participants ($n = 47$), ages 18 to 65, who completed vocational training processes, and whose degree of hearing loss was above 80 decibels. The second subsample ($n=39$) consisted of participants from the vocational-educational system, who conduct professional orientation of deaf people.

Measuring instruments and research methods

For this research, a system of variables was used to examine the opinions of the participants about the professional orientation of deaf people. The data was obtained by direct examination of deaf participants and educational workers, using the method of guided interview.

Descriptive characteristics of the research sample

The subsample of deaf people consisted of participants who attended specialized centers for education and rehabilitation of hearing and speaking, located in Sarajevo, Tuzla and Banja Luka. Gender structure of deaf participants was in proportion of 57.4% male and 42.6% female participants. Deaf participants were born in the period from 1961 to 1970 (31.9%), from 1971 to 1980 (34%), from 1981 to 1990 (25.5%) and from 1991 to 1995 (8.5%). The structure of participants compared to their professional qualifications consisted of deaf participants with a high school degree (87.7%) and low-skilled workers (12.3%).

The subsample of educators consisted of workers from the centers attended by the deaf people, and consisted of 20.5% male and 79.5% female participants. Participants were born in the period from 1961 to 1970 (51.3%), from 1971 to 1980 (43.6%) and from 1981-1990 (5.1%). The structure of participants in regards to their vocational training was educational workers with higher degree of education.

Table 1. Structure of subsample of participants in relation to gender, age and professional qualifications

Variables		Representation of deaf participants		Representation of educational workers	
		f	%	f	%
Gender of participants	Male	27	57,4	8	20,5
	Female	20	42,6	31	79,5
Age of participants	1961-1970	15	31,9	20	51,3
	1971-1980	16	34,0	17	43,6
	1981-1990	12	25,5	2	5,1
	1991-1995	4	8,5	-	0
Professional qualifications of participants	Not qualified	7	12,3	-	0
	Secondary school	40	87,7	-	0
	High education	-	-	39	100

Using the intercorrelation analysis, the classification of variables and determination the correlation between individual variables in the entire measuring space was made, based on the covariance test of applied variables, with a statistical significance at the level $p = 0.00$, with the value of Bartlett's Test of Sphericity and Chi-Square of 137,205, with a total KMO of 0.687. Table 2 shows the values of

the common variability, where it is seen that there are three significant values that exhaust 54.18% of the overall system variability, from the ten variables of assessment of processes and procedures of professional orientation of deaf people. The first unique value of 2.458 exhausts 24.58% of the total system variance, and the last extracted value according to this criterion is 1.078%.

Table 2. The inherited values of isolated components of the main body

Factors	Lambda	% Variance	Cumulative %
1	2,458	24,58	24,58
2	1,882	18,82	43,40
3	1,078	10,79	54,18

By checking the first major component of the measurements of educational pedagogical and deaf participants, it is noted that the largest parallel and orthogonal projections are reflected in the variable "Deaf people are well-coordinated to perform the chosen occupation". By inspecting the content of the variables that define this factor, it can be noted that in order to achieve a good professional orientation, it is necessary that the deaf people are well informed about offered professions, are satisfied with their choice of occupation and have fulfilled the requirement of expertise. In relation to such results, this factor is called Professional Information Factor. Insufficient information and education can very often lead to wrong decisions regarding

the possibilities and abilities of a deaf child. Creating assumptions about the limited capacity of deaf children can lead to their unequal position when choosing a job and continuing education. The type of work and employment that deaf workers achieve is to a large extent conditioned by professional orientation and guidance, as stated by DeCaro et al. (2001), deaf people can be characterized as culturally homogeneous groups in relation to the type of occupation that they consider appropriate. The same authors state that even in culturally different countries, deaf people receive consistently similar recommendations on professional abilities, based on the views of the employer and the hearing environment.

Capella (2003) states that deaf employees are more involved in jobs that require low level of education, as opposed to hearing employees who take jobs requiring a higher level of education, as confirmed by

Schroedel and Geyer (2000), which show that 13-15% of deaf people have a higher level of education than it is required for that work position.

Table 3. First inherited value - first overview of the measurement

Variables	PAP	ORP
Deaf persons are well directed for the work in the chosen profession	0,805	0,813
Deaf persons are satisfied with their education	0,763	0,761
Deaf persons are well informed on professions in the process of professional orientation	0,644	0,677
Deaf persons are satisfied with the choice of profession	0,550	0,548
Every deaf person should be employed under the condition that that person fulfils the requirements of that job	0,504	0,490

By inspecting content of variables, it can be noticed that the impact of communication, degree of hearing impairment and school achievements are crucial for the ultimate choice of deaf children, where linguistic and communication difficulties, that occur between deaf children and hearing community can contribute to directing deaf children to occupations that are not

in accordance with their interests and psycho-physical abilities. By looking at the parallel and orthogonal projections it can be concluded that the coefficients are extremely high, so we can safely claim that adequate diagnostic procedures are necessary for a successful realization of professional orientation, and this factor is called the Diagnostic Factor.

Table 4. Second inherited value - the second overview of the measurement

Variables	PAP	ORP
The level of communicating skills has the greatest influence in the choice of profession	0,779	0,784
Level of hearing damage has the most influence in the choice of profession	0,751	0,734
School success has the greatest influence in the choice of profession	0,700	0,718

The third overview of the measurements point out to the fact that deaf people are unjustifiably directed to a small number of occupations and that deaf students are not offered an adequate choice of occupations, and this factor is called a Corrective factor. Training deaf people for expert occupations, completed third or fourth degree of education does not meet the needs of the labor market. Capella (2003) points out that deaf people are mostly employed in workplaces requiring a low level of education, that they are engaged in jobs requiring physical work, and significantly less in expert, technical and managerial jobs. New labor market

demands and technology advancements are constantly changing and demanding new skills from deaf workers, while at the same time there is an increasing economic instability and reduced demand for jobs that they are trained for. The largest percentage of deaf and hard of hearing people in BiH have completed vocational training as a tailor, locksmith, shoemaker, jobs that have almost become neglected due to advances in technology. In addition, there is a lower formal level of education in relation to the rest of the population, where 20.22% of deaf people in BiH have only completed elementary school (Hasanbegović et al., 2013).

Table 5. Third inherited Value - Third overview of the measurement

Variables	PAP	ORP
Deaf persons are unjustifiably directed into limited number of professions	0,725	0,707
Adequate choice of profession is not given to deaf pupils	0,691	0,715

CONCLUSION

Lack of work experience and long term unemployment are the main characteristic of the work-age deaf population in Bosnia and Herzegovina, where in the process of professional orientation and guidance of deaf children there is no adequate education and training plan that follows the needs of the labor market. Insufficient professional information for the deaf population is singled out as the main cause of inadequate choice of occupation, reasons for this, is not seeing the overall psychophysical capabilities of deaf people, but only seeing the hearing impairments and preferred communication modes, as limiting factors for the choice of occupation. Corrective factor has isolated all the insufficiencies in the process of professional orientation of deaf people, which refers to their unjust orientation into a limited number and limited choices of occupation, which indicate that it is necessary to carry out a series of corrective actions, in a way to respect the individual psychophysical abilities of the deaf pupil, employment opportunities and the needs of the labor market.

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SELF-FASHIONING IN RENAISSANCE DUBROVNIK: MARIN DRŽIĆ VIDRA (1508-1567)

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Review paper

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ABSTRACT

Modern interpretation methods of the most important works of European Renaissance provide new opportunities in the interpretation of comedies of Dubrovnik writer Marin Držić. This especially applies to the theory of the new historicism, whose most important representative Stephen Greenblatt in his classic work Renaissance self-fashioning, provides an opportunity to examine Držić and his work according to this theory that deals with the identity of the Renaissance creators, which was also the goal of this work. In this way new and more detailed analysis of Držić pastoral, farce and Plautus comedy was opened, which will prove again the classical quality and timeless value of the dramatic work of the greatest renaissance writer in our region.

Key words: *Dubrovnik, Renaissance, Marin Držić, identity, new historicism, subversive literature, self-fashioning*

INTRODUCTION

Literature of Humanism, Renaissance and Baroque, created on the territory of the old Dubrovnik Republic, has reached European levels through its achievements. In these centuries, Dubrovnik creators which in the cultural, artistic and literary sense belonged to stated periods, lived, educated, and then created their works in the European environment and in that way became the part of the European literature elite. In this sense, their work today can be considered according to the criteria of the European literary tradition. This applies particularly to the most prominent representatives of Dubrovnik's renaissance and baroque, that is to Marin Držić and Gundulić Ivan.

Although the work of the greatest Dubrovnik Renaissance playwright Marin Držić (c. 1508-1567) was regularly stated in overviews of old Dubrovnik biographers and chroniclers, he did not hold the place that his counterpart in the Baroque period, Ivan Gundulić, had for centuries. In that way, Držić was almost forgotten for centuries, and it was only in the nineteenth

century the one of his comedies was published in the Dubrovnik journal Dubrovnik magazine (Držić, 1870), while the revival of his work awaited only the twentieth century. Extreme interest that followed, with numerous editions of all his dramatic works, as well as their set on the scene, was especially actualized after Držić's conspiratorial letters were found (Dayre, 1930), which enabled a new interpretation of his work. These interpretations of Držić's works ranged up to noting social unrest and resistance to aristocratic government. Modern interpreting ways of the most important works of the European Renaissance also provide opportunities for reviewing Marin Držić's comedy work in this regard. This especially applies to the theories of the new historicism, whose most important representative, Stephen Greenblatt, in his classic work Renaissance Self-Fashioning (Greenblatt, 1980) provided an opportunity to examine Držić and his work according to this theory that deals with the identity of the Renaissance creators.

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Namely, the identity, which represents the sense of personal order, the specific way of addressing the world, is expressed through a collection of testimonies of individuals about themselves and the specific type of social and cultural activities (Brubaker & Cooper, 2000). Within literary works, a writer has many opportunities for this kind of expression, and he does that through its characters. Namely, he loads his identity and forms a hero as his literary double. During the Renaissance, the relationship between intellectuals and the powerful starts its redefining. The old social forms are disbanded, and the new ones haven't been formed yet. In addition, it is a time of layman intellectuals who are free from the authority of the church, at least temporarily, and who enter into a special relationship with those who represent power. In doing so, they adapt with self-fashioning consciousness to the points of power, initially concentrated in the government system, but, again, in the church, and others who represent power - family, first of all.

Self-fashioning is a process, self-conscious, willing design of one's public figure, from dressing and behaviour to opinion, in accordance with socially acceptable standards of a certain society. Individuals, especially sensitive ones, such as creators, are aware of the consequences of this process, the responsibilities and of the dangers that this process bears.

Dubrovnik Renaissance was not excluded from this process. Its most prominent representative, playwright Marin Držić, his work and his biography are an illustrative example of self-fashioning.

The start of Marin Držić's literary work testifies to a very good position that poet established through his love Petrarchan verses and pastoral scenes. Cheerful spirit, literary knowledge and theatrical experience gained first in Siena, and later in other cities of Italy, allowed Držić to present himself in the pastoral prologue *Tirena* (Držić 1963, pp. 27-28) in a special place, in an idyllic setting, near water, surrounded by fairies ("with the fairies by the water"), with the laurel on his head ("made worthy of laurel wreath"), and ready to celebrate its republic ("to celebrate this country to heaven"). He considers himself the successor of the first Dubrovnik Petrarchists, his uncle Džore Držić and poet Šiško Menčetić. However, the idyll does not last long. Very soon the authorship of this magnificent pastoral was doubted. This makes the writer angry and he decides to protect his previous work from accusations of plagiarism by a special mean for that time. Therefore he prints them in Venice in 1551 and dedicates work to Dubrovnik patri-

cian Pucić Maro, whom he begs to protect his work from wicked tongue and defamation with his virtues and good voice (Držić, 1963, p. 21).

This act is also supported by prominent Mavro Vetranović, which has been otherwise incorrectly referred to as the author of *Tirena*, through his song *A poem of support for Marin Držić*, which explicitly states that he "... is stealing from nobody" (Vetranović, 1994, pp. 127-131), which, apparently, hasn't been enough to stop rumours and liberates the true author from suspicions.

Poet's anger and bitterness were not calmed. Already in a farce *Novela od Stanca* (Držić, 1963:89-111) Držić criticizes the moral of Dubrovnik citizens, which is exposed by Miroslav Pantić (Pantić, 1984, pp. 4-16), identifying the alleged fairies with unfortunate ladies of the night in Dubrovnik then. They couldn't rejuvenate the elderly or Stanac, Držić's reluctant hero, but they were able to transmit the deadly sexually disease that had, the writer skilfully found, initials symptoms similar to rejuvenation. To this hilarious situation laughed uproariously those who had been able to lead such a secret unworthy life.

Perhaps more important than these moral sparklets was the possibility that Držić just sensed in his farce *Novela od Stanca*. Engaging in an attack on the customs of society, which at the time was very dangerous and regularly sanctioned, Držić was already thinking about a certain hiding (masking), which lead to the idea of constructing his public identity. This was first through the idea of conscious mask manipulation and then through the concrete shaping of his public identity.

The main character, a young nobleman Dživo Pešica, skilled and cheerful joke teller to an aging Stanac, has been recognized, first of all, by the audience, as an actor, since he is being addressed as "our old Rade," that is by the name of character from pastoral *Tirena* where this young man from Dubrovnik probably has acted (Držić, 1963, p. 96). In addition to this revealed identity, Držić is using the case of the same figure to indicate the possibility of construction of another identity: Dživo Pešica in farce, in front of Stanac, is pretending to be a successful merchant from Dubrovnik in order to obtain his confidence. Even that hasn't seemed enough to Držić's playful imagination. That merchant, who describes the life of a common citizen of Dubrovnik Renaissance in completely authentic manner, has a name completely out of the real context: he calls himself an Eighth Husband and delves into the carnival-magic area.

In this way, Držić's hero is expressed in complex identity construction: he is an actor, a family member who performs Držić's plays, Radat from *Tirena*, he is Dživo Pešica in *Novella od Stanca*, but also a successful merchant from Dubrovnik. He is also a mysterious eighth husband, who is linked to the name of Magician - Seventh Husband from Držić's plautan comedy *Dundo Maroje*, and probably from his lost comedy *Pomet*.

Through these numerous possibilities of establishing identity in terms of a single person, Držić is clearly preparing to shape his own public identity. This is his introduction to the self-fashioning, which is claimed by Greenblatt as narrative fiction, project with an aim to make a part of one's own, to live one's life as a character thrust into a play, constantly renewing oneself extemporaneously and forever aware of one's one unreality (Greenblatt, 1980, p. 31).

This kind of Držić's imagination is recognized in his most successful work, in the comedy *Dundo Maroje* (Držić, 1963, pp. 113-293), where he is still hesitating between two ways of his own subversive activities in relation to public opinion, ruling moral norms and the government.

The first mode is shown in the prologue of the Long Nose Magician: Držić criticizes his environment, presenting it allegorically, so that the audience, which is subject to criticism, is not aware of it. This dangerous game was probably very interesting to comedian, especially since a lot of excitement came along with it: in case any of numerous representatives of aristocratic parliamentarian government which for centuries ruled Dubrovnik had recognized himself in men "untrue" (false, evil people), and not in "true" people (true, genuine people) that would cost Držić his life.

Držić is clear that true, real, genuine people are: "looser, quiet people, wise people and reasonable people." And, most importantly, "the heart is not under a mask, they bear their heart in front of their eyes so everyone sees their good thoughts ..." (Držić, 1963, pp. 115-118).

The second method has been widely explained, and presents Držić's reconsidering in identity shaping, where he names this process as - "akomodovanje" (adjustment). Here is self-fashioning expressed as a narrative feature – Pomet Trpeza, servant-manipulator, consciously shapes his behaviour anticipating the situation and further development. He argues that one should be very skilled and time adapting. Namely, it is not important to have money, because many who

have money are depressed; it is not important to be educated, because they are usually full of worries and tend to fantasize; is not important to be a hero with a sword in a hand, because dungeons are full of these, or they are killed. It is important, Pomet says, to know how to behave in evil times, in order to enjoy good times (Držić, 1963, pp. 161-163).

At that time, Držić's impression of himself as a writer and comedian has been already changed. The one who writes comedies, Držić says, everyone use to ridicule and instead to show him gratitude, they send him away with insults and became his enemies. Thus when author sets his work on stage and acts in them, he often has to sing when he would preferably cry (Držić, 1963, pp. 161-163)

From hiding behind masks, through attempts to structure its various identities while using his dramatic heroes, the writer is fully aware of its own status as an invention. Such mental-psychological situation is followed by perpetual self-reflexiveness and perpetual self-estrangement (Greenblatt, 1980, p. 31).

In that way, from irony over the sarcasm in his dramatic works, Držić gets to the tragic tones.

First, a comedy *Skup* (Držić, 1963, pp. 295-367) shows a bleak picture of the Dubrovnik nobility through the character of passionate miser. The personality of Dubrovnik nobleman in this comedy is much dehumanized as compared to another Dubrovnik's miser Uncle Maroje. All the values of his life, beginning with the most intimate parent values, are subordinated to the passion for possession, to gold as a symbol of the Dubrovnik society at that time. This indicates a more open comedian appearance and specific disclosure of his attitude towards the modern Dubrovnik and its authorities and the social and moral norms. This is the result of Držić's mental and physical condition, since the writer is aware that "all ... are caught up in receding layers of fantasy." Therefore, he "laughs or is angry to see another pride himself on a mere fiction, while he himself is no less a player, no less entrained in fantasy" (Greenblatt, 1980, p. 27).

Finding himself in this condition, the writer is only a step from an escape from the narrative, achieving the dream of a cancellation of identity itself and an end to all improvisation (Greenblatt, 1980, p. 32). The feeling of absurdity leads to social criticism, that is, when it comes to Držić, to the attempt of the actual actions against the source of power, that is, Dubrovnik authorities.

This is the moment when Držić's conspiratorial letters are written (Držić, 1963, p. 369–387; Kunčević, 2007, pp. 9–46), in which he boldly asks for the intervention of the Florentine dukes of Medici for a change of government in Dubrovnik.

Dubrovnik nobility which governs the Republic, Držić called "twelve monsters, unarmed, foolish, worthless," citing unconvincing examples of their poor management of state affairs, the economy, the judiciary. His plans for the conquest of power are also naive, since he asks from Cosimo de' Medici and his son Francesco only fifty soldiers with four captains, poorly armed (only with a sword), that he would meet in Dubrovnik, with the prior anathema (true or false) given by the Roman Pope. The aim is to dethrone the current regime, to form a parliament from the nobility and the bourgeoisie, modelled on the Italian statelets (Držić, 1963, pp. 369–387).

In these letters Držić sees the power of Dubrovnik authorities in its ability to impose its own fiction to the world that is to the citizens of the Republic. The more this fiction is unrestrained, a comedian considers, its manifestation is more impressive. Ceremonies, conventions, theatrical rituals are methods of presenting its power.

In that situation Držić tries to deny fiction and to play his own role. He believes that this is absurd: the rulers and the circle around them are crazy, obsessed by gullible fantasies, unable to distinguish between truth and fiction (Greenblatt, 1980, p. 16). He is also aware of his participation in this and his attempts to adapt (akomoduje), to cover up his own nature. It all leads to the disturbing inner emptiness and alienation.

This move is very dangerous. This sense of the human absurdity then at once leads him to social criticism and undermines that criticism, enabling him to ridicule the ideology of the powerful but severely limiting the practical consequences of that ridicule (Greenblatt, 1980, p. 27). However, Držić opts for practical actions, thus avoiding his annulment. After the negative response of the Florentine government, he himself gives up on daring ideas (Kunčević, 2007, pp. 9–46), which has no effect on his attitude, or on its further fate. Physical death of Marin Držić, which is likely but

unsubstantiated consequence of his conspiratorial act, had not annulled his escape from alienation, but had just stopped him. Držić remained true to his attitude perhaps from the reason he did not have time to adapt further.

Greenblatt's self-fashioning theory of renaissance literary creators has found its application in the interpretation of the life and work of Marin Držić from Dubrovnik. In this way, the new and more detailed analysis of its specific pastoral, farce and plautan comedy is given, which will prove again the classical quality and timeless value of dramatic works of the renaissance greatest creator in our region.

CONCLUSION

Recent studies of Renaissance literature provide us newer access to research of Dubrovnik literature. In this work, it is shown that the methods of new historicism can be applied to the modern perception of the work of Marin Držić. In this way, it has been shown also that the works of his predecessors, contemporaries, and supporters can have their new interpretations when applying Greenblatt's theory of self-fashioning. This primarily refers to the authors whose diverse and rich work provides an opportunity for complex considerations, such as the personality and work of Mavro Vetranović and Nikola Nalješković.

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POSSIBLE CALCULATOR ADDICTION IN STUDENTS WHILE PERFORMING SIMPLE CALCULUS OPERATIONS IN SOLVING MATHEMATICS PROBLEMS

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Review paper

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ABSTRACT

Contemporary learning processes in schools and universities could not be imagined without the use of computers and calculators. Naturally, all is good if they are used in order to acquire new knowledge or solve problems from expert subjects in technical schools, which demand large quantity of simple mathematical operations. However, what if frequent use of calculators, either pocket or those installed on every home and school computer, becomes an addiction in students who begin using them while calculating simple mathematical operations, such as multiplying or adding and subtracting one-digit numbers or numbers smaller than 20, when they should know this by heart? We arrived at this hypothesis during knowledge tests for students after regular demonstrations and elaborations of Mathematics subject matter. In order to confirm or deny this hypothesis, generic/developmental method, that is, survey was used as one of research techniques (Selimović, 2013., p. 104). The survey was conducted in March during academic 2016/2017 and the sample consisted of 59 students in 2nd grade of Grammar School Tešanj.

Key words: *simple calculus operations, one-digit numbers, multiplication table, adding, subtracting, calculator.*

INTRODUCTION

Contemporary life could not be imagined without the use of computers in various human activities and work areas. Mass production and use of different kinds of calculators and other electronic aids has greatly simplified work in accounting, commerce, engineering and other human activities where a lot of simple mathematical operations need to be done in a short time. Before the birth of electronic calculators it was a long and tedious work of a great number of employed clerks who spent their entire work life doing simple mathematical operations either by hand or using mechanical calculus aids.

Mass production and use of calculators has greatly facilitated teachers and students in contemporary classes in subjects where solving problems demands completing a certain number of basic mathematical operations with multi-digit numbers and where basic mathematical operations are only means to apply newly acquired knowledge. Such is the case with Physics classes, where solving practical problems demand incorporating given values of parameters and physical dimensions into empirical or derived formulas in order to gain values of other physical dimensions.

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However, contemporary Mathematics classes demand successful and rational work. The center is placed on the process of acquiring knowledge, where solving problems requires very few basic mathematical operations, mostly with one-digit numbers which should be easily completed by heart without the use of computing aids

The subject of this research is to examine possible students' addiction to calculators while performing the most basic calculus operations while solving mathematical problems. In other words, the subject of this research is to determine whether students will mechanically use calculators in learning new Mathematics subject matter and solving problems even when they need to add or multiply two one-digit positive or negative numbers, or use their own biological memory and 'remember' that they learned it in beginning grades of elementary school.

GOAL AND TASKS OF RESEARCH

Basic goal of this research is to determine whether and to what extent students use calculators while solving mathematical problems even when the problem requires one or two basic calculus operations with one-digit numbers, which they would need to do by heart with no calculus aids. So, what needs to be determined is to what extent is everyday use of calculus aids present in students while learning Mathematics subject matter.

The subject of research and formulated goal of research yields the tasks of research.

1. To determine whether and to what extent students use calculus aid – calculator in performing basic calculus operations.
2. To determine whether overuse of calculators (if it exists) has gone to an extent that students are using it for the most basic calculus operations between two one-digit numbers.
3. To indirectly determine whether Mathematics knowledge that students acquired in lower grades of elementary school - basic calculus operations – is successfully used when needed in secondary school or whether the overuse of calculators got is 'stuck somewhere in neurons of brain cortex'.

The above-mentioned goal and tasks of research set the zero hypothesis as follows:

H0: Gained knowledge in Mathematics from lower grades of elementary schools is successfully used among students when they need it while solving mathematical problems in secondary school, so they do not need calculators for this. Students use calculators in Mathematics classes in secondary school only when they solve problems which demand a great number of simple calculus operations with multiple-digit numbers in sort time, or when they need to perform calculus operations which cannot be done by heart (rooting, logarithm, trigonometry operations).

Opposite to zero hypothesis we find the main hypothesis of the research, which states:

H: Students overuse calculators so much that even for the simplest occasional calculus operations in Mathematics classes in secondary school they use calculators, so it can be said that they have become addicted to calculators.

The main hypothesis can be broken into two sub hypotheses:

H1: From the lowest grades of elementary school, students use calculus aids for solving Mathematics problems, so they never completely absorbed knowledge about basic calculus operations, which lead to their addiction to calculators in their later education.

H2: Students started using calculators in secondary school in Mathematics and Physics classes when they needed to perform calculus operations which they could not complete by heart, so this need later grew into completing simple calculus operations with a calculator, which then lead to students' addiction to calculators.

RESEARCH

In order to ensure quality survey conditions and acquire reliable empirical data, the characteristics and size of sample were taken into account. The sample comprised of students in three 2nd grade classes in Grammar School Tešanj, in total 59 students – examinees. When it comes to size of the sample, this is medium sized sample, but the survey does not emphasize on the number of examinees but rather on results of the research.

In order for survey to be adequate, good and successful, the questionnaire needed to comply with the following terms:

- 'To contribute to examinees' high motivation;
- To ask examinees necessary information which cannot be gained any other way;
- To be optimally long and not require a lot of time to fill;
- To meet aesthetic standards (look attractive and well put together);
- To avoid intimate questions;
- To guarantee anonymity;
- To be clear;
- To have questions formulated clearly, specific, short, unambiguous, understandable, without extra unnecessary words and unknown and unusual terms;
- To have questions which are not suggestive'. (Pedagoška enciklopedija I, 1989, p. 27)

Regarding general information, every examinee needed to write gender, class and average Mathematics grade on the questionnaire.

The questionnaire was closed and comprised of eight questions, and every question offered three answers. The answers were graded 1 to 3, while examinees did not know the grading tables in order to avoid suggestive questions. Answers which were offered had 1 point for supporting zero hypothesis, 2 points to show that examinees are between zero and main hypothesis, and finally, 3 points for supporting the main hypothesis.

So, scoring for given answers to all eight questions in the questionnaire was done so that the sum of points cannot be less than 8 or more than 24. From this range of possible sums of points for completed questionnaire a scale was made based on which every examinee was classified in one of three possible groups, as follows:

1. Examinees whose sum of points is 8-13 fall into the group of those not addicted to calculator and who perform occasional simple calculus operations in Mathematics by heart.
2. Examinees whose sum of points is 14-16 fall into the group of those who do not find their way in Mathematics classes without the use of calculator, that is, they occasionally make mistakes in simple calculus operations and it can be said that they are borderline addicted to calculators.

3. Examinees whose sum of points is 17-24 fall into the group of those who perform every calculus operation in Mathematics classes using calculators, regardless of its kind and volume, that is they can be said to be addicted to calculators.

RESULTS

During analysis and interpretation of research results the percentage procedure was used as quick and simplest manner of statistical analysis.

Therefore, upon the completed survey with 59 examinees and examining as well as analyzing the questionnaire, the following results were gained:

1. Group with points ranging 8-13 comprised of 44 examinees, with the percentage 74.58%.
2. Group with points ranging 14-16 comprised of 6 examinees, with the percentage 10.17%.
3. Group with points ranging 17-24 comprised of 9 examinees, with the percentage 15.25%.

CONCLUSION

Based on acquired results of the survey it can be stated that majority of representative sample (3/4) is not addicted to calculators and performs occasional calculus operations in Mathematic classes by herat without the use of calculators.

Only 1/10 of the representative sample makes occasional mistakes in basic calculus operations if they do not have a calculator, so it can be said that they are borderline addicted to calculators.

Approximately 1/7 of the representative sample performs every calculus operation regardless of it type and size with a calculator, so this manner of use of calculators is classified as addiction.

Based on the demonstrated results, it can be seen that zero hypothesis is confirmed, while the main hypothesis with its sub hypotheses is luckily denied. Those examinees who confirmed the main hypothesis are merely exceptions who confirm the rule.

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SOME THEORETICAL ASPECTS OF ECONOMIC INTEGRATION

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Review paper

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ABSTRACT

One of the basic links of the process of globalization are economic integrations. The aim of this paper is to systematize theoretical achievements and to review the forms, effects and conditions for connecting countries motivated by economic benefits. In addition to the theoretical review of the conceptual definition of economic integration, the focus is on the levels of economic integration from the free-trade zone to the monetary and fiscal union, explaining the specificity of each of the mentioned levels. Considering that the connection between countries always raises the question of the benefits and costs of connection, the special emphasis in this paper is placed on the potential effects for free trade. Finally, the greatest contribution of this paper is the systematization and theoretical review of the theory of optimal currency area and monetary integration, which is especially significant for the European soil, taking into account the already established European Monetary Union.

Keywords: *forms of economic integration, effects of economic integration, theory of optimal currency area.*

JEL: *F15*

INTRODUCTION

The perception of economic integration, and the interpretation of the effects of concrete integration depends on the level at which the integration itself takes place. Theoretically and empirically, several levels of integration are analyzed which, depending on the strength of the established connections between member states, and the degree of transfer of national competencies to the integration of the formed institution, give different results and effects reflected in the costs and benefits of integration. In order to form some kind of integration among countries, the countries of the integration process must be guided by some motives.

In modern economic integration, the most common integration motives are reflected in the resulting economic and political, usually, positive effects of integration. But besides economic and political motives, there are, and especially from the 18th to 20th century expressed, violent (through colonial

integration, when the "law of the stronger" ruled), and military motives of integration. But the subject matter of this paper will be the dominant economic integration motives, and in accordance with this, there are four different levels of integration: the free-trade zone, the customs union, the common market and the economic and monetary community or union.

Each of the above levels of integration, from the lowest to the highest, results in certain benefits and costs of integration, which primarily depend on the level of preparedness and development of the country that enters the integration processes. This means that, by default, every aspect of economic integration will not benefit if the potential member of integration has not readily entered the integration, with the maximum use of comparative advantages, and by the prepared internal forces to fight the pressure of competition coming from the member states.

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Therefore, the realization of economic integration motives, reflected through the improvement of economic activity through increased productivity, innovation and technological progress, the mobility of production factors, and ultimately more equitable distribution of wealth and the growth of the standard of living of the population, must be supported by structural changes and adequate preparation, not only for the formal membership, but also for essential and positive economic integration of the country. It is both theoretically and empirically proven that the economic integration has positive effects, which does not call into question the need for the integration of countries, but the problem of the will of the developed member states to make the integration useful for all members by conducting a just regional policy, which will result in a humane and fair distribution of the created wealth, that is, the convergence of the states of integration.

METHODS

In this paper, during the research, appropriate scientific-research methods were used: deduction, induction, synthesis, comparison and dichotomy as a form of specialization. Since the research carried out relates to theoretical aspects of economic integration, literary materials in the area of economic integration as a research base have been used, and appropriate research papers and internet sources have been used for the purpose of a more detailed theoretical coverage of economic integration and their potential effects.

THE THEORY OF ECONOMIC INTEGRATION

The notion of integration refers to consolidating, or connecting smaller entities into a larger system, in order to exploit the benefits carried by the functional interconnection. However, any kind of democratically based integration (political, military, economic, etc.) does not arise in itself, but is the result of positive expectations of separate entities in the integration process, and these expectations are reflected in the quantitative and qualitative expected benefits of integration. The case study of this paper are the economic reasons for integration, which result in the creation of economic integration, which, besides achieving positive economic results, manifested in the improvement of key macroeconomic variables of the linking entities, significantly contributes indi-

rectly to achieving other goals. Accordingly, the economic reasons for integration and economic integration stand out as a prerequisite for the success of any other form of integration between countries. Bearing in mind the above mentioned, there are many definitions of economic integration, and in this paper, two definitions given by El-Agraa are distinguished:

„**Economic integration** implies the agreement of two or more states on common goals and the pursuit of a common policy.“ (El-Agraa, 1982, p. 8)

„**Economic integration** implies a state or process that involves the fusion of individual economies into larger regions“ (El-Agraa, 1982, p. 9)

It is important to note that economic integration, but also any other, does not necessarily have to be profitable, and that any economic integration does not mean improving the value of macroeconomic variables, on the contrary, negative movements are possible. The degree to which a country will benefit from economic integration depends on its internal readiness to connect and open the borders. This implies that the realization of the planned economic integration goals that can be seen in the increase in GDP due to market growth, productivity growth, technological improvements, the mobility of production factors, innovations, and the improvement of the balance of trade balance and current account must be supported by structural changes and adequate preparation internally, which will be based on an efficient public administration, targeting the key sectors on which growth is based and maximizing the competitiveness of these sectors, by exploiting comparative advantages, favorable business environment and other elements of the competitiveness of the economy.

Different types of linking countries into specific trading blocks, regardless of the strength of the established link, represent only one part of the overall process of the globalization of gainful employment with a tendency to create a single world market.² Theoreticians of international economy, including Nobel Prize-winning Paul Krugman, argue that total global welfare will reach its peak in the event of the removal of all barriers in trade relations between countries, which certainly represents one of the strong arguments of the continuation of globalization.

²This is unlikely to happen, due to the contradictory interests of the bearers of the process of globalization (primarily the US, China, Russia and the EU), as well as the inability to reach a consensus on the paths of globalization, as well as determining the leader of the entire process.

However, the globalization process also has its opponents, who strongly advocate obstruction of the entire process, since they consider it to result in an uneven distribution of wealth and the loss of national sovereignty of individual states, leading them to be unable to independently regulate internal issues. The uneven distribution of wealth implies that the level of well-being measured by GDP p.c. will be at the level of the established integration, but that this GDP p.c. means the average GDP p.c. at the level of established integration, which means that regional development disproportions can occur, and the enrichment of certain parts at the expense of others, or the concentration of growth in the narrow space, which is, of course, theoretically not the aim. In addition to the above mentioned, one of the arguments of the opponents of globalization is the view that globalization will lead to the exploitation of workers in low-income and developing countries in favor of large-scale capital from highly developed countries.

The level of economic integration determines the strength of the relationship between the integration of the associated countries. Cooperation and liberalization of trade between countries can be done on a bilateral and multilateral basis. Bilateral trade cooperation between countries implies defining the terms of trade between the countries covered by the bilateral trade agreement, which does not require the liberalization of trade. Therefore, the level of liberalization of the country is agreed upon depending on their development and the development of mutual relations, because in the case of good bilateral relations, the more developed country can make certain concessions to the less developed country (eg voluntary limitation of exports, specify a preferential customs tariff, provided that it is not a member of a higher degree of integration by which it would transfer those competencies to supranational institutions). Multilateral agreements, too, do not necessarily mean full liberalization of trade, but define the trade relationship between several countries, and at least three. Economic integration is usually done formally at the multilateral level, and depending on the degree of complexity and strength of the connection, it can be: a free-trade zone, a customs union, a common market, an economic and monetary union, and a political union.

The free-trade zone is a form of linking countries that regulate trade relations between two or more countries, which involves the liberalization of trade in goods and services (the gradual reduction and

elimination of customs and non-customs barriers) between the free-trade zone countries, and each of the Member States retains its discretion to independently determine customs tariff to the countries that are not Member States of the zone. The characteristic of the free-trade zone is that it is relatively easy to organize politically, because of the possibility of retaining the right to set tariffs for non-members of the zone, It is not difficult to arrange political regulation of mutual trade between minimum two countries. However, the problem of the free-trade zone lies in the administrative difficulties of determining the origin of the product (adjusted according to: Krugman, Obstfeld, Melitz, 2012). For example, assume that a free-trade zone was established between Bosnia and Herzegovina, Serbia and Macedonia. The free-trade zone regulates the mutual relations and trade liberalization between the members of the zone. Let's also assume that Bosnia and Herzegovina has good bilateral relations with Turkey, and consequently applies low customs rates on imports of products from Turkey, and that Macedonia applies high customs rates on imports of products from Turkey. How can products from Turkey be found on the Macedonian market? A producer from Turkey who wants to place his product on the market of Macedonia can make most of the products in Turkey, and at a low customs rate export them to Bosnia and Herzegovina, and then in Bosnia and Herzegovina he can finalize and obtain a certificate of origin confirming that the product originates in Bosnia and Herzegovina. Then, due to the liberalization of trade between Bosnia and Herzegovina and Macedonia, which is a consequence of membership in the free trade zone, the product will be exported to the Macedonian market. The problem occurs at the border of Macedonia with the actual determination of the origin of products, and the prevention of possible abuse, especially if the product has a certificate of origin of a member country of the free-trade zone. An example of a free trade zone is CEFTA 2006³.

The customs union is a higher degree of integration in relation to the free-trade zone. The specificity of the customs union is reflected in the liberalization of trade (reduction and abolition of trade barriers) between the member states of the union and the application of the single customs tariff on imports from third countries.

³Eng. Central European Free Trade Agreement.

In this way, a part of the national sovereignty is shifted to the integration of the formed institution. The customs union solves the problem of determining the origin of products, given the unique customs tariff towards third countries, but it is much more difficult to politically establish the customs union in relation to the free-trade area (adjusted according to Krugman, Obstfeld, Melitz, 2012). The reason for this lies precisely in the common customs tariff towards third countries. Namely, if we return to the example mentioned in the free-trade zone, and suppose that the same countries formed a customs union, the question arises as to which tariff will apply to imports of products from Turkey, considering that we have assumed that Bosnia and Herzegovina has good bilateral relations with Turkey and apply low customs rates on imports of Turkish products, assuming that Macedonia applies high customs rates on imports of products from Turkey. It is logical that Bosnia and Herzegovina will push for lower, and Macedonia for higher customs rates. This problem usually exists at the beginning of the formation of a specific customs union, and each subsequent member of the customs union accepts a customs tariff that has already been established, since members of the formed customs union set it as a condition for membership in the union, except if the country claiming to be a member of the union is strong at negotiating and significant for the union that a customs tariff may be corrected at its request. The example of a customs union is MERCOSUR (a customs union in South America).

The next higher level of integration in relation to the customs union is the **common market**. The common market implies the economic integration of countries that, in addition to free trade between members, also includes the freedom of movement of people and capital, that is, the factor of production. So, it has all the traits of a customs union with the freedom of movement of the factors of production and people. Increased liberalization aims at improving the positive effects of integration processes. It is important to emphasize that with all the freedoms the equal status of all market participants is ensured, that is, a harmonized legislative framework at the level of integration guarantees everyone the same rights, but also obligations, regardless of national origin. In this sense, this type of integration according to the economic and legal order is not different from the arrangement of a state, only within the country; we have a single monetary and fiscal policy, and one currency, which is not the case in the common market. The best example of

integration with the features of the common market is the Common Market of the European Union.

Fiscal and monetary union is the largest degree of economic integration. It implies harmonization of fiscal and monetary policies, and a single currency at the union level. So, it retains all the properties of the common market, with the addition of a single monetary and fiscal policy. The monetary policy is carried out by a joint central bank in coordination with the central banks of the member states, and the fiscal policy is formed by a joint government at the level of the fiscal union. It is important to note that the monetary union is ranked by the scale of economic integration below the fiscal union, that is, there can be only a monetary union, so that the member states of the monetary union form a fiscal union. In addition to harmonizing monetary policy, the fiscal union implies harmonization of fiscal policies and harmonization of tax regulations at the level of the whole union. Thus, a monetary union can exist without a fiscal union, that is, the rule is to form a monetary and then a fiscal union. The monetary union is characterized by the complete absence of foreign currency risk, which significantly improves the trade relations of the member states. An example of a monetary union is the European Monetary Union, while on the territory of Europe we do not have a fiscal union.

RESULTS

Potential effects of economic integration

Economic integration implies the gradual reduction and elimination of barriers to trade between countries, and the free movement of goods, services, people and capital, and in the highest degree of integration and the formation of a single central bank, the pursuit of a single monetary and fiscal policy. Therefore, by establishing a stronger link among the participants of the integration, certain resulting effects will be caused which will be analyzed in this part of the paper.

There are many arguments for free trade, based on potential effects, and the analysis of the costs and benefits of free trade, but the following three are especially distinguished (Krugman, Obstfeld, Melitz, 2012):

1. Political argument for free trade
2. Removing the loss of efficiency in production and consumption
3. Additional benefits from trade liberalization

The political argument for free trade, and at the same time one can be interpreted as one of the potential effects of integration, is based on the fact that the state of free trade is better than the absence of the same. The reason for this lies in the fact that in the case of protection there will be no protection for economic sectors characterized by dynamically growing yields, that is, economic sectors that, according to the theory of international trade, need protection, but the economic sector with the strongest political influence will be protected, given that the decision on protection is passed by the government and the parliament, which, in fact, are representatives of political parties. Therefore, free trade advocates consider, that it is better to release the free-trade activity as it will create a better state in relation to the situation caused by the politically biased protection

of the sectors of economy that should not be the subject of the same.

The elimination of loss in efficiency in production and consumption is an argument of free trade which implies that it is better to secure free trade, as free trade will provide greater consumption of products and services, which is manifested as an increase in wealth, and at the same time it will be achieved and, overall, higher production to meet this demand. In other words, the introduction of customs increases the price of goods which leads to the growth of supply, but at the same time there is a decrease in demand and consequently consumption of products, which causes a decline in national well-being. This argument is particularly evident in the example of a small country, as shown in the following image.

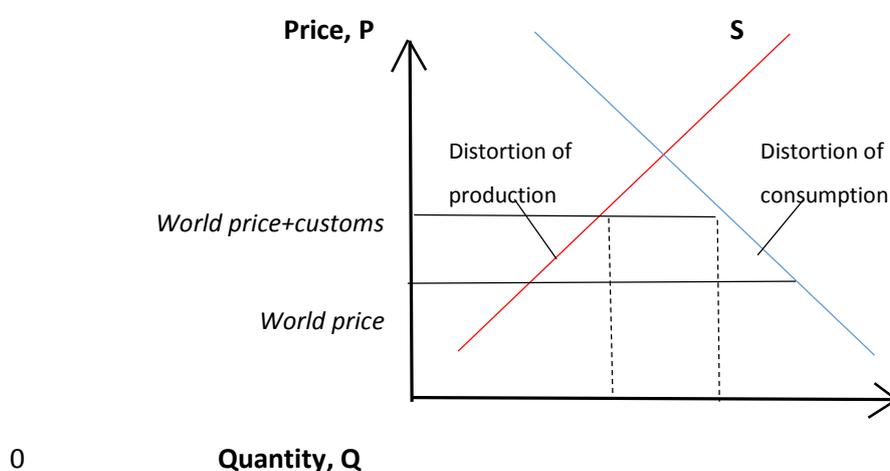


Image 1 Argument of efficiency for free trade

Triangles labeled as distortion of production and distortion of consumption represent the net cost of introducing customs in the case of small countries. Given that the small country has no impact on the fall in the world price of products, there is a rise in prices for the entire amount of customs, so that the net effect of customs introduction causes a decline in wealth, which means that it is better to secure free trade for the growth of the welfare of a small country, because in this case the losses resulting from the distortion of production and consumption will be eliminated.

In addition to the aforementioned integration effects, the additional benefits of integration and free trade are manifested in the achievement of economies of scale, and the possibilities of learning, innovating and strengthening competitiveness. Namely, in case of existence of protection, production is less efficient and high profits are realized, which attracts a lot of companies in a protected economy sector, the production of each company decreases, which leads to an

increase in the average cost and, consequently, product price growth and the reduction of welfare of the poster. In the case of free trade, only efficient producers who produce large quantities of products remain on the market, they achieve economies of scale, all of which lead to a fall in the sales price of products and the growth of consumer welfare at the level of integration. In addition, increased competition at the level of integration forces manufacturers to find new ways of production, which stimulates product innovation and production processes, all for the sake of survival in the market, thus ensuring the achievement of the most efficient production possible (adjusted according to: Krugman, Obstfeld, Melitz, 2012).

When it comes to establishing a customs union, Jacob Vinner performed an analysis of the effects of integration by defining two effects, of which, according to his analysis, it ultimately depends on whether there will be welfare growth. Those effects are: the effect of trade creation and trade diversion.

The effect of trade creation involves the replacement of expensive domestic production and / or more expensive imports from the rest of the world, with imports from a Member State of the Union. In order to create a clearer picture, we will explain this in the following example. Suppose that Bosnia and Herzegovina produces potatoes at a price of 2 KM / kg, Serbia at a price of 1.5 KM / kg and Macedonia at a price of 1 KM / kg. In the event that Bosnia and Herzegovina has high customs rates on imports of potatoes from these countries, resulting in a higher price of imported potato than the domestic price, it will consume its potatoes. But if Bosnia and Herzegovina establishes a customs union with Serbia, it will import potatoes from Serbia at a price of 1.5 KM / kg, thus replacing expensive domestic production with imports from the member state of the Union, and this effect **implies the creation of trade, which leads to the growth of welfare due to Integration**. However, if the customs duty on imports from Macedonia and Serbia before the creation of the customs union was 0.6 KM / pc, Macedonian potatoes in Bosnia and Herzegovina cost 1.6 KM / pc, while the Serbian potatoes cost 2.1 KM / pc, and Bosnia and Herzegovina imports Macedonian potatoes at a price of 1.6 KM / piece, without taking into account other costs. By establishing a customs union with Serbia it would be cheaper for Bosnia and Herzegovina to import potatoes from Serbia at the price of 1.5 KM / piece, because there is no customs duty. But in this case, the well-being of Bosnia and Herzegovina will not increase, since 0.6 KM / pc was the customs revenue that remained in Bosnia and Herzegovina, and Bosnia and Herzegovina pays 1.5 KM / pc to Serbia and the total amount of money goes to Serbia, while in Macedonia only 1 KM / pc was paid. This effect is known as the **trade diversion effect** and implies a decline in the welfare of the country by membership in the customs union.

The theory of optimal currency area and monetary integration

The question of establishing a higher level of integration of the countries in relation to the established common market, in order to continue the further absorption and increase the positive effects of interconnection, after World War II, initiated a debate on monetary convergence of the countries associated with the common market. Everything started with the work of Milton Friedman in 1953, entitled "The Case for Flexible Exchange Rates", which analyzes the method of potential monetary integration of countries, whether

through a fixed or floating exchange rate, or whether to introduce a common currency, and hence, this work is the basis for further research of the monetary integration.

After considering Friedman's monetary integration, the first author who laid the foundations and first mentioned the theory of the optimal currency area, as a theory that should answer the question for which regions or region it is desirable to introduce a single currency or fix foreign exchange rates, and to have a unique monetary policy, and on the basis of a cost-benefit analysis, was R.A. Mundell with his Theory of Optimum Currency Areas in 1961. After Mundell, there were R. I. McKinnon with the work of "Optimum Currency Areas" in 1963 and P. Kenen in 1969. In order to designate certain regions or countries as monetary integrated as an optimal currency area, it is necessary to ensure full employment, low inflation rate and balance in the balance of payments. There are several different definitions of the optimal currency area, and below are two definitions that best and most accurately describe the optimal currency area:

"... a region for which it is optimal to have its own currency and its own monetary policy; A region that is not even so small and open that it would be better to tie its currency to its neighbors, nor so great that it would be better to split it into sub-regions with different currencies "(Caves, Frankel, Jones, 2012)

" 'Optimum' has been used here to describe a optimal currency area in which monetary and fiscal policies and flexible foreign exchange rates can be used to provide the best solution (sometimes conflicting) of three tasks: (1) maintaining full employment; (2) maintenance of balanced international payments; (3) maintaining a stable, internal, average price level "(McKinnon, 1963).

Developing the Optimal Currency Area Theory, Mundell explains how to solve asymmetric shocks in the event of a currency area and in the case of different countries with national currencies that are not fixed. If we had the case of countries with different national currencies and separate monetary policies, demand shocks in one of these countries would have to be amortized in monetary co-ordination with another country. What does this mean? Before changing the supply and demand relationship, both countries are in balance. A decline in demand in one country, caused by a rise in demand for products from another country, leads the first country to a deficit situation, and causes unemployment to rise, and leads to a surplus of the other country and causes the emergence of inflation.

This would imply that the first country, due to the reduction in domestic demand and the balance of payments deficit, must address the problem of unemployment growth in the help of another country. If the central bank of the affected country would lead an expansive monetary policy, thus depressing the national currency, this would increase the export competitiveness of the deficit country, which would compensate for the decline in domestic demand by exporting products to another country, provided that the other country, which is in oversupply, does not reduce the inflation by the decline in credit activity, or restrictive monetary policy. If there is a lack of a cooperative approach from the beneficial country, a deficit country would pay the caused shock with increased unemployment. This would mean that in order to solve the unemployment and inflation problem it is desirable that the two countries with different national currencies have a fluctuating exchange rate in order to make economic stabilization in case of asymmetric shocks. If, in any case, the above-mentioned asymmetric shock occurred within the countries associated with the monetary union, the resolution of the unemployment problem would be exclusively within the competence of the central bank and the willingness of the associated countries to solidarity, as the expansive monetary policy would solve the unemployment problem in a shocked country or region, but it would cause inflation in a region that is not affected by the asymmetric shock. If there are symmetrical shocks in the case of monetary union, the problem is solved by adjusting the foreign exchange rate to the rest of the world. Lastly, Mundell believes that for the full functioning of the currency area is necessary to ensure full labor mobility in order to, on the one hand, redundant workforce in the country in which demand is falling, migrate in a country with a surplus of demand, on the other hand, provided that the other country can produce the products for which the demand in the first country has fallen. Such a method of resolving shocks, in fact, is an alternative to monetary interventions, as labor migration would solve the problems of inflation and unemployment, but it is important to note that short-term shocks, due to migration costs, can not lead to migration, but also that these shocks must be resolved by monetary interventions. Since Mundell was the first to emphasize the importance of labor mobility in a monetary union, and thus found the theory of optimal currency areas, the criterion of labor mobility is called Mundell's criterion: "Opti-

num currency areas are those within which people move with ease" (Boldvin, Viploš, 2010). Significant contribution to the development of the theory of optimal currency areas was given by R.I. McKinnon, who, for the analysis of the optimal currency area, takes the degree of openness of the economy, that is, the volume of foreign trade. His analysis shows that a country that has a higher proportion of goods that are internationally viable or that are the subject of international exchange should be used by a fixed exchange rate, because in the case of a fluctuating exchange rate, due to the shocks that cause the change in the exchange rate, this change would significantly affect the price stability and could cause disturbances in the balance of payments. This is particularly significant for a small country that has a large percentage of goods that are the subject of international exchange, since that country can not influence the movement of prices, and therefore, the inclusion of a small open economy in the currency area is proposed. On the other hand, a large economy with a small share of goods that are the subject of international exchange will not appreciably experience currency exchange rate disturbances in the balance of payment and price stability on the domestic market, and therefore it is proposed to use the fluctuating exchange rate, and eventual disruptions in the balance of payments can be corrected by a small reduction in consumption. If there are several countries that are open to trade, competition will create the price of the product, and in the mutual relationship lead to price equalization, so that the real exchange rates towards the rest of the world are identical for both countries, which means that for these countries it is more convenient to create an optimal currency area. Bearing in mind the above mentioned, the criterion that emphasizes the openness of economies for creating an optimal currency area is called McKinnon's criterion: "Countries that are very open to trade and to a large extent trade with each other form an optimal currency area" (Boldvin, Viploš, 2010). Peter Kenen of Princeton University continued to upgrade the optimal currency area theory. His contribution to the development of this theory is reflected in the introduction of a new criterion for the success and efficient functional functioning of the currency area, which is the diversification of production. Namely, Kenen believes that asymmetric shocks result in negative economic effects, and arise because countries or regions produce a variety of products.

Therefore, if the countries or regions in question have a diversified economic structure, diversify production, occasional asymmetric shocks will not cause significant adverse effects, since negative effects can be annoyed by redirecting resources to other related industries on the one hand, and there will be no need for monetary interventions if countries have similar products, since each country will be approximately equally affected by these shocks, so that they will suffer losses equally, on the other hand. For the success of the currency area, it is also necessary to meet this criterion, which according to Kenen was named Kenen's criterion: "Countries that have wide diversified production and exports and which have a similar structure form an optimal currency area" (Boldvin, Viploš, 2010).

In addition to the aforementioned economic criteria, certain political criteria need to be fulfilled for the formation of the optimal currency area, as well (adjusted: Boldvin, Viploš, 2010):

1. **Transfer criterion:** *countries that agree to help each other in the event of negative shocks form an optimal currency area;*
2. **Criterion of Homogeneity of Preference:** *Member States of the currency union should have a broad consensus on how to deal with shocks and*
3. **Solidarity criterion:** *When a common monetary policy raises a conflict of national interest, the countries that make up the currency area must accept costs in the name of a common fate.*

Forming an optimal currency area with it has certain significant advantages, but if it is formed between countries with a lack of real convergence, it can also cause negative effects. The most important advantages of inclusion in the currency area are reflected in the following: increasing allocative efficiency due to the elimination of the exchange risk, and reduced risk coverage costs can result in increased international exchange and integration; Removing, partially or completely, the exchange risk may reduce interest rates on those markets where the exchange risk premium was included in the interest rate; The possibility of financing the deficit of the balance of payments with the local currency due to its convertibility, without the need to earn foreign exchange; Reduction of transaction costs; Some countries by entering the monetary union can achieve credibility as a result of abandoning their own monetary policy and their own currency (in this way it is possible to reduce the high rate of inflation in these countries); Reduced relative price variability (this argument is valid only if

the prices of some commodities are more sensitive to the change in the exchange rate, and in the case of its fluctuation, they are fluctuated); Less susceptibility to speculative attacks (Hallwood, MacDonald, 2000).

The shortcomings that can be associated with accessing the currency area are reflected in the following (Koški, 2002):

1. If inflation is not stopped or the country approaches the currency area with an overestimated domestic currency rate, it can enter a period of high unemployment and reduced economic growth;
2. Relatively low-income countries can attract mainly direct low-value investments, while for high-income countries, the opposite is true. U odsustvu deviznog kursa izlaz mogu biti samo međuregionalni transferi. This means that due to the diversity of economic structures, countries are exposed to asymmetric shocks;
3. Withdrawal from inflation that can contribute to the reduction of public debt (if it is not indexed);
4. Monetary policy of the Union can be set up so that it does not gratify all members, as with interest rates, neither with the exchange rate. Furthermore, there is a problem of division of emission gain (seigniorage).

If we collectively look at the foregoing conditions for the existence of an optimal currency area, we can rightly ask whether the optimal currency area is only a theoretical model, and whether it is possible to create the same. The reason for this lies in the fact that in the 21st century we have uneven development between certain regions within very small countries, and these underdevelopments are also conspicuous in large countries, which is the result of domestic political pressures on the development of individual parts or regions in order to neglect the equal development of all regions. This means that if a country is unable to meet, first and foremost, the political criteria in its territory, it will probably not be ready for consensus on the territory of the possible optimal currency area. An important condition for an optimal currency area is certainly a real convergence, which has not been achieved at the national level, which undermines the willingness of more developed countries to create an optimal currency area, since these countries would have to give up certain funds in order to more evenly distribute wealth, that is, the reduction of national development disproportions. Therefore, the formation of a currency area with all the defined criteria between several countries is not possible, and the question is whether it is possible at the level of one state.

All this leads to the conclusion that it is desirable to create a monetary union and that these developed countries are ready, but with the aim of reducing costs and risks in mutual business, and more competitive approach to the rest of the world, but the optimal currency area is still at least on the European soil, far from realization.

CONCLUSION

The complete, forward-presented, analysis of economic integration, from the aspect of economic parameters, does not inevitably address the need for integration, since in the integrated space there will be improvements in the value of macroeconomic parameters. However, the question is how the dispersion of the created wealth will be carried out, and whether integration leads to the enrichment of the rich and the placing of a less competitive country in the function of further development of more developed members of integration. It is unlikely that the developed country, which enters the integration processes, will advocate for a just regional policy. This is supported by the fact that the developed countries at a national level do not respect the principles of balanced regional development, and the question is how is a country going to advocate for a fair regional policy on an international

level when there are regional divergent development trends internally. Finally, it is important to conclude that any integration does not necessarily mean generating positive economic results, but that economic integration can contribute to the economic development of a member state if it achieves the appropriate degree of competitiveness on the internal plane and takes advantage of its comparative advantages in the integrated space.

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PROPERTY RELATIONS OF MARITAL PARTNERS THROUGH THE HISTORY OF BOSNIA AND HERZEGOVINA

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ABSTRACT

The institutes of contemporary family law are rooted in Roman law, including the property relations of marital partners. From the historical perspective, the property-legal relations of marital partners in Bosnia and Herzegovina (BiH) were subject to religious regulations and the rules of the General Civil Code and Family Law of the Socialist Republic of Bosnia and Herzegovina. The article analyzes the solutions applied during the Roman, the Ottoman, and the Austro-Hungarian rule as well as the solutions included in the currently valid Basic Law on Marriage and Family Laws in BiH. The authors focus on the development of family law in terms of property relations of marital partners and provide historical-legal overview of the development of family law from the absolute power of pater familias to the full equality of marital partners.

Key words: family law, marriage, dos, mehr, property.

INTRODUCTION

As an institute, marriage developed in various cultures long before the written history and was regulated by common law that was codified into written laws later. In the ancient history there was a need for the regulation of property relation between the prospective marital partners. Babylonian law in respect to dowry identified two terms: *sheriktum*, a dowry as a part of marital property and *nudunnum*, wife's marital property. Although the husband managed the entire property, in case of a divorce a dowry was returned to the wife or her heirs. The ancient Egyptian law applied numerous customs and tradition in the regulation of marital relations. When the marriage was contracted, the wife would bring certain property including a dowry but also the property which served as an allowance for her and her children. Roman law saw a gradual development of the institutes with a direct influence on legal and property relations of marital partners. Although the issues of property relations were processed in accordance to the custom law, the institutes such as: *sponsalia* (engagement), *donation ante nuptias* (a wedding gift to the bride) and *dos* (dowry). The Twelve

Tables did not include specific orders pertaining to the abovementioned institutes, but its content suggests that the institute of a dowry was known. Dowry was later described in details in the Justinian Code.

With time, these institutes of marital and legal relations of prospective partners, established in Roman law, influenced the development of later and some currently valid regulations in family law. In Medieval Bosnia, the issues of marriage and marital relations, including the property relations as well, were regulated by Common Law, with the written records on the absence of a dowry dating back to this period. The property relations on the territory of BiH, from the Ottoman rule to the passing of the Basic Law on Marriage in 1946, were subject to religious rules. The Austrian Civil Code, brought in 1811, which was indirectly applied in Bosnia and Herzegovina (BiH), included the provisions on the property relations of marital partners. The passing of the Basic Law on Marriage brought secular state and the institutionalization of marriage and consequently of all the relations between marital partners on the territory of BiH.

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“In its widest sense, marriage is a permanent union of life between man and woman. The Romans considered marriage to be only the union recognized as such by the law” (Horvat, 2002, p. 131). Man and woman were in *de facto* union of life with the intention for their union to be considered a marriage. “The Romans knew two forms of marriage – with *manus* and without *manus*” (Stanojević, 2000, p. 160). In Roman law the word *manus*, meaning hand, is a symbol of power, which is why it is used in the names of some legal affairs, *manumissio*, and even for the marriage with *manus*².

The property relations between spouses are different in *cum manu* and *sine manu* marriages. “The marriage *cum manu* put the wife under the power of her husband (or his *pater familias* if he had one) and she was given the position of a daughter while her property became his” (Watson, 1991a, p. 27). In such marriage, the wife³ did not have her property as all the property, whether the one she had before the marriage or the property she acquired during marriage, belonged to her husband or his *pater familias*, provided he is the person *alieni iuris*⁴. “In the *sine manu* marriage, the concept present in the XII Tables, *Lex duodecim tabularum*, and probably even earlier, which became the rule by the end of the Republic, wife remained alien to her husband’s agnate family and did not fall under her husband’s ownership, keeping at the same time, regardless of the fact that she was married, her previous agnate membership of her previous family” (Horvat, 2002, p. 132).

²Previously, a widely accepted opinion in science was that only the marriage with *manus* was legal, while the marriage without *manus* was considered a sort of half-marriage which became legal only through a certain period of time. Recent research, supported by rich comparative material of oriental peoples as well as the peoples in the primitive stage of development confirm that most ancient peoples, including Romans, were familiar with the duality of marital forms, regarding husband’s authority over wife. In earlier times, other peoples, as well as Romans, saw the marriage with *manus* as a regular phenomenon conforming to the strict and closed organization of a Roman family in the period of natural economy. More developed economic circumstances that loosened the previous strict agnate family organization brought more independence to family members, including women. Hence by the end of the Republic, *sine manu* marriage became a rule. (Horvat, 2002, p. 132)

³On the position of woman see more Gardner, 2009.

⁴The property which the woman held or which was constituted for her benefit, passed into the possession or ownership of her husband. He became liable on her contracts in the same degree as if the obligations had. In this system there were no proper matrimonial relations. The husband’s rights were paternal rather than marital, and, so far as the law was concerned, paternal rights were as unlimited as those of a *dominus* (Loeb, 2004, p. 95-96).

This type of marriage recognized the principle of distinct goods, which means that wife’s property was managed by her *pater familias*, if he is the person *alieni iuris* or by the wife personally, provided that she was *sui iuris*. “In the event of dispute on the origin of wife’s property, the so called *praesumptio Muciana* applied, the presumption that everything a married woman possessed had been given to her by her husband unless she could prove otherwise” (Lučić; Šarac, 2006, p. 77). Husband did not have the right to manage or use wife’s property that was not a part of her dowry, which was marked as *bona parapherna*. The literature states that wife in *manus* marriage came under the control of her husband or his *pater familias* and was given the position of a daughter, *filiae locus*, along with the inheritance right in that family (<http://www.ius.bg.ac.rs/naucni/prilozi/21%20Vojislav%20Stanimirovic.pdf> accessed 18/04/2016). On the other hand, woman in marriage without *manus* remained the member of her own family and as *filiaefamilias* kept their inheritance right. Based on these facts, it can be concluded that there was no mutual inheritance between husband and wife in marriage just as the marriage itself was not based on the principle of mutual rights and obligations (Barry, 1963, p. 81 and 250).

There are many views given by the authors writing about Roman law that, besides these two types of marriage there existed a third type, which was marriage for expediency, the marriage contracted only because of wife’s property or the dowry she would bring to her husband’s family (Carcopino, translated by Lukšić; Buljan, 1981, pp. 103–104).

Dos

“Dowry (*dos*) is the property contribution that wife, her *pater familias* or her relatives gave to husband for the establishment of the new household.

⁵In case a fiancée was the *alieni iuris* person, all the property she acquired for her engagement or later during marriage still belonged to her *pater familias*, and only her children had the right to inherit such property. If a fiancée was the *sui iuris* person, all the property she acquired for her engagement and later during marriage belonged only to her. Such property, except for the dowry was called *bona paraphernalia*. A fiancée had to possess the document confirming her ownership of the property. If she failed to provide such proof, she might be punished due to praetorian regulations that created the *praesumptio Muciana*. http://www.prafak.ni.ac.rs/files/centar_pub/Zbornik_LIV_2009.pdf (accessed 15/04/2016)

The dowry given by *pater familias* was called *dos profecticia* while *dos adventicia* was the dowry from other sources” (<http://ius-romanorum.blogspot.ba/2007/02/miraz-dos.html> accessed 24/02/2016). Although it was not a necessary condition for the validity of Roman marriage, dowry in Rome had a central position in marital givings and it was almost an essential characteristic of marriage. “It is not known if all the daughters received *peculium*⁶. They had less need for it than sons since they were given dowry for marriage. However, there have been many sources on *peculium* given to daughters ever since the 3rd century so it may be assumed that it was a common phenomenon” (Antti, 1998, p. 43).

“*Dotis dictio* is a solemn promise of the dowry given by wife or her family elder“ (Stanojević, 2000, p. 301). It is assumed that dowry was promised unilaterally by pronouncing certain words without the concurrence of will, which means that there is no need for the declaration of the other side. There is a difference between delivery and promise of dowry. *Dictio* is a significant word, different from *dictum* and *promissum*, which means that *promissio* is only a promise, a binding statement, not the delivery of dowry, which makes a clear distinction between a promise and the very delivery of dowry⁷. Regarding the legal sources, it seems that *Lex Julia de fundotali* additionally obliged fathers to give their daughters dowry. This law stipulated a possibility that praetors impose tutors on women to be married due to dowry. This as well as the possibility for filing a suit against the father of the family or his heirs in case of not delivering dowry is mentioned in the Digest (the Marcian fragment 23.2.19). Until this law was brought, giving dowry was considered as a moral duty while after it there was the legal obligation of giving dowry since wife was given the possibility for filing a suit for dowry.

⁶The increase of social wealth, especially for the members of the elite, broke family cohesion. The influx of slaves, large territories of farmland conquered and the market enabled the survival outside family. Adult men left the family, got emancipated and independent while those who stayed had the possibility to acquire something for themselves rather than for *pater familias* only. There were earlier cases when the head of the family would give a part of his property to his son, grandson or other family member, on the provision that he had the right to take it back anytime. This was the so called *peculium* (Stanojević, 2000, p. 143).

⁷Bechman connects *dotis dictio* with the ceremony of *sponsio*. The *dos*, he thinks, was promised by a *sponsio* (Buckler, 1895, p. 34).

There are views that there is a clearly visible evolution of the development of dowry institute in Roman law, while the opposite views state that this is only a change in character and features of this institute rather than its complete change and development (William, 1885, p. 29). In the first stage husband or his *pater familias* was able to completely assume the dowry wife would bring to marriage and dispose of it freely. Since there are no written sources⁸, the conclusion is that the issue of dowry was regulated by Common Law until *Lex Julia etpapiapoppaea* was brought. “It seems that the turning point leading to intervention regarding the regulation of dowry was the case of first divorce without guilt in Rome”.

(<http://www.ius.bg.ac.rs/naucni/prilozi/21%20Vojislav%20Stanimirovic.pdf> accessed 18/04/2016) In the older period of the Roman state, husband was able to divorce and keep dowry or spend it completely during marriage. In order for such behavior of husband to be prevented, two obligations for husband were introduced – limitation of dowry disposition and obligation to return dowry in case of marriage termination⁹. In post-classical law woman was allowed to file *reivindicatio* suit for individual dowry items¹⁰.

“In the Code of Justinian we meet significant limitations of husband’s rights over the goods he acquired in the name of dowry. Husband could no longer legally alienate the immovable property given to him as dowry, be it in Rome or provinces, even if wife agreed” (Deretić, 2011, p. 343).

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⁸A new interpretation is needed of *res tuastibi habeto* if some such clause were in the XII tables. This cannot refer to the regulating of property. It simply means “Take you things” i.e. you clothing and personal objects.. It is a particular curi way of telling the wife to get out. Even in marriage *cum manu* where everything legally belongs to the husband it would be natural to regard the wife's clothing and the small personal items as her own (Watson, 1991b, p. 33).

⁹Special legal actions were used for the return of dowry (*actio rei uxoriae, actio tacita ex stipulata*). The procedures pertaining to these legal actions were by no means simple as the plaintiff first had to prove that he constituted dowry, then the contents of the dowry and finally that he had the right to institute a legal action (Deretić, 2011, p. 343).

¹⁰*Reivindicatio*, see more Stanojević, 2000, p. 214.

Dowry was wife's ownership and husband had the right to manage her property and the usufruct for mutual marital needs. In this respect, he was obliged to treat it as a good host while having the obligation to compensate for any potential damage¹¹. Justinian is considered the ruler most credited for the codification and reform of Roman law. His Novels introduced many changes in the field of marital law and consequently property relations. "Upper class citizens (Illustres et senators) were ordered to compose a written document about the dowry that bride would bring to groom and the wedding gift by groom in favor of bride" (Deretić, 2011, p. 345). The aim of the introduction of such contracts, including the possibility for contracting a marriage before a church representative, is the need for the prevention of any possible difficulties in proving the existence of marriage or gifts received and dowry given.

Donatio ante/proper nuptias

"The Digest mentions the gift between spouses; giving gifts by husband, before or during marriage, which became the obligation of husband or his pater familias, the same as dowry was the obligation of wife or his father or some other person" (Deretić, 2011, p. 345). There was a rule that husband could give a gift to wife before contracting a marriage, *donatio ante nuptias*. In time, this rule was changed in the sense that husband could only promise the gift to wife, without the obligation to give it. "In the time of Justinian, the name of this institute was changed into *donatio propter nuptias* since Justinian allowed for this gift to be established during marriage as well, not only prior to marriage" (Deretić, 2011, p. 341).

¹¹Woman was given the legal inheritance right over the entire husband's property and the advantage over other creditors, in order to be provided with dowry return. In terms of dowry restitution, the rule was that husband would retribute dowry at all times, regardless of whether such action was contracted or not, even in cases when non-restitution was contracted, unless husband was wife's legal heir. In the law of the post-classical period, woman was allowed to bring the vindication lawsuit for individual dowry objects while privileged general mortgage over the entire estate of the husband was introduced in favor of the wife, as an assurance of dowry restitution (Deretić, 2011, p. 341).

This implied that giving gift became the obligation of husband or his pater familias equally as giving dowry was the obligation of wife's pater familias¹². Gift was wife's ownership and husband was not allowed to use it even with wife's approval. Giving gift was approved by the fact that wife brought dowry to marriage while husband gave gift¹³.

PROPERTY RELATIONS OF MARRIAGE PARTNERS DURING THE OTTOMAN RULE

The characteristic of Islam is granting woman the rights naturally belonging to her and protecting woman as person. Hence, one of the rights Islam gave to woman is the right to possession and acquiring property. In pre-Islam time, woman suffered injustice of every type and was deprived of her rights. Thus, her guardian freely used her property without the opportunity to earn money or dispose of her property. Islam saved woman from this humiliating position specifying the wedding gift MAHR, making it her own property, not allowing anybody to take it but her next of kin unless she agreed. Mahr is the obligation husband assumes by the very act of wedding. Wife has the right to mahr in case of divorce, even if she did not contract it at wedding.

Mahr is an integral part of marital contract but it is not a prerequisite for its validity. (Tuhmaz, 2003, p. 125). Mahr serves as the material protection of wife against husband's autocracy. Islamic law does not allow for wife to be materially uncared for or blackmailed, or left without resources for life after divorce.

¹²If the wife is divorced from the husband without her fault, she is entitled by law to the *donatio ante nuptias*. She is equally entitled to it, though by special agreement only, in the event of her surviving her husband. The practical result in such cases is that the wife can claim payment of double the amount of her *dos* (Sohm, 1892, p. 381).

¹³*Donatio ante nuptias*, of which we first hear in constitution of Theodosius and Valentinian, which speaks of it as recognized by law, was a gift on the part of the husband as an equivalent of the *dos*. It was the property of the wife but managed by the husband, *dos* could not be alienated, even with her consent. Justinian provided that the wife, if survivor, should receive an equal value from the *donatio propter nuptias* with that which the husband, if survivor, would have received from the *dos*, the actual amount reserved for the survivor being matter of agreement between the parties. By a constitution previous to Justinian the wife had, if survivor, an equal portion of the donation with that her husband had of the *dos*. Justinian substituted an equality of value for an equality of proportion (Thomas, 2007, pp. 232–233).

Mahr also prevents wife from being left at the mercy of husband's relatives. It strengthens the bond between spouses, it is a material bond that strengthens and reinforces the spiritual bond providing wife with everything she needs for her wedding ceremony and the move to her husband's house (Tuhmaz, 2003, p.128). Wife decides on the amount of mahr prior to contracting marriage while husband rejects or accepts the conditions set forth.

There are two types of mahr:

1. El-mehru`l-musemmais the nominated or specified mahr. With this type, the amount, type and procedure of giving mahr are specified.
2. El-mehru`l_misliis the additional contracting of mahr if it was not specified by the wedding act. Woman who did not contract mehr shall do it subsequently, in proportion to the amount of mahr specified for her sister or a close female relative, taking into consideration their age, simial physical appearance, education, etc. (Džananović, 2003, p. 44). The additional mahr is contracted in the following cases:
 - a. When people contract a legally valid marriage without contracting mahr, leaving husband to determine the amount of mahr or not determine it at all. This marital contract is called akdtefwie – the contract of trust;
 - b. If spouses agree at the wedding ceremony to get married without mahr, or husband makes marriage without mahr conditional for wife and she accepts it. Such marriage shall be valid but husband's condition is null and mahr needs to be additional contracted;
 - c. If mahr is contracted but contains the element forbidden by Sharia Law, the additional mahr needs to be contracted since such mahr contract is null.

Islam did not specify the mahr amount as people have different material abilities and the congregation is left to give mahr according to that. That is why the highest and lowest amount of mahr cannot be limited. Giving mahr is not conditioned in the entire amount and its giving can be delayed. "Usually, smaller amounts are giving at contracting a marriage and such mahr is called mehrmu`adždžel – urgent...". If the urgent mahr is contracted, wife has the right to refuse to enter husband's house until she receives mahr (Džananović, 2003, p. 44). No person has the right to dispose of mahr but wife. She deposes of mahr independently and she can give it as a gift, invest it or spend it. She can give the entire mahr to her

husband as a gift or free him of one part of mahr.

Wife disposes of mahr independently on the condition she has the legal capacity. Husband is not allowed to put it into circulation without wife's specific permission. What wife earns is also her property and only she has the right to dispose of it and neither her husband nor any other person have the right to take it away unless she is willing to do so (Tuhmaz, 2003, p. 132).

"In Islamic law, mahr is not equal to the obligatory allowance given to wife and it is completely independent from this obligation" (Tuhmaz, 2003, p. 132).

PROPERTY RELATIONS DURING THE AUSTRO-HUNGARIAN RULE

Allgemeines Bürgerliches Gesetzbuch

"The Austrian Civil Code (hereinafter ACC, German the Allgemeines Bürgerliches Gesetzbuch) belongs to an extreme bourgeoisie codification in the 19th century, based on the reformulated Roman law. After many years' work, the Committee¹⁴ came to a single draft which on June 01, 1811 the emperor Franz Joseph I proclaimed the Austrian Civil Code" (Imamović, 2003, p. 224). The first part of the Code was related to persons with the provisions on personal rights and family law that included marital law, relations between parents and children, tutorship and guardianship. The second part dealt with property law and law on obligations, including the provisions on marital contracts. The third part of ACC was related to common provisions of personal rights, property law, and law on obligations.

¹⁴During the reign of Maria Theresa, two Committees were established and two drafts of the Civil Code were made (Codex Theresianus Iuris Civilis). During the reign of Joseph II, a new, third Committee was established and a new draft was made. The first part of that draft was published in 1786 as "Josefinisches-Gesetzbuch". During the reign of Leopold II, after the Imperial Court appointed the Austrian lawyer Karl Anton von Martini as its head, the fourth draft was made (known as Martini ever since), which was put into effect field tested in Galicia (the so called Western Galicia Civil Code) while at the same time it was given to the public (provinces, faculties, judicial committees, etc.) for assessment. In 1801, a Court chamber was appointed for the draft revision. The result of this revision headed by Zeiller, the highest scientific authority in the history of Austrian codification, was issued after several revisions on June 01, 1811 (Radovčić, 1975, p. 251).

In terms of ACC implementation, it was enforced in the Austro-Hungarian Monarchy and the states with this union. “By issuing a letter patent on November 29, ACC entered into force in Hungary, Croatia and Slavonia, the Serbian Voivodship and the Banat of Temeswar” (Dobrovšak, 2005, p. 78). In Bosnia and Herzegovina, ACC was the additional legal source¹⁵. ACC allowed spouses to contractually join their separate properties and specify their mutual authorizations for managing and disposing of their property. Failing this, the assumption was that husband had the right to manage the joined property (Austrian Civil Code, 1906, paragraphs 233–236). Consequently, the regime of mutual or separate property of marital partners existed. In the event of non-contracting mutual property, each marital partner retained the ownership of his/her proper¹⁶, while the other partner did not have the right to use such property. Based on the legal assumption and the fact that husband is wife’s legal guardian, he had the right to manage wife’s separate property until she would specifically object to such practice (Paragraph 1238, ACC). The very act of contracting marriage¹⁷ did not lead to the establishment of spouses’ joint property.

¹⁵There were five sources of law in Bosnia and Herzegovina during the rule of Austro-Hungarian monarchy: laws, regulations and other acts enacted for BiH by the Common Government, the Ottoman law and the law of Sharia, canon laws of the Catholic and Orthodox churches, Jewish marital law, Bosnian common law, and ACC (Imamović, 2006, p. 74).

¹⁶Prior to contracting a marriage a woman (girl) rarely had her own property. If she had her own property, that was most often the result of inheriting it or earning it through some labor outside her home. The specificity of such labor was that girls were sent outside their homes to provide dowry for themselves, especially in the families that were not able to provide dowry from their own resources, since without dowry they would remain unmarried. In such way, the property a woman would bring into marriage was actually the integral and sometimes the solely part of her dowry (Krešić, 2010, p.545).

¹⁷Pursuant to the provisions of the General Civil Code (GCC), the marriage was contracted by a wedding. It stipulates the legal declaration of two persons of the opposite sex of their will to live in a union, give birth and raise children and help each other. Marriage is then a full and permanent union formed between the persons of the opposite sex. Its purpose is to join the spouses but in such a way that husband is the head of the family. The purpose of marriage is in giving birth and raising children as well as in satisfying sexual urges in a dignified way that would not prevent child birth. The sacrament characteristic of marriage was not mentioned in GCC as this institute defined marriage in general, regardless of different denominations. Hence, the institute of marriage in GCC is applicable for the followers of the denominations that do not recognize the sacrament.(Dobrovšak, 2005, p.79).

Such property required a separate marital contract¹⁸. Marital contracts included the contracts regulating property issues of future spouses, meaning the issues of dowry, paraphernalia, morning gift, union of property, management and usufruct of one’s own property, order of succession or in the event of death, specific lifelong usufruct of the estate and widow support (Paragraph 1217, ACC).

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Dowry included the property wife or some other person promises or hands over to husband, for reducing the costs of living for that marital union. If fiancé had her own property, she and her fiancé agreed on handing dowry and other gifts. If wife was underage, the decision on dowry was made by her father or tutor with the approval of the authorized court (Paragraphs 1219-1220, ACC).

ACC specified the obligation of giving dowry, provided that such practice was contracted and that any dispute would be discussed before a court of law (Paragraph 1220-1224, ACC). If husband, prior to contracting marriage, did not contract dowry, he had no right to demand it. (Paragraph 1225, ACC) During marriage, husband had the right to usufruct and accession. If dowry consisted of money, handed claims or expendables, husband had full ownership over dowry. Consequently, husband managed and used dowry property and he was able to expendables as his own belongings. After husband’s death, dowry belonged to his wife or her heir if she died before husband. ACC also specified that after wife’s death dowry could be given to husband rather than her heirs, on the condition that such practice was specifically contracted (Paragraphs 1227-1229, ACC). ACC also recognized the term paraphernalia that included the gift man or some other person gave to increase dowry.

¹⁸The conclusion of the contract on the union of resources required the definition whether such union includes the present or future property or it includes both the present and future property of spouses. It was therefore necessary to create a list of all the property thus dividing what is to enter the union and what is to be excluded. (Krešić, 2010, pp. 575–576).

Wife did not have the right to use or dispose of paraphernalia but was granted such right in case when marriage was terminated due to husband's death (Paragraphs 1230-1231, ACC). In case of husband's death, wife was granted the amount called widow support. It was granted to wife immediately after husband's death and was supposed to be paid three months in advance (Paragraph 1242, ACC).

ACC according to Roman law

The characteristics of ACC solutions in relation to Roman law are that they recognized the institute of marital contracts that were made when the regime of joint property was contracted. If this regime was not contracted, each spouse retained and managed his/her property as one's own. However, even in such marriage, wife's property was managed by her pater familias if she was alieni iuris person. Woman in Roman law was never completely independent in managing property; even if she was sui iuris person she needed her tutor's consent for certain actions. In terms of dowry, the Justinian reforms of Roman law introduced the limitations for husband's management of dowry as well as his obligation to return dowry in case of marriage termination. Such solution was also included in ACC as well as another characteristics taken from Roman law - the *over the praesumptio Muciana*, a presumption that everything a married woman possessed had been given to her by her husband. Men and women in the Roman state were not equal, men had their own rights that were *ius civile* granted to a Roman citizen. On the other hand, women had limited rights that she could exercise only with the consent of her pater familias or tutor. The period of ACC implementation, considering the social and economic development, saw the equality of man and woman in the issue of marital rights and obligations. However, one can still not fully accept the existence of such equality, especially due to the fact that woman was not able to perform all the jobs and that for some jobs she needed the consent of the father of the family.

MARITAL PROPERTY RELATIONS THROUGH HISTORY OF BOSNIA AND HERZEGOVINA

What characterizes the institute of marriage in Medieval Bosnia is the absence of dowry. Woman in Medieval Bosnia did not have economic rights and she

brought almost nothing into marriage, as dowry almost did not exist (Kešetović, 2011, p. 300). This was justified by the fact that collective family ownership of the property was long-kept and that giving dowry would destabilize the economic power of family cooperative, which is why woman was deprived of these rights at the contracting of marriage. The custom of giving dowry did not exist even in the period when private property appeared. A document states that women are not married for their dowry but for their love and the respect of their family¹⁹.

The period of the Ottoman and Austro-Hungarian rule in Bosnia and Herzegovina is characterized by the implementation of religious legislative on family-legal and marital relations of recognized religious communities. Although religious regulations specified the rights and obligations of marital partners in marriage, husband is mainly considered the head of the family and managed the entire property. Although it was not explicitly specified by religious regulations, the custom was made that by marriage woman brought dowry, which was to serve for the costs of common life, and that she ran such property independently, whereby in case of marriage termination dowry was returned to wife or belonged to her heirs.

¹⁹Valuable data on marriage and inheritance law can be found in the wills made by the members of the noble families. The will made by Pribislav Vukotić shows that he had offspring from two marriages as well as the inheritance line. The will was made on March 21, 1475 in Padua where he lived with his second wife Dorotea and their children. The will was compiled by the scribe Pinni Niccollo in the presence of Jacomo Todesco, the abbot of the Church of St Francis in Padua and his best man/godfather Martin from Novo Brdo, the resident of Padua. Pribislav Vukotić kept some elements of the old indigenous Bosnian way of life but he also accepted something new, influenced by the new living environment. This is indeed confirmed by the will provisions related to his wife Dorotea. The will also specifies that there was no such custom in Bosnia by which the wife is taken for her dowry but for love, goodness, honor and the reputation of her family. This way Pribislav somewhat denied that in his time in Bosnia wife remained her position only as long as she was faithful and kind (Kešetović, 2011, p. 300).

In the state of Yugoslavia in the period of 1918 – 1941, although the constitution principle was proclaimed that marriage is under the protection of the state, the jurisdiction and procedure in marital issues was given to religious courts, meaning that the regulations were applied that were valid in specific territories²⁰. The unification of marital law was prevented by the following: the existence of several religious communities that regulated the field of marital law, obligations of the Kingdom of Yugoslavia specified in international treaties (The Treaty of Saint-Germain-en-Laye) and the concordats (the valid concordat for the territory of Bosnia and Herzegovina was the one Asutro-Hungary concluded with the Holy See and the Patriarchate of Constantinople and later the rules of the Serbian Orthodox Church)²¹. In this respect, there is the continuity in the implementation of religious legislative in the issues of marriage and marital relations ever since 1946. The Basic Law on Marriage of the Federal People's Republic of Yugoslavia dating back to 1946 (hereinafter BLM) (Osnovni zakon o braku – „Službeni list Federativne Narodne Republike Jugoslavije” 29/46, 36/48, 89/48) regulated the norms of marital and family relations for the entire country. BLM clearly regulates separate and mutual property of marital partners. The property one marital partner has at the time of contracting marriage remains his/her own property and that partner keeps the right to manage and dispose of it independently. (Article.12 OCC)

²⁰The jurisdiction of the ecclesiastical courts in these marital issues was considered a privilege of the religious communities that were given the status of public legal institutions. However, the courts of the recognized religious communities, except for the Islamic community, were exclusively church institutions. Their establishment, organization, and procedures were regulated by church rules. Here lies the essential difference between these institutions and the Sharia courts. The Sharia courts were the emanation of the state rule; their jurisdiction was established by a state law, they declared their verdicts in the name of the king and the verdicts were executed pursuant to state laws. The ecclesiastical courts, even when they executed the power delegated by the state, were primarily church forums while the verdicts were declared in the name of God. (Karčić, 2005, 88.)

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Marital partners can mutually enter into legal contracts in order to specify their rights and obligations. More detailed provisions of property relations between spouses are specified by the Law on Property Relations of Marital Partners. (Law on Property Relations of Marital Partners, Official Journal of the People's Republic of Bosnia and Herzegovina no. 32/50) The enactment of BLM made marital partners completely equal in marriage, with exercising the same rights and obligations, including the option of agreement on mutual property relations based on complete equality²².

“The Constitutional reform and enactment of constitutional amendments in 1971 transferred the jurisdiction in the field of family law from the Federal Republic of Yugoslavia to republics and provinces” (Traljić; Bubić, 1998, p. 33). The deadline for the enactment of republic-level laws was too short, which is why the decision was made on the prolongation of the validity of the federal law, which meant that BLM was valid as the republic-level law. BLM suffered slight changes and was valid in Bosnia and Herzegovina until the enactment of the Family Law of the Socialist Republic of Bosnia and Herzegovina (hereinafter FL SR BiH). (Family Law of the Socialist Republic of Bosnia and Herzegovina, Official Journal of the Socialist Republic of Bosnia and Herzegovina no. 21/79, 44/89)

“Marital property law regulates property-legal relations between spouses. The Family Law regulated these relations in the form of legal property regime. This means that spouses were not given the option to regulate these relations by a contract in a way that would be different from the provisions of the Law” (Traljić, Bubić, 1998, 312). FL SR BiH recognizes separate and mutual property of marital partners. The property a spouse has at the time of contracting marriage remains his/her own separate property (Article 264.section 1. FL SR BiH). The property that spouses acquired by their labor during marriage as well as income resulting from such property make mutual property (Article 264.section 2. FL SR BiH). Gifts given by third parties to marital partners during marriage make mutual property although they can make separate property if such is the result of the nature of gift (Article 264 section 3.FL SR BiH).

²²Article 4. BLM, Husband and wife are equal in marriage

Family Law explicitly regulated the issue of dowry as a part of property, whereby dowry or the property given as dowry make separate property of wife (Article. 290 FL SR BiH). “Marital partners jointly own, manage, and use mutual property. This includes equality and agreement on the maintenance, usage, improvement, usufruct and settling the costs resulting from the management, etc“ (Traljić; Bubić, 1998, p. 318). Marital partners may agree on the division of mutual property (Article. 266, FL SR BiH) or each marital partner may file a complaint before the court for the assessment of his/her own share in mutual property (Article.267.section.1. FL SR BiH).

Since the Family Law made marriage and common-law marriage as equal, the property relations of common-law partners were also regulated by this law. The legal regulations identified the issue of gifts that marital partners gave each other before contracting marriage or during marriage. In other words, the law regulated that such gifts of lower value are not returned in the event of marriage termination (Article.276. section.1. FL SR BiH). The higher-value gifts originating from the separate property of one marital partner are returned, with the exception that they can be kept if their return would impose severe material life conditions on the partner returning it (Article.276.section.2. FL SR BiH).

After the Dayton Peace Agreement²³, family law in Bosnia and Herzegovina has been regulated by three separate laws: Family Law of Bosnia and Herzegovina Federation²⁴ (hereinafter called FL FBiH), Family Law of Republic of Srpska²⁵ (hereinafter called FL RS), and Family Law of Brčko District²⁶ (hereinafter called FL BD).

²³The Dayton Peace Agreement dated November 21, 1995 was signed on December 14, 1995 in Paris. The Peace Agreement included 11 annexes. Annex 4 of the Agreement acts as the Constitution of BiH. A separate value is given to the European Convention and its protocols. Like the agreements in annexes to the Constitution of BiH, pursuant to Article II/2. of the Constitution of BiH, the Convention is not only directly legally applicable but it also has the priority over any other law. This raises the issue of its position within the pyramid of the entire legal system of Bosnia and Herzegovina (Vehabović, 2006., p. 25).

²⁴Family Law of the Federation of Bosnia and Herzegovina, Official Journal of the Federation of Bosnia and Herzegovina no. 35/05, 41/05, 31/14.

²⁵Family Law of Republic of Srpska, Official Journal of Republic of Srpska no. 54/02, 41/08, 63/14.

²⁶Family Law of Brčko District, Official Journal of Brčko District no66/07.

Family legislative in Bosnia and Herzegovina accepts the regime of mutual property with the differences in the definition of marital property. Namely, while marital property in FL FBiH and in FL BD are considered co-ownership, FL RS defines the property of spouses as mutual property. In the legislative of Bosnia and Herzegovina, the legal property regime includes marital property and separate property. Marital property is acquired by labor during marriage. Labor is the means for acquiring property and as such it can be individual (independent) or mutual, direct or indirect.²⁷ In terms of managing marital property, the regulations of property law and law on obligations are applied, if not regulated otherwise by the Family Law. Co-owners have the right to manage the property jointly and they can entrust the management to one or more co-owners or third persons. (Article 16 Paragraph 1, Law on Ownership and Legal Relations). This management is related to making decision on the way of usage, maintenance and keeping, improvement, etc.

Marital property is divided into equal parts. The legislator accepted the system of equal parts, based on the principle of equality of marital partners.²⁸ According to the system of equal parts, the parts/shares of marital partners are always equal. The situation in which one of marital partners did not participate with his/her labor in the acquisition of marital property is only possible in theory. The fact that one marital partner was frugal during the acquisition of marital property while the other marital partner was a spendthrift does not affect their co-ownership shares (Alinčić, 2006, p. 505).

It is justifiably emphasized that the division into equal parts shall not always be rightful for both marital partners (Traljić; Bubić, 2007, 80. Also see: Alinčić, Mira et al., Mladenović; Panov). In order for marital partners to exclude the legal property regime or create the regime most adequate for them, the legislator created the possibility for the conclusion of marital contract.

²⁷For more see: Mladenović, Panov, 2003, p.197.

²⁸In terms of marital contract, FL RS included the regulation by which such contract was subject to court or notary certification. It can be concluded that the lawyer of marital partners themselves were able to draw up the contract which would then be certified by the court or notary public. Unlike FL RS, FL FBiH specifies that marital contract needs to be made by the notary public. By the amendments to FL RS in 2008, the regulation was taken from FL FBiH.

On the other hand, the system of equal parts/shares is particularly protective of the unemployed woman, providing her with equality in advance. It is particularly emphasized that equal division contributes to shorter court proceedings and eliminates the possibility for their lengthening. Unlike FL FBiH and FL BD, FL RS specifies the following in the division of marital property, "Each spouse is entitled to a half of the mutual marital property." (Article 272. FL RS) However the subsequent paragraph defined that each marital partner has the right to demand the court to assign him/her the share that would be larger than the half, provided that the spouse proves one's contribution in the provision of the mutual property to be obviously higher than that of the other spouse (Article 273 Paragraph 1. FL RS). Separate property in family legislature in BiH is defined from two aspects: by the time and means of provision. The property a spouse has at the time of contracting marriage remains his/her separate property (Article 254 Paragraph 1. FL FBiH, Article 270 Paragraph 1. FL RS, Article 231 Paragraph 1. FL BD). The property acquired before marriage, regardless of the way it was acquired, remains one's separate property. The application of time framework accepted for the definition of the term marital property, defines the property acquired after the termination of marital union as separate property, regardless of the legal framework for its provision (Traljić; Bubić, 2007, p. 84).

The contractual property regime is a novelty in family legislature in BiH. All three family laws regulate the possibility for the exclusion of legal property regime or its alteration by means of a contract, thus providing a wide freedom in contracting. The contract by which marital partners exclude the legal property regime is called marital contract (prenuptial agreement).

Hence, the domestic legislature enabled marital partners to regulate their marital-property relations by means of marital contract. FL RS was the first that regulated the issue of marital contract in BiH, as early as in 2003. After that, FL FBiH regulated this institute in 2005 and FL BD regulated it in 2007. By the amendments to FL RS in 2008, the regulations of marital contract in family legislature in BiH was almost balanced in all its segments.²⁹

²⁹In terms of marital contract, FL RS included the regulation by which such contract was subject to court or notary certification. It can be concluded that the lawyer or marital partners themselves were able to draw up the contract which would then be certified by the court or notary public. Unlike FL RS, FL FBiH specifies that marital contract needs to be made by the notary public. By the amendments to FL RS in 2008, the regulation was taken from FL FBiH.

Common-law marriage partners have the possibility to conclude the contract and regulate their property relations, provided that they live in common-law marriage as regulated by the law. FL FBiH (Article 3) and FL BD (Article 5) specify that such common-law civil union between a man and a woman that are not married to or in another common-law civil union with another person has to last three years minimum or shorter if a mutual child is born in such a relationship. Unlike these laws, FL RS specifies the length of common-law civil union as the only prerequisite. Family legislature in BiH does not state the title of the contract made by common-law partners. Namely, legislators did not have the need to specify the title as they explicitly do not regulate the conclusion of this contract. The legal regulation specifying that all issues related to marital property are also applied to common-law marital property³⁰, also covers the contract that defines the property relations of common-law partners. In legal theory, the contract between common-law partners is titled common-law contract or just contract (Belaj, 2002, p. 39).

CONCLUSION

In Roman law, society and family, man and woman did not have an equal position. Namely, in the field of public law, woman did not have any political rights, or active or passive vote to right. Woman did not have inheritance rights since she received dowry which excluded her from any other inheritance. Woman had limited business capacity and she was under the authority of her pater familias or husband. Even in the situations when she was sui iuris, she needed her tutor's consent for certain business affairs. Husband and wife were not equal in marriage, wife was under the authority of her husband and he managed the entire property.

³⁰Article 263.section 1. FL FBiH "The property acquired by common law marriage partners by their labor in a common law marriage as defined in Article 3 of the Law is considered their common law marital property." Section 2. "The property in Section 1 of this Article is subject to the provisions of the Law on Marital Property."

The provisions of the article of FL BD are identical while in Article 284 FL RS regulates the following: Section 1. "The property acquired by the labor of the persons living in a common law marriage for a longer time period is considered their mutual property." Section 2. "The division of the property defined in the previous section is subject to the provisions related to the division of the common property of marital partners."

As law developed, the position of woman changed, and the Justinian Code introduced certain improvement of her position and rights. Daughters were included in the inheritance line; man had certain limitations in managing dowry, etc. What is indisputable is the fact that ACC when specifying property relations of marital partners. What is different from the period of the Roman state is that in the time of ACC implementation, in accordance to the changes and development of society, women had the right to certain professions and consequently to acquisition of individual property, independent of their family property or some other property managed by her father. Although ACC established equality of legal subjects regardless of gender, this principle of equality was not implemented consistently. Woman still faced certain limitations of her business capacity; she could not be assigned as tutor, witness in making the will or land registry deed. Husband was considered the head of the family and regardless of the fact whether wife brought dowry in marriage or not, he was obliged to support her. Although women were given rights, such situation, in other words an unequal position of man and woman, especially in marriage, remained until 1946 when marriage was institutionalized by the enactment of the Basic Law on Marriage. This law specified that man and woman are equal in marriage. Regarding marital property, it was specified that marital partners have mutual and separate property. Earlier family legislature defined marital property as mutual ownership possessed, managed and used by marital partners. FL FBiH specifies marital property as co-ownership by its nature, with marital partners as co-owners with equal shares, unless they defined it differently. The exception to this is FL RS that kept the solution from the previous law, whereby the property acquired by spouses by their labor during marital union is defined as mutual property. It can generally be concluded that in present-day law men and women, as legal subjects, are completely equal, which is confirmed by the family legislature of BiH in the field of marital property relations.

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METHODS OF COOPERATIVE LEARNING AND THEIR APPLICATION IN THE DEVELOPMENT OF COMPETITIVE THEMES IN TEACHING MATHEMATICS

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ABSTRACT

Contemporary changes in the whole system of education and training require the teacher to be a person of trust, educator, counselor, friend, organizer, coordinator, associate, innovator, assessor, mentor; in another words, a contemporary and modern person. In the modern school (even more in the future) the role of the teacher is far wider. He needs to be active in school, outside of school, within free activities, as well as cultural and public activities of the school. A good teacher does not resist the influence of a student, because his or her extremely responsible role can be successfully achieved, if they work well with them. To cooperate in this context does not mean that only the teacher listens to the student's suggestions, although that is also very important, but cooperating means accepting the student's proposal, if they are objectively acceptable or explain why a particular proposal cannot be realized. It is not possible to work well and democratically in the classroom if the student's influence is not accepted. If the teacher's behavior and style of work are not necessarily limited to the work and behavior of a student, then there is no interaction, and the teaching process must be an interaction.

Changes in the society affect school changes, and changes in school play the most important role in changing the position of the teacher and his role and the style of work in the teaching process. The survival and future of the school is reflected in its educational role. In order for a teacher to be an educator, to fulfill his or her educational role, he/she must love or sympathize with the kids, respect their opinion, encourage them to achieve good results, but also to share with them possible misunderstandings and failures. The success and superiority of teachers as educators depends more on the quality of the relationships established, and less on the knowledge of the subject being taught, even though this component cannot be ignored. Thanks to the good work style, the teacher can achieve better results in the educational process. This does not only apply to the choice of working methods, but the style of work is reflected in the overall individual pedagogical practice of teachers. In the style of work the teacher expresses his / her independence, creativity, initiative, democracy or authoritarianism, lack of competence, irresponsibility.

In modern school, children need to play a central role, and the school should become a place where they are exploring, examining, solving problems and to lead them to a deliberate dialogue. Students need to experience the school as a place where the child develops in cognitive, emotional and social sense, and where the child's motivation to work is at a high level.

Active teaching (active learning, active school) is an original pedagogical creation based on theoretical settings and practical attempts of transformation of a traditional school into an active school, i.e. a school in which both the student and the teacher have an active role. Thinking about active learning is inspired by the works of Kerenstahner (work school), Laj, Dekrol (school for life and life), Klapard (school by sea), Djuij (pragmatic conception), Montesori, Fereira (active school) Frenoa, Dalton plan, Vinteka-plan, etc.

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The summary of their research endeavors and theoretical endeavors, aimed at constituting an active school, is the following Piaget's statement, which for active teaching has an absolute programmatic meaning: "In one of the words, the basic principle of active methods should be inspired by the history of science and can be expressed in the following way: Something means self-discovery or reconstruction through re-discovery and it is necessary to adhere to that principle if in the future we want to shape people who will be capable of producing and creating and not just repeating what already exists. "

To reach a comprehensive and precise concept of active learning, the activity of children in the learning process is of paramount importance. From the cited Piaget's theoretical point of view, for the active learning, three are very important elements:

An important component of activity as an internal (mental) activity is defined: this activity (or at least one of its, important for school learning) is the passage through the intellectual processes through which it came to science when it came to discoveries and finds. So, the student briefly reconstructs these thought processes;

The object of thought activities is not only their own immediate experience but also the intellectual content of certain scientific disciplines;

The basic goals of school learning through active methods are: a good understanding of what is in science but also the adoption of intellectual arts for productive and creative activities.

The traditional school works on pre-defined plans and programs and the goal of the curriculum is to adopt the program. The basic teaching method is the lecture (verbal transfer of knowledge) with the occasional use of teaching resources. The student has a mostly passive role of a listener who has to understand, remember and reproduce the compulsory material. Evaluation, whether verbally or in writing, consists in verifying the measure in which the required degree has been adopted. Learning motives are largely external to nature (appreciation, praise, reward, punishment ...) In a traditional school, the child is looked upon as a pupil, that is to one who should, with understanding, repeat the course more profoundly.

An active school is more focused on a young man who is treated as a whole person whose intellectual potentials need to engage more in the teaching process. The active school is based on compulsory education standards based on which the orientation plans and work programs are designed. Such access also implies a part of teaching that is flexible and varies depending on the student's interest. Learning motivation is personal (internal).

In teaching, active learning methods are based on work and intellectual engagement of students and research activities. The goal of an active school is not only the adoption of a curriculum, but also the versatile personality development of students. The active school evaluates not only the degree of competence of the knowledge defined by the educational standards, but also the progress of the children in comparison with the initial situation, the motivation and interest of the students for work and activity, the development of the personality and the satisfaction of the student's teaching that is realized.

Key words: *Mathematics, Learning. Co-operation, Classes*

INTRODUCTION

Cooperative learning is the topic of a large number of research both in the world and in our country. The focus of these researches is on achievements, interpersonal relationships and mental health. Participants in research differ according to age, ability, gender, race, nationality, socio-economic status etc. Different tasks, models and techniques of cooperation were used. Research has been conducted by researchers of different theoretical orientations in different conditions and over a long period of time. This research, in addition, has such validity and trust, which can be rarely found in pedagogical and psychological literature.

In the broadest sense, cooperative learning can be defined as any learning situation in a classroom where students of all levels of achievement work in structured groups to achieve a common goal. Cooperative

learning is also defined as the use in teaching small groups where students work together to achieve the maximum, both their own and the groups they work with. In these groups they are negotiating, initiating, planning and evaluating each other. Instead of working individually and competing with each other, students are responsible for building a community in which all students participate. Co-operative learning requires that students work together to achieve goals that as individuals do not achieve. Students involved in cooperative learning have many social and academic benefits.

The experience of cooperation and the interactive exchange of information that occurs during cooperative learning has the consequence of having a better memory of teaching contents, improving attitudes towards learning and strengthening interpersonal relationships among group members.

The role of the teacher

At the beginning, the teacher carefully designs the tasks that require the active participation of each student in the group in order for the assignments to be accomplished. At the beginning of the cooperative work, the teacher explains the task. When the group starts working on the task, the role of the teacher is to encourage and orient, he/she moves from group to group and follows the learning process. He/she provides students with feedback and assesses the progress of the group.

Compared to the traditionally understood and applied work in small groups, cooperative learning has its own authentic features, and hence the following teaching situations cannot be classified as co-operative learning:

A teaching situation in which students work at the same desk on individual assignments,

A teaching situation in which students work on individual tasks and more capable students help the less capable,

The teaching situation in which one student works on everything while the other students in the group are passive and mostly rely on active student's work,

The teaching situation of the group work of a student in which the teacher often and almost completely manages the student's work and gives very strict instructions for work and where is no genuine student co-operation,

A teaching situation in which students have not developed social skills of open and effective communication and where there is no real exchange of student's opinions, ideas and the solution of the problems of the group work,

The teaching situation in which students work team-minded, but know that the teacher will evaluate their work individually.

In these situations, which are very characteristic of traditionally understood work in small groups and can be seen in the teaching process, the inefficiency and inadequate level of activation of all students in the classroom are noticed. In these situations, the activity of a few students is evident, while other students remain passive and generally "buy" baked knowledge. For such situations we say that the process of learning has not really begun, and most often, the acquired knowledge is mechanically unmanaged, with a low degree of functionality. This will certainly not positively influence and contribute to the achievement of the goals of cooperative learning, such as high levels of student achievement, the formation of a positive

relationship to a particular curriculum, the development of a critical thinking of students and the like.

Teachers should try to create a class organization that will encourage student interaction with the goal of mutual cooperation. Co-operation and interaction among children can be encouraged by the introduction of collaborative groups. In the following, we will present several models of collaborative groups, i.e. ways of organizing student work in the teaching of mathematics (Rešić, Šehanović; 2017)

POSITIVE INTERDEPENDENCE is the first and most important element in cooperative learning.

Group members feel they are interconnected because they are pushing for a common goal.

To have one group succeed, every individual in it must be successful, and vice versa.

This contributes to development of social skills, e.g.:

1. A more positive, tolerant and friendly relationship among peers;
2. A more positive attitude toward self-empowering self-confidence;
3. Readiness for Teamwork and Flexibility;
4. Discipline etc.

The goal of developing a positive interdependence is of utmost importance! Without it, co-transversal learning is not possible. Students should accept it as the most meaningful and most interesting.

The aim of cooperative learning is to advance each and every student, in different aspects (achievement, social skills, self-confidence, etc.). After participating in cooperative work, the members of the group should be trained to do the same or similar task independently.

Interaction "Face to face"

During group work, group members should have their faces face-to-face so that they can easily maintain contact with their eyes, in other words, close enough to be able to delineate the material, mutually talk quietly and share opinions without disturbing other groups work. Enhancing interaction is considered to be the forms of behavior that individuals encourage one another and help each other to make it easier to complete a group assignment. Through this interaction, students also build an academic and personal support system for each member of the group. Enhancing intra-group intractability is what has the strongest impacts on students' achievements, social relationships, social competence, and psychological adaptation.

Behaviors that characterize good communication are: mutual assistance, exchange of necessary teaching materials and resources, feedback to enhance the future work of members, consideration and questioning of the group's conclusions to improve the quality of the group as much as possible. In this context, relationships within the group are characterized by mutual trust and respect.

Exercising the social skills of students

To form groups of students who do not have the experience in group work, and therefore the social skills necessary for them, and require them to cooperate, is analogous to the situation in which an illiterate person is required to read a book. For group work to be effective, students must be taught in the appropriate social skills, such as: active listening, decision-making, allowing informal leadership in the group, conflict management, and the like. Numerous studies have shown that most primary and secondary school students lack basic social skills, such as the accurate identification of other people's feelings or the skill of discussing different topics. It seems that incompetence in this field continues in the adulthood.

Of course, it is not enough for a teacher to know that students need to adopt and practice social skills so that they can apply cooperative learning. They need to know what skills they are, how their disciples teach them and how they are continually refined. Generally, group work skills can be categorized into four broad categories, given the stages in the group's development. These are the skills:

Formation (basic skills needed to establish a group)

Functioning (skills needed to manage group activities to complete the task and maintain effective relationships among group members)

Formulation (skills to build a deeper level of understanding of the materials being studied in order to stimulate the application of strategies at higher levels of resonance as well as maximize the learning and application of the learned) and

Making waves (skills needed to engage students in cognitive conflict discussions to encourage reconsideration of knowledge, active search for information, giving reasons or arguments for conclusions, etc.)

The social skills learning process never ends. They need to be continually modified and perfected. Once students acquire the skills needed for group work, it

is sufficient for the teacher to see how the students behave, identify the desirable and undesirable behaviors, provide feedback to the students and intervene when necessary. Making a decision on when to intervene, and when leaving it to the group to find a solution on their own, is part of the teacher's teaching or teaching skills.

The evaluation of group processes

The easiest way to evaluate group processes is to look at groups while working on a common task. This is most often done by the teacher, with the help of an appropriate observation protocol in which the teacher understands the frequency of previously defined forms of behaviors. In the case of an unstructured protocol, specific behaviors that occur in the group are described.

Systematic observation allows teachers to gain a deeper insight into what is happening in the group. While listening to the students as they discuss during the joint work, he gains valuable information on how did they understood the instructions, how they understand the basic concepts and strategies they use while they master the subject, and what social skills they use, and how much a learner contributes to a group goal. In addition, the teacher may ask each student to evaluate their work and behavior by filling in a structured questionnaire. When students gain more experience in group work, the teacher can train them to be observers and assign each student a role in each group. In this way, the teacher can gather much more information on group functioning than when he does it alone, observing all groups at the same time.

After observation, the teacher evaluates group processes and provides feedback to each group. Finally, groups are given recognition for work and behavior to feel more competent and to contribute to the enthusiasm and motivation of students for future cooperative activities.

COOPERATIVE LEARNING IN TEACHING MATHEMATICS

So far, only a small number of researchers have carefully examined specific types of interactions that occur among students while learning math in smaller groups. Most of the interaction-related tasks identified among students are related to the help they seek or provide to each other (Gušović, 2013).

A great deal of concern among mathematicians is encountering the low recognition of students that they need help in learning math. Neumann and Goldin (Newman and Goldin, 1990) show that children, especially with lower opportunities, are reluctant to seek help when they have difficulties in learning math. They are most reluctant to seek help from their friends, mostly because of being afraid they will laugh at them. If they are to seek help, their main source is a teacher who is often unable to provide the appropriate assistance each pupil needs individually. Carefully designed subdivisions to smaller groups can enable interaction between students who, in turn, can provide appropriate assistance to the pupils who need it.

Unfortunately, most math lessons do not sufficiently promote student activity in tasks. What is more, full-time, as an environment in which students are not sufficiently active, has shown negative effects of low student achievement (Mulyn, 1992). By contrast, some small cooperative learning groups have shown that student work is increased and student interaction facilitated learning in small groups does not ensure automatic collaboration in work and positive effects in all students. For example, sometimes more capable learners by showing far more active behavior tend to dominate the less able learners. Although promoting math through co-operation in small groups makes it feasible for "highly productive students", the real challenge remains to do the same with "low productivity" students.

Levels of cooperation of students in teaching mathematics

The most commonly applied levels or forms of realization of cooperative learning in the teaching of mathematics are:

- Cooperative learning based on the department;
- Cooperative learning based on small groups, sub-groups or teams;
- Co-operative learning based on couples.

Cooperative learning based on the department

Although rarely mentioned in the literature, in the broadest sense, scholastic co-operation also encompasses the whole of the department. At this level, different teaching methods that support cooperative learning, such as storm ideas and the like can be ap-

plied.

Of course, it is not essential that co-operative approaches be represented at all times, which are suitable for the entire department. On the contrary, these methods are suitable for certain stages of work, such as: talk breaks used for discussion and active student learning, for introducing into a topic or problem, when discussing topics that are just present for discussion, asking questions, and interplay help with the materials that are just exposed.

Cooperative learning based on small groups, sub-groups or teams

Cooperative learning at this level takes place when small groups of students work on a common task that can only be solved by cooperation of all group members. The group work represents the sitting of students in smaller groups of 3 to 6 students. The best group of 4 students, because that communication is six-fold. Group composition can be permanent or changeable.

Students can be grouped in the following way:

- Pupils of similar abilities,
- Groups of students of different abilities
- Random choice of students in teams.

One of the most widespread methods for grouping students in the same class is grouping the same skills. Research shows that teachers are generally positive about this grouping of students. Many of them justify this way of grouping, based on the need to adapt the content of the time, pace, and teaching method to students of different abilities.

Mathematics is by nature "linear, structured, accumulated, serial, which makes it difficult to work with groups of students who differ by level of knowledge and abilities. Basic grouping questions in this way refer to "ability to learn math" and the hierarchical nature of the subject. Students' abilities are considered to be the main explanation for their different achievements in mathematics. Recent research, however, has shown that there is a doubt as to whether ability grouping is the right method for working with students with different abilities. It is generally considered that the school achievements of students in higher expectations groups are better than those students who are assumed to have similar skills but are placed in groups with lower expectations.

Co-operative learning based on couples

It has long been considered that learning in pairs is nothing more than learning in the smallest group. Working in pairs (tandem) is a transitional model of individual to more complex forms of work. We can say that work in couples is an innovative form of work in the contemporary teaching. By working in pairs, the students get better and the climate for work is more enjoyable, the student's activity is maximized, as feedback is even more encouraging for the activity. The student is trained to compare his work as well as to listen patiently to the interlocutor. This mode of work also has some shortcomings, such as restriction, rivalry, more time to get feedback on student work, etc. The solution needs to be sought in understanding the pair as a temporary form of joint work on a task or part of a task.

In math teaching, given the student's age, the nature and contents of the teaching material, work in pairs is mostly used in the form of interactive work and joint work. Working in pairs helps us, above all, to respond to the needs and the mood of the so-called; specific classroom students. Almost every department now has those students who at first glance stand out from others, whether they are gifted or have some difficulty in mastering the material.

Student pairs can be formed on a variety of criteria:

Gifted and less capable students

A couple of gifted students or a couple of less gifted students

Couples by interest

Pole different or identical pairs

Pairs according to the likeness of temperament and personality characteristics

Pairs of similar learning styles

It is not the case that the couples are drawn up according to the seating schedule, the student's agreement, the free standing of the individual, and the like.

Particularly suitable contents for this work in teaching math are those who have a lot of new terms, information, rules, definitions and content that require the practical application of certain knowledge.

METHODS

Anyone who has ever tried to organize a cooperative lesson from any subject knows that it is not easy, because it is necessary that the time is so designed to provide an active participation of all students.

Some of the leading pedagogues in this area have

devised methods used by teachers around the world. Some of these methods are taken from contemporary literature in this paper, some I have taken from the seminar "To Functional Knowledge Using Methods and Techniques in Interactive Teaching", and some are just ideas that need to be thoroughly considered. The aim is to provide teachers with as many methods as possible and more recent knowledge in this field. Of course, in applying this method it is possible to perform combinations or create an analogous own approach, depending on the specific conditions of teaching practice and teacher training. It has been shown that these methods develop apart from achievement, and cooperative quality of personality, favorable emotional climate in learning and a higher level of student motivation. The most important advantage of cooperative learning methods is their compatibility with traditional teaching. The teacher, therefore, does not have to abandon his previous experiences. Practice has shown that whoever tries these methods will definitely decide to continue to use them and will not go back to the old.

SELECTED IDEAS

Mosaic method and its variations

The mosaic method is one of the first strategies of cooperative learning. It was originally developed by Eliot Aronson and his colleagues at the University of Texas. Aronson has developed a mosaic method to address some of the school segregation problems of the 1970s in the United States when they were separated in black and white studs and there was very little interaction between pupils of different skin colors. Aronson has solved this problem by involving students in small, heterogeneous groups with a division of tasks and sources in which the pupils are doing so that each student has to rely on all the members of the group. This interdependence of the students was very high, and the role of the teacher as a provider of information was temporarily diminished.

The original mosaic method

The name "mosaic" expresses the essence of this cooperative learning strategy. The learning material is distributed to members of the group in the form of mosaics and a piece is given to members of the group. The zeal that is generated by the slicing of the material will not be solved until all the pieces are put together.

In essence, the responsibility of each member of the team is to process their piece of material and to teach the other. In other words, the mosaic method firmly binds pupils of materials and resources, as well as strongly motivates the interdependence of students in cooperative learning. A team member who is not efficient in the work on his or her piece of work can help other members of the team.

Although it is originally developed for the fifth and sixth grades of elementary school, the mosaic method can be applied for work in all grades of primary school, and children need to be able to read because most tasks in the mosaic method require a minimum reading ability. In the original mosaic method the students work in two groups: a control group (expert group) working together to produce a joint material and a mosaic group (the so-called homegroup) working on material that has just been learned from each group member individually in expert groups. The original mosaic method requires each mosaic group member to be part of one of the control groups working on the teaching material. The members of the control group have the same number of different mosaic groups. They work on the same teaching material, study information, discuss the method for working on the material. When the mosaic of the group is rebuilt, each student teaches others about his material he learned in his control group. While the mosaic method strongly relies on the task and resources as well as on the interdependence of group members, it is important to point out that this is essentially not a hierarchical method. The method does not require the same level of mastery for all students. Usually, students master the material that, as experts, convey to their mosaic group.

It is recommended to reduce the number of members of mosaic groups, depending on the number of topics for work. Team members can be selected so that one organizer-leader is found in each group for each mosaic group. It is important that the group organizer helps the group and forms the role of a team leader for other students in the group (because all must play that role). After two to three meetings, the roles of the team leader rotate and each mosaic group chooses a new leader. To be experts in their field, pupils are composed of members of the same mosaic groups who have the same questions, the same thing. Members of the matched or expert groups work together to understand the material and discuss how it is easier to master that piece to make the most of it to its mosaic group. Approximately 30% of time is spent on treat-

ing materials in the expert group. It is recommended that the leader of a mosaic group choose pre-work. If all the material is matched and done at the same level, it is possible to enable students in the expert groups who have completed their task to help others in their work on the design, as well as developing the ways of doing this themselves. In these circumstances, each expert group must be as heterogeneous as the mosaic group.

When they finish learning in expert groups, students return to their mosaic groups to teach others the curriculum, as specially arranged, if possible. Members of the group mosaic consider the material to ensure that each member understands. When the group ended up with the learning material, the time for discussion, analysis, and reflection followed. Proportionally, it is necessary to spend 60% of the time on the curriculum and 40% on the discussion. When they finish working in mosaic groups, students take individual tests and materials. The interaction task used in the mosaic method is to ensure that each student is fully successful on an individual test. This success depends on the individual's cooperation. Aronson and his associates did not foresee any form of reward within this method.

RESULTS

EXAMPLE:

This is the teaching unit with which students of the eighth grade of elementary schools meet. The very concept of treating the information is known to the students, both from the earlier classes and from life. This teaching unit is also a good proof that math is everywhere around us and that it is a very applicable science. There is also an opportunity to acquire functional (applicable) knowledge in which it is specifically insisted.

One example of this is when students are given data gathered in a survey and they are subdivided into expert groups first to learn how to process and display data (drawing tables, graphs, diagrams) and then return to their mosaic groups and train other students to present together files. We divided the students into groups of 4 students and each group gets a special assignment.

Namely, the students have visited the tourist destinations of our region as part of the project of learning geography and collected data on the number of visitors, number of foreigners, age structure, number of visitors in certain periods of the year and so on.

Now, at the math class, students received the data they were supposed to process and show to some of the statistical methods. Each group got one tourist destination.

The students pulled out one card marked with a number from 1 to 4. Then the students with the same number on the card formed the group. Then the captains of the groups form an expert group that has two tasks to learn how to make graphs and diagrams based on data written in the table using one of the Word tools and then teach other members of its mosaic group.

When they finish learning in their expert groups, students return to their mosaic groups. Each of the mosaic members of the group is obliged to transfer the knowledge they have acquired to the other members in order to ensure that each member understands. When the group has finished the learning material, it is time for questions, analysis, thinking, etc.

After completing the work in mosaic groups, each student gets tasks to work individually. Depending on the interaction within the group used in the mosaic method, each student will achieve some result on the individual test. If the group work was successful and the students cooperated with each other, then the results on the test would be as good as possible.

Method of Scoring-Achievement

This method has emerged as a practical application of learning theorists of motivation achievement. The essence of applying the scoring method is that the students know exactly what they are looking for, that they have time to prepare and that there are no surprise factors in checking the adopted knowledge.

After processing the teaching unit, students are given points for mastering the teaching contents. Points are given analytically. Any information, fact, or essential item is scored in brackets beside content with a predefined number of points, so that the students know how much points they are going to get by filling out this information. At the end of the teaching unit or topic, a score scale is awarded (for example, 21 points for grade 2, 31 for good and the like). The student does not know which questions will be on the test or on the test of knowledge.

Points - Achievement is very effective for group work. The class is divided into groups that are preparing for a few days or weeks to test the lessons learned. Group collaboration is followed. All members of the group are concerned that each group learner learns the best to make the group more successful. It is possible to organize various forms of competition be-

tween groups. The differences between the other cooperative methods and this is that the students know exactly what is being sought for the grade, and that grade will not be different from the teachers.

When working on teaching contents, the teacher should draw the students attention to important information and scoring. It is best to give the teaching unit a test question, in addition to which it is indicated where the answers are in the book or other source of knowledge, as well as how many points they carry. The teacher can use multiple forms of evaluation of achievement, depending on their assessment of the effects of this evaluation.

This type of evaluation should be applied which will most contribute to the further achievement of students:

Testing individual achievement when group work is used: the goal is to establish a group's achievement, and individual student contributions are valued only by a group. It is an important group assessment. A group rating is highlighted in a class chart, in a school newspaper or otherwise. It is important that a group is struggling for more achievement by training or "training" all its members for maximum individual scores;

Evaluating group achievement without individual scoring: the goal is to test groups rather than individuals. Testing for the group needs to be prepared.

Self-assessment of the group: The goal is to show the group's achievements in the curriculum and analyze the way to achieve the achievement.

DISCUSSION

Method of group research

Methods of group research have been developed by Sharan and Herz- Lazarowitz (Sharan and Hertz-Lazarowitz, 1980; Sharan and Sharan, 1992) as a variation of the project method. Orientation to developing intergroup collaboration and satisfying students' intersections. Topics can be suggested by students based on search by source or by self-propagation topic. Groups of 5 to 6 students are formed that will study the topic of their choice. The composition of the group is based on the theme selection. Each group discusses its topic and analyzes the aspects of a possible approach to the topic.

The first three questions should be answered first:

What will we do?

How will we do it?

Why will we do it?

Subsequently, the group conducts its research plan, which implies defining tasks for each member of the group. Group members search for sources of knowledge to better respond to the project assignment. Each group member should be aware that a better outcome of each individual will also mean a better result for the group. Each group should select one member for the Steering Board. The task of this committee is to monitor the group's progress, to ensure that each member of the group is engaged, to hear the group's plans for the final report, to draw up a list of final presentations and to consider the needs of each group. The whole group presents what it has done so that every member of the group has its role in the final report. The teacher helps students who do not know how to present their material. The entire class should be in good standing during the presentation of any group. It would be desirable for the presentations to include a part that points to difficulties in processing or investigating problems, as well as instruction to other students as best to overcome the topic considered. The teacher is starting to evaluate during the observation of the students' work in the groups. It is necessary to evaluate how students have approached the subject and the problem of research, how they cognitively treated and which skills did they use. It is necessary to involve students in evaluation as much as possible or to develop self-evaluation. The Steering Board should be a group work assessor, but it is very important to carry out the evaluation of this committee's work. For the evaluation, the teacher can create a "group efficiency questionnaire" that will be filled out by all the students and processed by the board of directors.

Students should be divided into 5 groups of heterogeneous compositions with approximately equal number of members. Each of the groups will deal with one of the following budget items:

- Foods and beverages,
- Chemical products
- Home Appliances and Applied Techniques
- Wardrobe
- Monthly Accounts (Taxes)

The groups can agree on which items will be responsible or items may be assigned by a random selection method, for example by pulling the cedar from the hat.

Before going to the survey, each student should ask their parents who are working in the family, how often they go shopping, which foods they buy every day, what is in their opinion necessary to buy within

the items the student belongs to and the monthly invoices. When students meet in a group, it is necessary to share the knowledge they have come to and to make a list of the things that are necessary for the life of a family. Their imaginative family must be equipped with as many basic things as possible. The goal is to save as much as possible. It is also necessary to elect the members of the board of directors from that group. The task of the first three groups is to visit great brands and find the catalogs with the reduced prices of the products that they need in accordance with their group and then calculate how much the percentage is their discount, how much money will be saved in such a purchase and write down in their reports.

If students live in an environment where there are no large markets, these catalogs can be found in daily newspapers or discounts seen in TV commercials. Old catalogs can also be used, and the pupils can do it by going to the appropriate shops, for example the home appliance store, and writing down what is on the discount. Individual products must be found in the reports regardless of whether they are discounted because their purchase is indispensable for family life.

Thus, a group in charge of food products in their report must be obliged to include bread, dairy products, fruits and vegetables and other basic products with their prices if they are in the catalogs or not.

In the final report must be found all the products that the group "bought" with their prices with and without a discount, the total amount of money spent and how much of the percentages were saved by discounting.

As the wardrobe is rarely found in the catalogs, the group responsible for "dressing" the family has to go to the shops and on the face of the place find the reductions they mostly have throughout the year. The minimum wardrobe is a shirt, trousers or skirt, depending on the half, and shoes for each member individually.

The family, for example, consists of four members: father, mother and two children. In the final report, all the wardrobes that the group has chosen to buy with their prices with and without discounts, the total amount of money spent and how much money is saved by discounting.

As for the group in charge of monthly households, their task is for each member of the group to collect information from their parents about the monthly bills for the previous month for items: electricity, telephone, cable, internet ...

Based on the data of each group member, by calculating the mean value for each item, the monthly account of the imaginary family is obtained. Also, from talking to parents and studying accounts, the group should determine how much each account will be reduced if a payment is made to a specific date, or, if not, until the date is specified, how much will be the increase (interest) on these accounts. In the final report, all accounts should be found with their amounts if they are paid in time, to calculate how much savings have been made and what the costs would be if they were late for payment.

When all the groups complete their research, each group will say what it all included in their research, which they produce on the list, how they came to the price, what caused them problems and how much they had saved. For such a presentation, the group can choose to own a representative who does not have to be a member of the board of directors. When the presentations are over, the board of directors will meet, and based on the data that each member of the board will bring, it is calculated how much money is spent on the family (total budget), what is the final cost savings and what percentage of that total budget that group spent. This information will be forwarded to each group by each member of the board, and all submissions will be completed by entering them.

Co-operative concept mapping

The "Cooperative map concept" method has been developed by a group of authors at the Concordia University in Montreal. The author's intention was to develop a method that would help students understand the subject matter with the help of their classmates. It has been noted that a large number of children equates memory with the understanding of the material. Practice has shown that children can easily explain some of their contents and ideas to each other in their own way, rather than what teachers do. When students learn to sketch and conceptualize their explanations, the effectiveness of these instructions increases. This method requires students to plan and conceptualize their plan maps based on identifying the main ideas and links between them. It is a graphical seed, for example, a node-junction-node, in which the contents of the idea are printed in nodes (rectangles and circles) and the links are represented by lines or arrows.

It is advisable for a teacher to bring out and demonstrate a concept map and explain it and give groups so that students see a conceptual model that will later facilitate their learning and mapping.

Many students come to school with prejudices about learning and teaching, with the understanding that success is enough to memorize the facts. It also supports the beholder mode. To work efficiently in the map concept, students have to change their attitudes or prejudice about teaching. Learning objectives should be understood by students as their own.

It is necessary to form heterogeneous groups of 3 to 4 members and encourage them to cooperate and assist the weaker so they can lean onto the group. It is important for students to understand or understand what is a cooperative mapping concept and to understand the conceptualization process. The teacher should make an emphasis on thinking out loud so that all students can follow the theses, main ideas, relationships between them and the like. Let the students understand that it is not only important to conceptualize the contents, but also to develop the ability to conceptualize. It is necessary that students have the courage to notice the main ideas, to learn to summarize the text and to know what is important. When each of the students draws their own idea into the notebook, the students in the groups discuss individual notes, ideas and theses. They ask each other questions and ideas. Groups reduce the number of ideas and make the key structure of the nodes from which the concept maps will be derived. It is necessary to encourage students to ask or consult teachers, if necessary. While explaining the folder to other members of the group, the student purifies his understanding of the material.

Students should be able to see the success of this work from a teacher's point of view, but should ask themselves to analyze what they have learned and how the mapping process was going on. Also, it is important for students to emphasize that it is not only the concept of folders that they are important but also the facilitations they make when memorizing content.

CONCLUSION

The fact is that the most efficient learning is what is happening in the group and that cooperation is the basis for any progress. When we separate people and individually evaluate, we make a gap between them and their natural environment.

The results of the research have shown that co-operative learning as an indicator of quality education and education is reflected in school climate, interaction and communication, improving interpersonal relationships, willingness to help and cooperate, friendships and peer acceptance, as well as their own contribution to learning and work.

Pupils who have met cooperative learning point out the interestingness and usefulness of this learning, its contribution to relaxation and the overcoming of fears of negative evaluation and school failure. However, although the review of the mentioned literature on cooperative learning provides a clear picture that its application in school provides very potent effects when student achievement and their social and emotional development, research on school practice shows that the application of individual work is still dominant in the teaching of basic and Secondary schools. One of the possible reasons for insufficient representation of cooperative learning in practice is the fact that initial attempts by teachers to create those situations among pupils are often condemned to failure. Teachers who do not have the resources and resources to plan and apply this form of work, apart from their enthusiasm and interest in trying something new with their students, are quickly disappointed because they are faced with serious problems in discipline and motivation of students. More careful insight into interaction models in groups reveals primers of a number of phonographs and the withdrawal of others. Given that they are not accustomed to co-operation while learning, students will rather retain patterns of behavior commonly used in individual forms of work. However, this does not have to discourage the teachers. Every teacher who has had at least one successful class and felt the benefits of such a method often returns to this modern method.

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