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PHENOMENOLOGICAL APPROACH TO VIOLENCE IN SCHOOLS

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Review Article

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Abstract: The paper discusses "The phenomenological approach to violence at school as a critical approach to the problem of violence in schools. This problem is a reflection of the current situation in the world, both in the economic, political and military, and the cultural and educational level. The topic and research of the topic deal with the problem of violence in schools among students, students and teachers in the Republic of Srpska and Bosnia and Herzegovina. The focus of the problem is the verbal and physical abuse, and neglect of individuals by peers or peer groups, and the verbal and physical violence by teachers against pupils and students against teachers. The problem of violence in schools has been present since the foundation of the school. The questionnaire was specifically made by the teachers, especially by students. The data obtained in the study are expected. They say that violence in school already, to be applied through various forms, to be applied between students, between students and teachers and between teachers and students.

Keywords: school violence, physical violence, verbal abuse, teachers, students.

I. INTRODUCTION

Many theorists around the world deal with the problem of violence in society, in different ways interpreting the concept of violence. However, they all agree on the fact that violence is intentional use of physical force and power of threat or action towards oneself, to another person, or a group of people or a whole community, which could lead to or result in injury, death, psychological consequences, underdevelopment and the like. In the sociological lexicon, violence is defined as "the use of physical force to force as particular behavior of people." Milosavljević M., "by violence includes various acts, methods and behaviors of individuals, groups, social institutions, an organization or company in reference to human studies which include the application of physical, psychological, or other forces, and which endangers the physical, mental or social integrity and cause various physical or psychological damage or other adverse consequences." According to Krešimir Petrović "violence as a means of solving, or a threat to extortion, is shown as the most efficient, and therefore, as the most common form of resolving many conflict situation (rational and irrational) are displayed on different levels, planetary, group or individual." The second theorist regarded violence as a phenomenon which is opposed to freedom, or as a mark of attaining political power, that is the way of communication which is based on the fact that users of force can cause pain, damage or fear on the part of the force which conveys the message, according to D. Simeunović. According to D. Koković, "violence becomes a symbol, an integral part of the lifestyle, philosophy of young people. It figures and works as a means of diverse forms of social power, primarily by observing the position of the mass media. According Koković, we live in a time of violence and the violence of time.

"School violence is the only segment the violence that exists in the social environment and everyday life. With considerable certainty it could be argued that violence at school phenomena that exists since there is a school. More correctly might say that what we now call the violence in school were always present in the schools, and many times that seen as something that is normal and inevitable. This form of student conduct, therefore, from the beginning of schooling, continued up until the 90's of the 20th century, when it just exploded all over the world, and when, for all the bells began to talk about violence in school. Violence in schools and against the school is all pervasive and is gaining weight forms, both in advanced countries, and in our country. Violence in schools is a "trend" in the Serbian Republic, Bosnia and Herzegovina and the region. Violence in school, as well as any other act of violence, contrary to the moral and legal norms of behavior. The different form of violence in school is increasing in sociological

literature and is treated as a product of the social crisis. Symptoms of the crisis are the forms of school violence among students, between students and teachers, between students and school staff, and all this leads to the erosion of the identity of the school, students and teachers. For centuries, the school is considered a holy place, that students should be respected, because it comes to new knowledge and to training for life, and therefore, violence in schools is considered as a great evil, something that is unnatural and unexpected. As much as it seems at first glance as an internal problem, increasingly acrimonious forms of violence in schools are closely connected with the forms and causes of violence in the family, the peer group, the school environment, and in society as a whole. School violence as a phenomenon or rather, as the problem of the 21st century is, unfortunately, rapidly arrived in our school.

II. RESEARCH OF VIOLENCE IN SCHOOLS IN THE REPUBLIC OF SERBIAN / BOSNIA AND HERZEGOVINA

In the research of violence in schools, we've worked for the last 10 years, and we have come to important data. At the outset, there is no difference between violence in school that applies to us and applied in other advanced countries of Europe and the world. All the same, only the actors are different, nationality, religion, skin color, etc.. In present there is violence between peers, between teachers and students and students and teachers. Even here, there are physical, verbal, psychological, social and sexual violence, as well as electronic violence as a contemporary form of violence. And here are the main factors creating a young, educated and progressive personality, parents, peer groups, schools and the media. The data that we have been worrying about give us the right to suggest to all public institutions and organizations dealing with the problem of young people, to start urgently implementing measures for the prevention of violence in schools, while it is still not too late, to provide that they have done programs for prevention of violence in schools. In fact, as we have been doing separate surveys with teachers from surveys with students, and we came to different data, but both have confirmed the fact that violence is present in schools and that happens every day. In addition to parents, peer groups and schools, most responsible for the phenomenon of violence in schools, the media every day full head of youth violent scenes, primarily via TV, Internet, mobile phones and video games. All the mentality of the media and film destructive acts of violence and calls into question the norms and values that underpin the community and social order. Renowned sociologist N. Now, Dragan Koković defines values as follows: "Values are a set of general rules, beliefs, opinions and attitudes about what is right, good or desirable and what is accepted and forms through the process of socialization. The survey was carried out in several, separate in time, the research phase. In the first phase of the research is used to identify students-abuser and the abused students in relation to any form of violence. In the second stage of the research examined the characteristics of the identified student-abuser and the abused students. In the third research phase to monitor student behavior-abuser and the abused students, in order to better understand the development of bullying at school. The aim was, exploring the forms and mechanisms of development of school violence in our community. In addition, the practical goal of this work is based on the results of the research design a strategy for the development of prevention programs existing bullying at school. The research topic is school violence among students and between students and teachers and vice versa. Within each of the previous set of research objectives, we formulated the hypothesis private. Expectations are as follows: - there is a greater degree of agreement among the surveyed teachers and support staff in identifying students who are bullies and victims of physical violence compared to other tested forms of bullying, that is, physical violence among students is clearly defined and most obvious - more students will be recognized as a victim of emotional and psychological violence, but the relatively small number of students to be recognized as a bully in the framework of this form of bullying - more students will be recognized as a victim of social violence (discrimination), but the relatively small number of students to be recognized as a bully in the context of this form of bullying, - sexual and abuse among students are present in a relatively small extent, so that a relatively small number of students to be recognized as the abuser, or as a victim of this form of bullying, - electronic violence, although present among students are not in a sufficient increasingly recognized among the n mortgage and support staff, while if a relatively small number of students to be recognized as the abuser, or as a victim of this form of bullying, - a number of students at the same time will be also recognized as the victim of a violent and as within the same forms (eg. a student who is physically abused at the same time may be violent to lower students), or in various forms (eg. a student who is the victim of social violence at the same time may be physical violator or a student who is physically abused at the same time may be electronic bully ...). Interviewing students was done in small groups. In order to ensure intimacy and discretion responses, students were

sitting alone in the pews. Due to the sensitivity of the issue dealt by the questionnaire, we thought it would be privacy of respondents and could better protect those seating arrangements. Perceptions of bullying were obtained using a questionnaire which was created in accordance with the objectives of the research. Created and applied two versions of the questionnaire, one version for teachers and one for students. Both versions consist of a few questions given in the form of scales of assessment. Respondents were given the opportunity to answer their letter in case they did not like being offered.

III. TEACHERS AS SUBJECTS

Teachers agree that the school violence is present, and that the verbal abuse, through; gossip, name-calling, humiliation, ridicule, inappropriate heckling, fabrication and launch of untruths, mockingly interpretation of origin, intimidation, deliberate neglect and exclusion from the group it belongs to, threats, blackmail, confiscation of money and personal belongings, ordering, etc., of all other forms of violence, usually is present (82%). This behavior of students, according to the assessment of teachers is copied from the media, which daily violence program running for several hours, which leaves a lasting impact on students and their behavior. Locations in schools where children are most often exposed to verbal harassment based on data from the study are: the schoolyard (57.4%), training (13.9%), the relation school-home-school (6.9%), school corridors and preparatory gymnasium facilities. What certainly promotes violent verbal reactions of the child and adopted a value system that gives guidance desirable behavior and models of successful people. We are witnessing a shaky system of values in our society, it is quite expected that children resort to inappropriate behavior patterns and stick to violently provocative content, and they usually are not completely clear. In their growing up there are values like honesty, sincerity, diligence, good, truth, justice, labor, valuable, emotional, moral and other care; Crime, corruption, bribery, lies, laziness, injustice, lack of work, buzz, kick it, insulting, violent behavior and more. Reasons for potentiation of verbal harassment in the peer group are varied, but the most common motives, according to the results of research are primarily poor, home education, the need for emphasizing and jealousy. If we bear in mind the reasons for verbal harassment or abuse of students considered the perception of the teaching staff, it is expected that most of them proposes the realization of educational activities in schools and various forms of cooperation between schools and parents in order to prevent this occurrence or prevenisale. In addition to working to raise awareness about the bad effects of threatening communications and affirming tolerant response in conflict situations, teachers believe that the consistent punishment of any effective preventive measures. Disturbing is the fact that one sixth of employees in schools did not respond to the question. The conclusion is that it is their lack of interest in this issue. Verbal harassment of students by the teaching staff, in relation to the physical, more present in schools. On this statement suggests the perception of respondents. Prevalent opinion is that the person endangers students more verbal interpretations of teachers, rather than their actions. Confirmation of every fifth employee at the school (19.8%) of the tendency of teachers to create tasteless jokes addressed to students talk about bad taste and lack of professionalism of a part of the teaching staff. This data supports the constant neglected educational role of educators. The school system in our society is such that the Ministry is investing more resources in education than the educational segment, and teachers themselves have (from the beginning of the war) given up educational objective. Physical violence, such as: fighting, kicking, pushing, throwing, slapping, pulling, attack various objects, demolition, spitting etc. among students is a daily, following the education element, as this research confirmed. According to the opinion of almost a third of the teaching staff (29.7%), fights are common in their schools. Estimated by teachers, it confirms the significant presence of pure physical violence in the school environment. This is worrying, because it directly indicates heightened aggressiveness among students and potentially hazardous situation where children are exposed to in school. In relation to verbal harassment and abuse of this form of communication is difficult and has consequences not only psychological in nature, but also physical. And for this kind of violence, the teachers, in addition to parents, blame the mass media, who "took" an educational role over our children. Locations where physical violence usually happens at the school yard (58%), Home-school-house (14.9%), the classroom in times when there is no teaching staff (13.9%), school hallways, etc... What is certain, the children in the school setting, the opportunities in which teachers have no control physically to harassed peers. The absence of an adult authority is more likely to be identified with the absence of fines and, as such enhances the violent reaction. In the opinion of teachers motives for physical violence are: bad family education (27.7%), the need to dominate (18.8%), primarily a reaction to the provocation addressed (13.9%), personal dissatisfaction (10.9%) expressed temperament and generational transmission. In schools there are and violence between teacher-

student as well: tasteless jokes, taunts, insults, kicking, etc. forms of violence by teachers, as suggested by the results. Thus, the lower part of the teaching staff (11.9%) agree with the statement happens to be a teacher / ca in my school occasionally struck students, while six times more (68.3%) responding disagreement. Teachers agree with the statement that among them there are those who have "strayed" into the classroom and who behave inappropriately profession and students to learn. There are those who provoke the students, called them names, and apply physical violence.

IV. PUPILS AS SUBJECTS

Students generally estimate that their peers are prone to verbal violence. In fact, more than three-quarters of respondents (78.5%) is consistent with the statement in my school some children offend other children and called them bad names, while only a fifth disagreed (13.3%). If we consider the situation in which the most frequently encountered thread verbal harassment, we can see that students in schools indicate derogatory comments about the origin and physical appearance of their peers. Almost twice as pronounced agreement (53.2%) of disagreement (27.8%) with the statement some kids in my school to taunt other children and making jokes at the expense of their origin. Every fifth student (19%) is undecided in the assessment of the specific situation. Students who are overweight are also the focus of compaction peer tasteless joke. My peers at school make fun of kids who are overweight agree fully or partly slightly less than two thirds of respondents (62.3%), while one-quarter disagreed (24.8%). Similarly with the claim of the children that are too thin are often the subject of ridicule other students, as is agreed almost third (31.2%), is opposite to that in paragraph nearly half (47.4%), and the fifth of the undecided. Boys, in the opinion of respondents, more often than girls pay attention to the physical appearance of their peers and use it for unsavory comments. According to estimates of the respondents, girls are skilled in the machinations of the boys. In addition to verbal harassment in schools is present and physical violence among students. Violence largely reflects specific organized groups of students who enjoy the image of dangerous persons. Inconsiderate children in school attracted peers prone to violent reactions. The subject of peer beatings are generally rude children, motivating them to take justice into their own hands and punish by violence which further concern is that one and the same child often is a subject of physical violence of groups of children! About unfair perception of this relationship has divided opinion of students, because the same number expressed disagreement and uncertainty when it comes to the claim group of children occasional shock of the same students in the school. On the other hand, slightly more respondents, the same effect. Verbal violence by teachers towards students, as research shows, is presented on a daily basis. The students say that inappropriate, rude, indecent, uncivilized and other behavior of teachers towards students in a high percentage. This is usually expressed through: student's insults, name-calling and extremely primitive names, ridicule, humiliation, provocation, demonstrate and highlight the complex and personal shortcomings. Physical violence between teacher-student is more widespread. Occasionally unprofessional reaction of the teaching staff is part of school life, which is utterly unacceptable! Every third student was confirmed by direct experience, the physical threat to the personality of the child by the teacher, which leads to the violation of fundamental children's rights guaranteed by the UN Convention. The fact is that the communication between teacher and student is far from ideal speech and student perception. More than a third of respondents agreed, while half disagreed with the statement that physical violence is more widespread by teachers towards students. Locations where usually happens verbal violence are: the schoolyard, classroom at a time when the teaching staff absent, school hall, gymnasium and relations –school- house - houses. So all of those areas in which there is no adult supervision controls are ideal for this situation. Locations where the most frequently performed physical violence of the student population are precisely those that are not under the watchful eye of adults, school grounds, classrooms without teachers, school relations - home - school. At the end of this brief analysis should present an alarming rate, and that led the teachers and students of the perpetrators and their sanctioning. Both are concerned about the fact that the student who perform verbal, physical violence in schools, is not punished are too lenient. He concludes that this is one of the major reasons why students behave violently, and why we have repeated violence against students, teachers and other employee staff. They already knew at the start that there will be or will be punished lightly, but they do not endanger the position of the school and classroom. The most common penalties are: a reprimand form teacher, reprimand class council, teachers' council reprimand and reprimand the director. With all of this reprimand, the student remains in school even raises tensions and changes the style of behavior and to the students and to the teachers and others staff. No violent teachers are not subject to serious sanctions, nor is it happening today. Violence in schools is

increasingly aroused public opinion in the Republic of Srpska and Bosnia and Herzegovina, and is an expression of conflict and violence students, violence in the workplace and institutions in which they are employed, as well as violence in the street in the city where they live and in environment of schools. All kinds of conflicts and forms of violence encouraged by the reduction in living standards, lack of money and the impoverishment of the majority of the population. In addition to this, during the still unfinished transition period is over and the previous value system, while the new has not yet formed. In this context, the value do not respect the legal norms that change, such as changing political-party elites in power, but also the less respect to the valid moral principles and norms. These young people lead to depression and hopelessness. This creates a favorable environment to expand and consolidate all forms of deviant behavior of children, students, youth and adults. Their role model are "tough" guys with a lot of love, "furious" cars, big gold chains, tattoos, who recently got out of prison with hard labor. Young people with no experience learn from people who had participated in the war, who killed other people who were poisoned by hatred, who are ready for violence at any moment, and they are negative, wrong values, which do not fit in today's life. Here goes further, enjoying marriage, gambling, prostitution, crime, disrespect of older, negative values that young people "learn" from their "idols". Do not we value such and such "idols" should be in the 21st century? Violence can be seen as a rejection of certain values, but also as a struggle for new values, because it draws power from low self-esteem of man, of his own doubts about the value.

V. MEASURES AGAINST VIOLENCE AT SCHOOL

When disclose an incident of violence at school, what the public most troubled and angry are two conclusions that are of such cases usually perform: the case is, above all, proof that we are faced with a flood of school violence and in addition, that the school (teachers, principals and others) they cannot or will not adequately respond to violence. Incidents that occasionally appear in public are by no means a sure proof of an increase in violence. Before you could say that such incidents are, unfortunately, inevitable and that when such cases would not be in the public could mean that such cases are hidden but that does not happen. In Bosnia and Herzegovina, there are several thousand school buildings, hundreds of thousands of students and over 50,000 teachers. So many students go to classes, in which daily "buzzing like a beehive," continually takes intensive interaction, filled up, cooperation, quarrels, rivalries, stresses. It is impossible that from the first to the last day of the school year all none of the students during the thousand hours spent in school does not make any serious incident. It is also unrealistic to expect that school personnel can and must prevent any such incident. But, although the school is unable to prevent the overall violence, it is obliged to try everything in its power to prevent violence, such as the obligation to respond appropriately when violence happens. Teachers, principals, support staff, parents and students must jointly implement measures against violence in schools through education, lectures and other forms of training for a successful fight against violence in our schools. Research has shown that all actors in the educational process very low levels that are stuck and cannot even know how to react in the moment of violence at school, or how to behave and react after the commission of violence and the abuser, and towards students who have suffered violence. For the older generation of teachers, who have taught at universities how to properly educate and assist in the education of the young generation, we conclude that it does not cope, and do not try to find their way, because they are not used to this, violent style of behavior, and we think that the education of these teachers go hard enough. Again, they believe, (completely correct), that they come to school as teachers, not as police officers.

VI. CONCLUSION

Violence in school is a problem of the modern world. In our country it is not just a problem of constitutional law and the legal system, educational system, parents and peer groups, but society as a whole. Research has shown that the institutions dealing with the problem of violence and young people, such as: social work centers, judiciary, prosecution, police, ministry of education and culture, health institutions, schools and others were not up to the task and did not provide plans and programs for the prevention of violence, and not for the education of violent and other students, their parents, teachers and other individuals and organizations that should be involved in the programs. According to the latest data, the age limit among delinquents is getting down, they are children of 10 and 11 years, but there is increasing percentage of total delinquency. The similar data have taken by other researchers and scientists, sociologists, psychologists, criminologists and others, which shows the seriousness of the problems in this paper highlight. Modern children are freer behavior, daily use of mass media, primarily

the internet and mobile phones, but at least they go to school to learn what they cannot see, nor hear, nor of their society not from the Internet. Schools are boring to them again, and only began to live there because of them someone asks for certain knowledge, he called out in front of others and question him, and he does not care. In this fast life who live young generation, they are the least cost to new knowledge and old-fashioned teacher lectures. Their motto is, the more fooling around, buzzing and hanging out for all day, and in addition to surfing the computer and video games to their hearts' content. And so on from day to day. A particular problem in all, represents precisely the Internet and mobile telephony. Young offenders who commit violence in school are not aware of the result, not the volume, not weight of violence that have been done, because they have no experience of it, they just saw and copied from the Internet and video games. Based on the above, we came to the conclusion that the percentage and numbers may change from year to year, from generation to generation and will be altered, and that violence in schools exists among peers, between students and teachers, between teachers and students and will exist in all forms that apply today, as long as there are schools and students in them, regardless of where they are. The age limit will be lowered among abusers under 10, as violent trend is increasing, and the technology is steadily advancing. In our country, if the problem of young offenders is not taken seriously, the sudden arrival of Western culture will be big problem, which we will later find as hard to rehabilitate. Therefore, it should be today, in all schools throughout the Republic of Serbian and Bosnia and Herzegovina, to begin with the implementation of measures against violence in schools and the education of teachers and other school staff, students, parents and the wider community. We hope that this work, which can be used pedagogues, psychologists, sociologists, teachers and other professionals in schools and other preschool teacher education institutions, as well as parents, students, professional services in the municipalities and the other part of the program for fight against violence in schools.

Summary: The subject of this paper, "Violence in schools as a result of disrupted values in the society" provides critical approach to the problem of violence in schools. This phenomenon is a reflection of the current situation in the world, not only in economic, political and military terms, but also in cultural and educational terms. The subject of this dissertation and the research itself deals with the problem of violence in schools amongst the pupils, and between pupils and teachers. The focus of the problem is on verbal and physical violence and negligence of individuals by their peers or a group of peers, as well as on verbal and physical violence against teachers of their pupils and their pupils against teachers. The problem of violence in schools has been present since the origin of schools. Both theoretical and empirical aspects are presented in the work. Questionnaire has been conducted separately with teachers and pupils. The expected outcomes of this dissertation are data obtained in the research showing that violence is present in schools, that it is applied in various forms amongst pupils, between pupils and teachers and between teachers and pupils.

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DURATION ESTIMATION OF TEMPLATE- BASED PHP SOFTWARE PROJECTS BASED ON PRACTICAL EXAMS ANALYSIS: A CASE STUDY

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Original research

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Abstract: Within information system development, some of the most important issues in software project management are software complexity, software quality and performance, as well as estimation of software project duration and cost. It is of a great importance to introduce these important issues to students during their study time within teaching process. Moreover, in assessment and exams period, proper estimation of students' programming workload is another relevant issue. This paper deals with educational context of estimation of software projects duration, particularly for software developed for the organizational context, i.e. within information systems development. The main result of this paper is presenting teaching methodology within the case study in PHP programming as well as analysis of exams results. Teaching methodology is presented with practical lectures content (template-based programming, OOP, CRUD) and organization of classes, preparation for exams and exams conducting. Exams results analysis is the basis for a case study that demonstrates application of the method for estimation of students' PHP projects workload (duration) planning.

Keywords: students' software projects, estimation, duration, workload, CRUD, OOP, PHP.

I. INTRODUCTION

Common practice of students' theoretical knowledge assessment usually includes essays and multiple-choice exams [1] [2], while practical knowledge and skills assessment includes practical exams [3] and projects [4]. Many factors influence students' performance at knowledge and skills examination (such as student effort, student ability and teacher input [1]), but it is of a great importance to do proper design and evaluation of tests before their actual application with students [5]. Adequate workload estimation is one of the most important aspects in appropriate design of various examination forms in students' knowledge and skills assessment.

Students' projects could improve their project management skills [6], as well as programming skills, writing and culture [7]. According to Project Management Institute, "a project is a temporary endeavor undertaken to create a unique product, service, or result." [8] Project management, as important factor of any project success, expresses many potential paths in research and further development such as [9]: optimization in project scheduling, project selection, earned value analysis, task allocation and notification, cooperation of task operators, subcontractors and stakeholders, management of uncertainty and completion incentives, learning from and between projects, scalability of agile methodologies, sustainability of project management. Rational projects management is based on established system for key-performance criteria estimation and measurement, such as well-known "Iron Triangle": cost, time and quality [10]. It is of a great importance to define appropriate set of measures according to the target benefit scope.

Aim of this paper is to present research in duration estimation of students' software projects in PHP programming, based on analysis of results in PHP programming practical exams. Research is conducted as a case study with students' practical exams and students' projects in PHP programming at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. The proposed approach is based on idea of using analysis of success and duration of practical exams in PHP programming as foundation for

estimation to possible duration of students' projects in PHP programming. This way, real data is used for more precise estimation of students' projects duration, i.e. workload. Structure of this paper consists of: related work analysis, research methodology description, teaching methodology description, results analysis and conclusions.

II. RELATED WORK

During many years, research and practical efforts are made towards more precise estimation of software projects, particularly in the duration (time) aspect, which relates to costs and could affect quality of software product. Duration of project is closely related to workload. i.e. efforts that are usually expressed in man-hour, man-day or man-month [11] measurement units. Some of the estimation methods are based on experiences from previous projects or from estimation of experts (which have foundation of estimations in their own experiences) [12]. Some of these experience-based (empiric) estimation methods are Empirical parametric estimation models [12], where parameters are:

- lines of codes (LOC),
- functional points (FP),
- data flow graph and object-relation graph elements analysis,
- number of pages of system documentation,
- elements of object-oriented system analysis and design (number of objects and services of the system)
- COCOMO model that includes various parameters such as estimated full LOC of future software product, subjective assessment of hardware, personnel, project, and additional cost drivers.

Other estimation models include approaches such as [12]:

- Empiric non-parametric estimation models (use data on projects realized earlier, with similar characteristics in complexity etc.).
- Expert estimates (consulting other software experts and combining different opinions with methods such as Delphi).
- Analogue estimation models (analogies of new project with similar ones that are completed previously).
- Downward (component based) and upward (from implementation of parts to integration) estimates
- Percentage method [13], where the system development is divided into phases and estimated time is expressed with percentage (e.g. in Table 1):

Table 1: Percentage of efforts in system development, divided by phases (improved from [13])

Requirements analysis	11%
Logical system specification	5%
Physical design	10%
Coding and module test	52%
Integration	5%
System test	12%
Deployment	5%

In aim to gain simple useful practical directions, software estimates resulted in “rules of thumb”, as a kind of “rules to apply in practice”. These simplified rules are considered not exact, inaccurate and not liable standards, but could easily be applicable. Some of such rules are defined in year 1999, presented as conclusions from a workshop [13]:

- *The productivity of a programmer is approximately 5 FP per person month (PM).*
- *1 Function Point corresponds to about 100 LOC (Lines Of Code) of COBOL - 20 LOC for OO or generators and more than 300 LOC of Assembler.*

From this example, it could be concluded that as programming technology changes, definitions and pragmatic “rules of thumb” change. In contemporary programming environment, with object-oriented design patterns and frameworks, as well as highly automated software development tools, productivity of programmers changes. Estimation of software project duration should be related to particular

implementation technology. Therefore, in this paper, particular software development style (template-based) and programming language (PHP) is analyzed.

III. RESEARCH METHODOLOGY

Research objective of this paper is to present a case study on students' software project duration estimation. Estimation is based on analogy of programming effort made within:

- Practical exam (conducted in computer laboratory classroom), and
- Software project (implemented at home working environment).

Analogy is possible because both type of programming efforts use:

- The same programming language PHP,
- The same front-end design, available as template,
- The same back-end template, available with all coding samples/modules (CRUD – Create/Read/Update/Delete with Tabular presentation of data, Search and Print support – named “essential programming module CRUDTSP”, implemented with OOP – object-oriented programming).
- The same development tools at classroom and at home: XAMPP (Apache web server, MYSQL database management system with visual tool PHPMYADMIN, programming tool Notepad ++).

Main hypothesis for this research is:

It is possible to have estimation of software project programming efforts based on analogy with programming efforts within practical laboratory exam.

Hypothesis will be examined within two research objectives:

1st research objective

The basic idea: Programming efforts within practical laboratory exam is measured in man-hour where “essential programming module” is set to be finalized within certain limited time period. In software related to business, i.e. information systems, is essential programming module consist of elements of user design and appropriate coding for enabling functions such as: data insert, update, delete, tabular presentation, search and print (CRUDTSP). By measuring time that is adequate to finalize completely functional CRUDTSP, we can define precise “essential programming module” duration.

Research method: Analysis of the practical exams (in CRUDTSP implementation with PHP, design template and OOP) results success and duration for each students' work. Maximum duration time for practical exam is 3 hours. It is to be determined if is it possible to finalize CRUDTSP PHP/template/OOP web application within 3 hours. Research population consists of practical exams from students in year 2016.

2nd research objective

The basic idea: If CRUDTSP PHP/template/OOP web application is possible to implement within 3 hours, then the whole software implementation duration, where implementation is based on exactly the same technology, could be estimated with simple analysis of USE CASE diagram for determination of all software functions, determination of number of CRUDTSP submodules within the use case diagram, multiplication of that CRUDTSP submodules number with time needed for single CRUDTSP submodule implementation (i.e. 3 hours in this analogy) using simple formula:

$$SPPD = N * D(CRUDTSPe); \tag{1}$$

Where:

SPPD – software project programming duration,

N – number of CRUDTSP submodules within the whole software project,

D – duration function,

CRUDTSPe – duration of a single CRUDTSP module implementation, within exam limited time period.

Research method: A case study with one student’s project in analysis of USE CASE diagram, determination of sub-modules and application of formula that integrates single CRUDTSP duration with the whole planned software functions.

IV. THE TEACHING PROCESS

PHP teaching at University of Novi Sad, Technical faculty “Mihajlo Pupin” Zrenjanin, Serbia is conducted at several teaching subjects, such as: Elective subjects (“Internet tools and services”, “Web design”), mandatory subject (“Information systems 2”). As per previous years statistic, these two elective subjects were chosen from approx.. 20% of the whole students population in higher education of information technologies at University of Novi Sad, Technical faculty “Mihajlo Pupin” Zrenjanin. Since PHP programming knowledge and skills are very important (PHP programmers were second as required at job market in Novi Sad region in year 2013 analysis [14]), since February 2014. PHP was introduced within mandatory subject “Information systems 2” within final bachelor level study of Information Technologies Engineering at University of Novi Sad, Technical faculty “Mihajlo Pupin” Zrenjanin.

Teaching process within subject “Information systems 2” is organized within three levels:

1. Basic level – implementation of database connectivity with standard mysql and mysqli programming commands, implementation of login, menus, sessions, data navigation between pages, basic CRUD implementation with standard PHP commands with one-table database, introducing OOP with extraction of database connectivity to separate class, creating simple entity/model class and including CRUD SQL queries within appropriate class methods. Implementation include inserting, update, delete, tabular presentation, filtering/search and printer friendly page.

2. Advanced basic level – working with two-tables database, combo box within user interface that uses data from other table, transactions, stored procedures and views, parametric printer friendly page, master-detail data input and print

3. Advanced level – demonstration of Laravel and Symphony PHP frameworks, demonstration of Wordpress and Joomla.

Within each of first 2 blocks (levels) classes, there are demonstrations and implementation of examples. At the end of lectures, there is dedicated class for exam preparation, where students could implement example testing application, by using finalized template (created from previous classes) and transform it according to another semantic (given with textual description of needed database/table structure).

Knowledge and skills examination is organized alternatively (student can choose one of these two types of examination forms) as: Two practical laboratory exams (after each of first two levels, i.e. basic level exam and advanced basic exam), or student’s project, which includes all elements from both practical laboratory exams.

V. TEACHING MATERIAL AND TEMPLATE

During implementation of practical exams or students’ projects, all students are allowed to use previously created template, which included both front-end and back-end programming part. The template [15] could be downloaded and copied to “htdocs” folder within XAMPP (Figure 1). Basic elements of front-end part of template (baner, status strip, menu, main content block and footer) are presented at Figure 2.

Name	Ext	Size	lDate	Atr
.[.]			<DIR> 24.04.2017 14:19	—
[css]			<DIR> 24.04.2017 14:19	-a-
[database]			<DIR> 24.04.2017 14:19	-a-
[idolovi]			<DIR> 24.04.2017 14:19	-a-
[images]			<DIR> 24.04.2017 14:19	-a-
voziloznimi	php	1.435	30.03.2017 17:06	-a-
index	php	3.330	30.03.2017 17:02	-a-
VozilaLista	php	2.259	30.03.2017 16:49	-a-
VoziloUnos	php	2.159	28.03.2017 15:26	-a-
stampa	php	3.095	21.03.2017 18:29	-a-
VoziloZmeniForm	php	3.954	16.03.2017 17:18	-a-
vozilozmeni	php	2.653	08.03.2017 19:39	-a-
voziloobrisi	php	2.349	08.03.2017 18:17	-a-
Welcome	php	2.008	07.03.2017 17:41	-a-
prijava	php	2.099	28.02.2017 18:44	-a-
prijava	php	1.778	12.03.2015 12:29	-a-
podesavanja	txt	26	12.03.2015 10:32	-a-

Figure 1. Files and folders of template for front-end and back-end PHP programming



Figure 2. Structure of front-end part of template

Template (implemented as example of Tourism Agency) includes implementation for all CRUD operations, as presented at next figures. Students were given this template (with both front-end design and back-end programming) to use it and transform to another semantic. The semantic of the template is tourism agency, while students were given (within classes and exams time) to transform the template web application to adjust to another semantics, as per given task description (such as information systems support to production industry, healthcare, education and many other business processes support).



Figure 3. Reading and “tabular” presentation of data



Figure 4. Printer friendly page

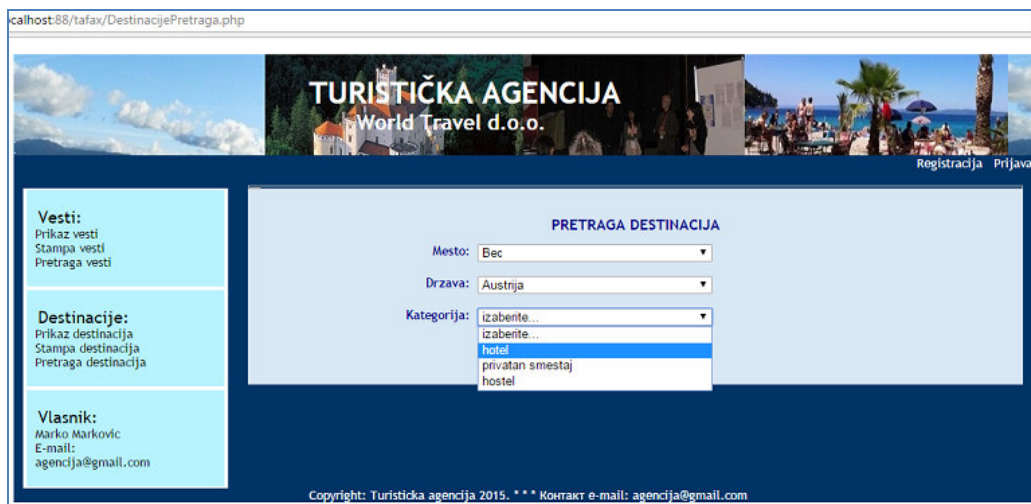


Figure 5. Filtering page



Figure 6. Data input page



Figure 7. Update and delete enabling list with buttons for “update”, “delete”

VI. RESULTS

1st research objective results

Total population of students’ results for analysis within first research objective (attended teaching process and exams within subject “Information systems 2” during year 2016) is presented with Table 2.

Table 2. Exam results in Information systems 2 with population of students, in year 2016.

	%	max=5	max=5	max=30	max=30
Student No	Attendance	Class work	Class activity	Exam 1	Exam 2
1	100	5	5	30	30
2	100	5	5	30	29
3	100	5	5	30	30
4	100	5	5	30	30
5	100	5	2	28	14
6	91	5	3	28	29
7	91	5	2	25	30
8	82	4	5	28	30
9	82	4	5	29	30
10	82	4	3	28	30
11	73	4	5	30	27
12	73	4	1	29	29
13	64	3	1	28	30
14	64	3	0	28	30
15	64	3	0	29	29
16	64	3	0	29	14
17	55	3	5	30	30
18	55	3	5	28	30
19	55	3	1	28	30
20	55	2	1	25	26
21	55	2	0	7	14
22	36	5	5	30	30

23	36	2	0	21	30
24	36	1	0	30	27
25	36	2	0		
26	27	1	0	15	
27	18	1	0	29	
28	18	1	0	27	6
29	18	1	0		
30	18	1	0		
31	18	1	0	29	0
32	9	0	0		
33	9	1	0		

Table 2 presents list of students' work in PHP programming at regular classes and at exams. Column 2 presents percentage of students' attendance at practical laboratory classes, where students were practicing PHP programming. Success of students' work within classes exercises work is expressed in points (third column – quality of work, fourth columns – activity (agility, preciseness, discussions, creativity)). Columns 5 and 6 present results of evaluation of students' work within practical laboratory exams in PHP programming. Maximum number of points for each exam is 30 and each of the two exams were organized with duration limitation of 3 hours. Each exam was organized that each students had one computer and his personal programming task to finalize. So duration could be expressed as 3 hours per student.

Analysis of previous results:

- Population for research on 1st research objective consist of 33 students' work within Information systems 2 teaching subject at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia
- Within the research population, 63.64% were regularly-attending students, while 36.36 % were non-regularly attending students
- Within regularly-attending population, 95.24% of students passed practical exams, i.e. only one student did not pass practical exams (achieved 7/30 and 14/30 within two exams).
- Within non-regularly attending population, 25% of students passed practical exams
- Within complete population, $(20 + 3) / 33$, i.e. 69.69% of students passed practical exams.

Conclusion from the 1st research objective is that regularly-attending students could successfully finalize each practical exam within 3 hours duration limit. This leads to conclusion that 3 hours is sufficient time to implement PHP application with basic CRUDTP functionality.

2nd research objective result

Having results from 1st research objective, it is possible to start activities in 2nd research objective. A case study of estimation of complete software programming effort is based on analysis of a use-case diagram (Figure 8.) combined with results of 1st research objective.



Figure 8. Use case diagram for example of tourism agency web application software project

Figure 8. presents a use case diagram for software functions in software project for tourism agency web application development. There are two actors (software user profiles): TA officer and TA client. TA officer adds destinations and TA client adds reservations on destinations. This is a simplified example of use-case diagram with only essential software functions, that is created in aim to illustrate the idea of the proposed methodology and to enable application of the formula to calculate estimated duration for software project duration.

Since within the first research objective was proved that the “essential programming module” (consisting of software functions on data input, update, delete, tabular presentation with filter and printing = “CRUDTPe”, i.e. CRUDTP essential module) could be finalized within 3 hours limit, in this section this fact will be used for determination of the whole software programming effort calculation. Use-case diagram in this case study is analyzed to determine number of CRUDTP modules and upon that number, total programming effort is calculated to express duration of programming for the whole software project with multiple functions.

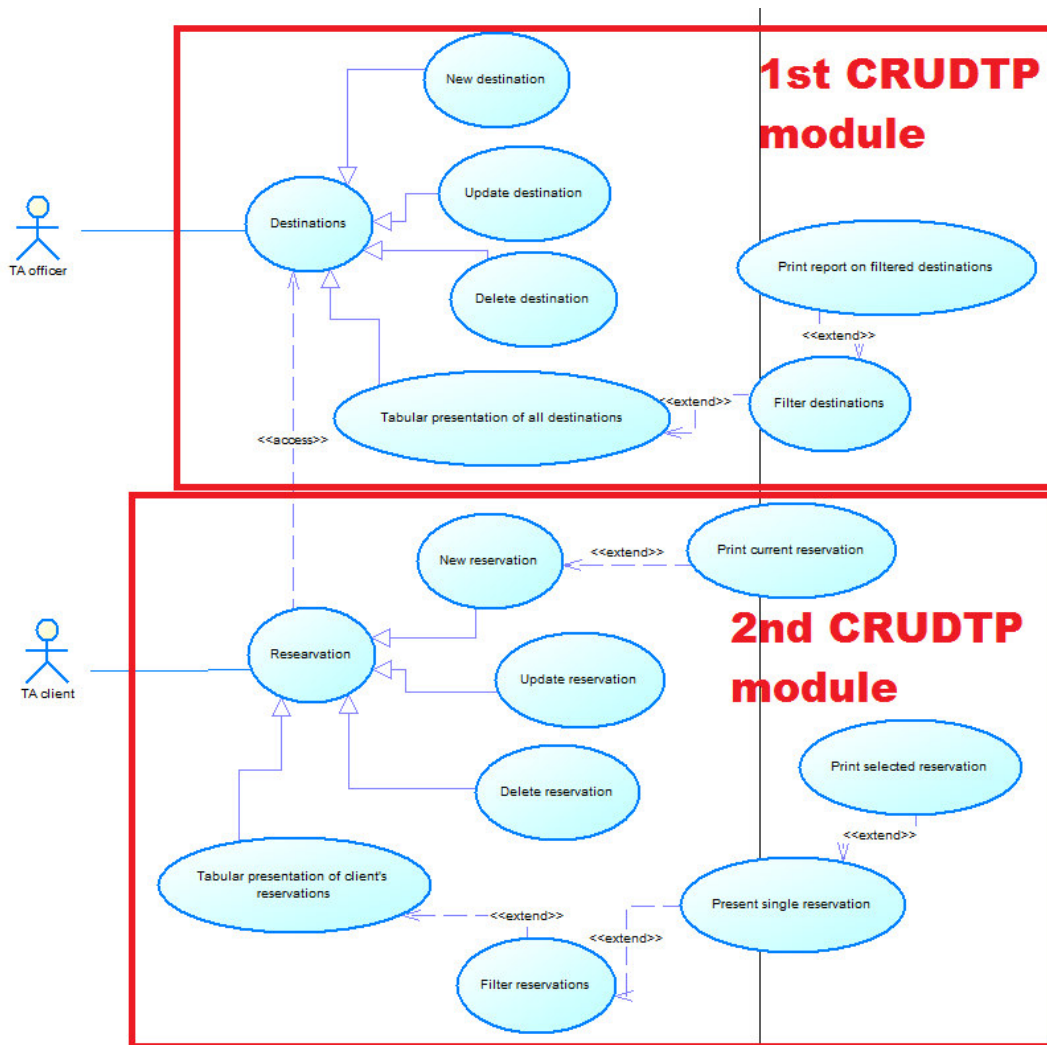


Figure 9. Analysis of use case diagram for determination of number of CRUDTP modules

As per analysis of the example use case diagram, there are 2 CRUDTPe modules within the specified set of software functions. Therefore, the formula could be calculated from formula: $SPPD = N * D(CRUDTSPe)$;

$N = 2$ (i.e. 2 CRUDTP modules), $D(CRUDTSPe) = 3$ hours/student

$SPPD = 2 * 3$ hours = 6 hours per student.

Complete programming effort for the whole software project is estimated and calculated as 6 hours per student.

VII. CONCLUSION

The research presented in this paper is related to method for estimation of software project duration within educational context. It is of a great importance to estimate students' workload in aim to enable good teaching and knowledge evaluation conditions for students.

In introductory part of this paper, it has been shown that related work in this field consists of many methods for software project duration estimation. Some of these methods are based on experts' opinions which are consulted, while others are, similarly, based on analogy with previous projects of the same complexity. Some related work in software project duration estimation emphasizes the importance of implementation technology which could correlate with results of estimation.

This paper had two research objectives – first to determine the essential programming module duration and second – to analyze use case diagram to determine the number of essential programming modules

within the whole software project. This way, it is possible to calculate whole software project programming effort by simple multiplication of number of essential programming modules (CRUDTpe) with duration for one CRUDTpe module implementation.

First research objective is finalized with the conclusion that 3 hours is sufficient time to implement CRUDTpe module in PHP programming, based on previously given software template (PHP example application with both front-end and back-end implementation). This result is used within second objective. An example use-case diagram is analyzed to determine number of CRUDTpe modules and since it was a simplified use-case diagram (prepared for this paper) it consisted of 2 CRUDTpe modules. Since duration of one CRUDTpe module implementation is 3 hours, for the whole software project that consist of 2 CRUDTpe modules the duration for the whole software project programming is 6 hours per student.

The proposed method in this paper could be applied for estimation of software projects duration in professional environment, as well as within educational context. Future research could include empirical evaluation of the proposed method with other technologies. The formula that is used within the proposed method could consider diversity of CRUDTpe modules, in aim to have more precise estimations.

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THE ANALYSIS OF AWARENESS OF IT AND ICT SYSTEM SECURITY IN THE EDUCATIONAL INSTITUTIONS, COMPARED TO OTHER INSTITUTIONS IN CENTRAL BANAT DISTRICT

UDC 007:004.3

Review Article

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Abstract – In this paper, the authors give review of security of IT and ICT systems in educational institutions in Central Banat District and compared it to the situation in other fields. Firstly, the severity of consequences of data loss and poorly secured systems for organization is pointed out. Later, based on the survey and its results, the awareness of the people in the domain is analyzed. The main focus of the research is to establish whether the organization uses IT and ICT systems, as well as whether it uses the penetration testing as a means of data protection. Moreover, the existence of will for change is perceived with the people in charge, regarding setting the sensitive data system security as the main focus. In addition, in this paper, the authors want to establish the basis for further research and point to the present, observed problems in the domain.

Ključne reči – ICT system security, security awarness, educational institutions

I. INTRODUCTION

A large number of published research papers, both scientific and professional ones, are related to data loss and distortion of high-tech organizational security. These publications point to the significance of this topic in our region and wider, as well as the attention to be paid to it with the aim to establish the quality of education and finally, IT and ICT system security.

Contemporary organizations store large volumes of digital data on their business, and this volume increases from year to year [1, 8, 9]. This is the reason why it is necessary to pay great attention to data protection. The scope of the security can also be concluded from the aforementioned, so as for the consequences not to be catastrophic for the organization. According to [10], these consequences can be set into seven categories, ranging from productivity loss and ending with employees' morale loss. Each of the categories influences the organizational work and can lead it to question of existence. This is what Dr. Jane LeClair [2] proves, pointing out that within six months, small organizations find keeping up with the business difficult and eventually find themselves out of work.

Therefore, in order to properly secure and respond to malicious threats timely, it is necessary for the organizations to regularly test their IT and ICE systems by penetration testing [3, 6, 7]. The importance of this testing is not only in the field of system protection, but also in the analysis of the existing system security status, as well as whether and to what extent the responsible people know the given topic. Today, there are organizations [11, 12] which give education in penetration testing and total IT security improvement.

Although data security is a significant topic today, organizations are not willing to discuss and offer information related to it. Based on this research, which shall be discussed later, a general overview of the

problems of poorly secured systems can be created. In addition to job loss, the consequences can be of a criminal character, where the organization or responsible people can be brought before competent institutions. In fact, numerous laws imposed to penetration testers and business organizations, are becoming more and more rigorous in order to force them do their job more professionally.

Based on everything mentioned so far, a conclusion can be drawn that the importance of IT and ICT security is very big. Therefore the research, like the one presented in this paper, is very important in order to establish the current state in the data protection domain, as well as the level of knowledge of the responsible people. By reviewing the research results by area, the authors want to give a clear overview of current state in the domain of IT and ICT security in Central Banat District.

The further paper structure is organized by the following sections: Section II. Related research, Section III. Survey structure, Section IV. Research results, Section V. Conclusion.

II. RELATED RESEARCH

In order to review the research in the field of ICT system security and to give the most precise results possible, it is necessary to use several different renowned sources. In [4], a complete security analysis has been done for ICT systems in 14 companies, operating and having branches in numerous countries, where 43% of the respondents belong to the manufacturing industry, 14% to financial sector, 14% to government institutions, 14% to telecommunications, 7% to information technology and 7% to construction works. Moreover, it is important to point to the fact that a large number of organizations included in this research, operate in numerous countries and more continents and have branches there. Based on this, it can be concluded that they utilize geographically distributed systems in their business, as well as the technologies to communicate between the branch offices.

When overall security is taken into account, the research [4] establishes that the malicious attacker can access the internal IT systems in 9 out of 10 cases. Moreover, by using the appropriate attack vectors, the attacker could gain full control over complete IT organizational infrastructure in 57% of the cases, even without the physical access to the system. This undoubtedly points to the low level of total security of IT and ICT systems in the observed organizations.

The same research also shows that in order to compromise the outer protection ring of an ICT system, the malicious attacker needs to utilize two vulnerabilities in average, to gain access to internal hosts and internal organizational network. It is important to emphasize that the knowledge level necessary for the malicious attacker, is at the elementary level of programming knowledge in 82% of the cases.

It is important to emphasize that the research [4] shows great oversights related to creating security passphrases. 40% of the access to internal networks is gained due to weak passwords. These points to the fact that weak passwords are still one of primary security vulnerabilities in ICT systems.

According to numerous authors, the Web application security presents the greatest threat to high-tech organizational security. Research [13] shows that it is the attacks on organizational Web application that made up 40% of all attacks in 2015. On the other hand, according to a report [5], investing in Web application security has fallen significantly in 2015 in comparison with other segments of high-tech security. Here, an estimation has been recorded that the total of 591.5 million dollars has been invested in Web application testing throughout the world.

Research [14] points to the big problem in Web application security. In the aforementioned 2016 report, the clients' Web applications are proved to have 5 to 32 vulnerabilities. This is a really worrying fact if the fact is taken into account that each tested organization has several hundred to several thousand clients actively using these vulnerable Web applications. Upon a more detailed overview of the report by its areas, a number of really worrying conclusions can be drawn.

One of the more important elements is the time exposure of a Web application to the vulnerability. It means the number of days during which the application was exposed to one or more serious vulnerabilities. Worrying results can be seen in key areas like IT, education, production, banking and financial sector, health, sales and food industry. These areas record the time exposure to vulnerabilities of 500 or more days in over 40% of the cases, and if the IT industry is put in focus, the same length of exposure can be seen in even 60% of the cases. Based on this, it can be concluded that the organizations are not able to solve all the

serious security vulnerabilities found in their Web applications, as well as that the time needed for solving this problem is long.

Moreover, research [14] points to the smallest number of vulnerabilities detected in production organizations, having in average 2 serious and 5 regular vulnerabilities. Then, entertainment, energetics and technology follow with 3-4 serious and up to 10 regular vulnerabilities in average. The middle group includes financial sector, healthcare and insurance, with 5 serious and 12 regular vulnerabilities in average. Finally, an alarming group is formed in sales, education and IT industry, having in average more than 10 serious and over 20 regular vulnerabilities.

Based on the aforementioned, and taking the previously analyzed research into account, it can be concluded that over $\frac{3}{4}$ of the observed organizations are subject to complete compromising of the IT infrastructure. Also, the worrying fact is that the most compromised areas require longest time for removing the identified vulnerabilities. For instance, the same research shows that removing vulnerabilities in IT industry in average requires around 248 days, and in financial sector around 160 days. Therefore, it can be concluded that the malicious attackers have a lot of time to explore the vulnerability, leading to the inevitable compromising of the company and its digital data.

III. STRUCTURE OF SURVEY

The survey structure can be split into four areas, with the first one being the questions related to identifying the organization and whether it uses IT and ICT systems in its everyday business. This segment of the survey consists of the following questions:

- (1) How many employees are there in the organization?
- (2) What is the organization's core business?
- (3) Does the organization provide its clients with a form of electronic business?
- (4) Does the organization use a form of electronic business with its business partners?

The second survey segment is related to the responsible people's awareness of the penetration testing and security of IT and ICT systems. Moreover, in this segment, there are questions related to education of the employees in this area, that is, how frequently they improve their knowledge. The questions in this survey segment are as follows:

- (1) Does the organization perform security check ICT compromising tests (onwards: pen-test)?
- (2) If yes, how often?
- (3) Are external companies (pen-testers) engaged in performing the pen-tests or it is done by an in-house department?
- (4) Do the employees improve their knowledge in the field of pen-testing, data protection and computer networks?
- (5) How often do the employees receive education in this field?
- (6) Who performs the education and certification of the employees within this field?

The third segment is related to identifying mechanisms for creating security passphrases and ways for their safe storing while being in use. This survey segment has the following questions:

- (1) When creating a password for accessing the wireless network, which characters are used?
- (2) How many characters safety passwords (security phrases) implemented through wireless networks have?
- (3) When creating a password, are password mangers and special algorithms used for their generating and safe storage?

The last survey segment is aimed to establish whether the responsible people within an organization want to improve their knowledge in this field. This survey segment consists of the following questions:

- (1) Would you like to know more about pen-testing and methods and techniques for ICT security check?
- (2) The way you would like to know more on the penetration testing.

IV. RESULTS OF SURVEY

The survey included 65 organizations from the territory of Central Banat District. Figure 1 presents the organization size and business area, and therefore the analysis of the results of questions (1) and (2).

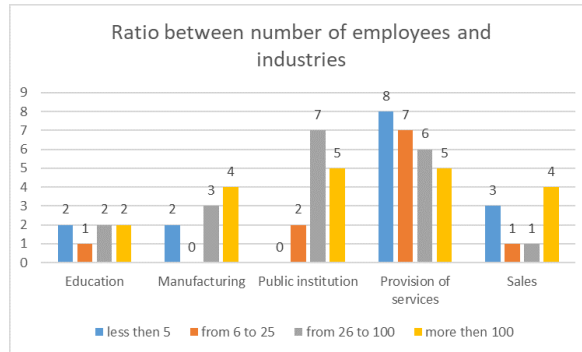


Figure 1. Results of answers to questions (1) and (2)

As can be seen from Figure 1, the area of education included 7 respondents (10.7692%), production 9 (13.8462%), public institutions 14 (21.5385%), services 26 (40%), and trade 9 (13.8462%). It should be noted here that service area includes book keeping agencies, tourist agencies, law offices and similar.

Figure 2 gives the graphic view of answers to question (3).

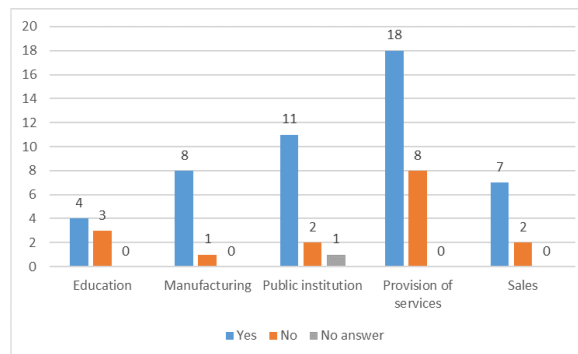


Figure 2. Results of answers to question (3)

As can be seen from Figure 2, there are still institutions engaged in education, not using any form of electronic business towards their clients. The notion of electronic business in this paper includes any form of electronic communication, offering the possibility of paying the service by electronic means, information exchange and such. It can also be noticed that this ratio is significantly smaller in other areas compared to the area of education.

Figure 3 shows the graphic overview of the analyzed answers to question (4).

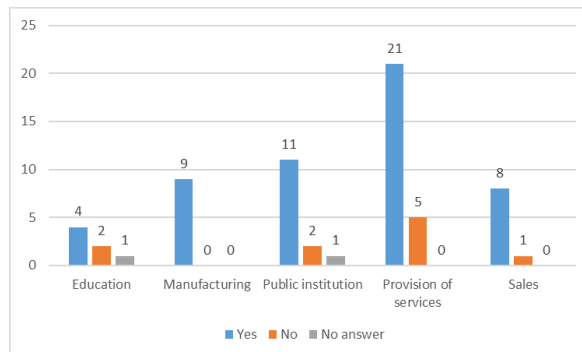


Figure 3. Results of answers to question (4)

On the other hand, when it comes to using electronic business in educational institutions for communicating with business partners, as seen from Figure 3, not a lot has changed. Just like in the previous case, a large fraction of respondents answered negatively. Other types of organizations show a largely different state, since a small number of respondents do not use a form of electronic business.

Based on shown and analyzed results from the answers to questions (3) and (4), a conclusion can be drawn that even though educational institutions use IT and ICT systems in large proportion they do not use the electronic business to its maximum. Interviewing the respondents led to the knowledge that using IT mainly reflects in data storing and data processing for business purposes. Therefore, we can conclude that, even if the IT and ICT systems are used, this use is not to their full potential.

The second survey segment, as has already been presented, is related to using penetration testing to IT and ICT systems used by business organizations. Figure 4 presents the graphic view of the analyzed answers to question (5).

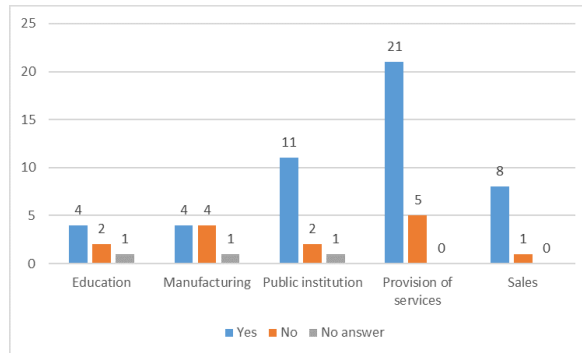


Figure 4. Results of answers to question (5)

As can be seen from Figure 4, when penetration testing and educational organizations are taken into account, more than 50% of respondents do use penetration testing on their IT and ICT systems. On the other hand, talking to respondents proved that they are aware of the notion of penetration testing but their tests are related to simple automated scanning using ready-made software solutions like antivirus tools. Other organizations, as shown in the Figure 4, also use penetration testing but just like in the previous case, a small number of them really do it in a proper way.

Figure 5 shows the graphic view of the analyzed answers to question (6).

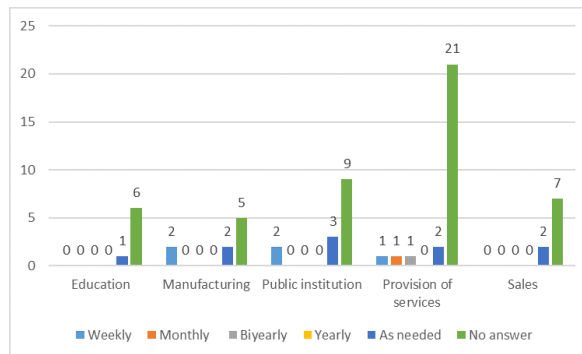


Figure 5. Results of answers to question (6)

It can be noticed on Figure 5 that the largest number of respondents did not answer this question regardless of the type of organization where they work. The reason lies in the fact that the tests are actually automated scanning by antivirus tools and similar ready-made software solutions. Planned and scheduled security system testing are almost inexistent in organizations in the area of education as well as the other ones in the Central Banat District.

This is the reason why it can be definitely concluded that, even though a basic knowledge about penetration testing does exist, it is necessary to additionally educate organizations about the proper ways of doing it.

Figure 6 shows the graphic view of the analyzed answers to question (7).

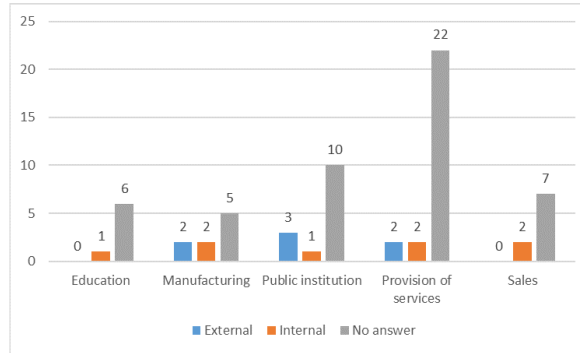


Figure 6. Results of answers to question (7)

As can be seen in Figure 7, the vast majority of respondents from educational institutions did not respond the question. Only one respondent gave the answer and confirmed that penetration testing is done by a department within the organization.

On the other hand, when it comes to other organizations, it can be seen that there are ones engaging external organizations to do penetration testing of their IT and ICT systems. It is clear that there are still a small number of organizations doing these tests, and even a smaller one assigning this task to the third party.

Figure 7 shows the graphic view of the analyzed answers to question (8).

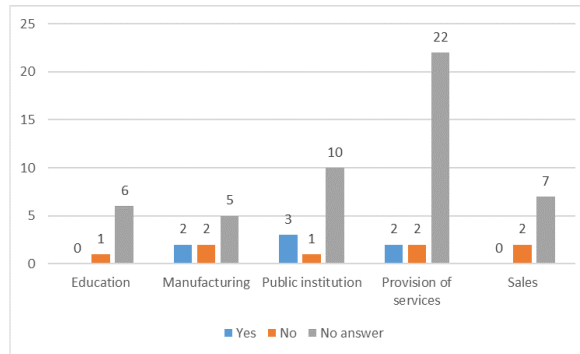


Figure 7. Results of answers to question (8)

As can be seen in Figure 7, even though the educational organizations are in focus, none of the respondents said to be improving their knowledge in the field of penetration testing. This is, indeed, a serious oversight which needs to be corrected as quickly as possible.

A legitimate question can be made here, derived on the aforementioned: who educates the employees in the other business areas?

Unlike the educational institutions, as can be seen in Figure 7, there are organizations setting aside certain financial resources to educate their employees. Unfortunately, some of them not doing it consciously, with the main reason being the lack of quality sources for doing so in this region. On the other hand, interviewing the respondents revealed that the budget for improving the employees' knowledge is fairly small.

In order to create a more detailed overview on whether the employees follow the news in this area, question (9) has been asked. Figure 8 gives the graphic view of the analyzed answers to this question.

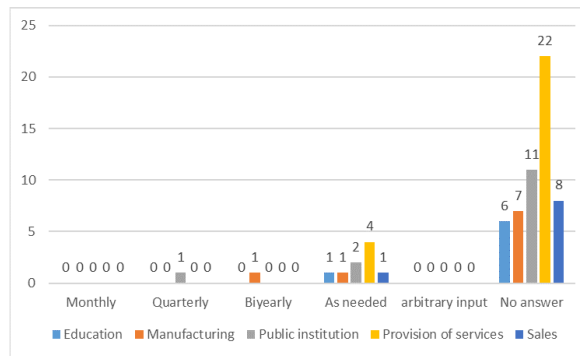


Figure 8. Results of answers to question (9)

As it can be seen in Figure 8, only one respondent from the field of education gave the answer, saying that he does it only if necessary. If the aforementioned is compared to other organizations, it can be concluded that the situation is largely unchanged, with the improvement being done only if necessary. Only a small number of organizations do it regularly. This can also present a problem since new vulnerabilities of IT and ICT systems are detected every day and therefore the systems become increasingly exposed to malicious attacks.

One of the important segments of penetration testing, especially in service organizations, is the question which company certifies their employees. Figure 9 presents the graphic view of analyzed answers to question (10), which is related to the aforementioned issue.

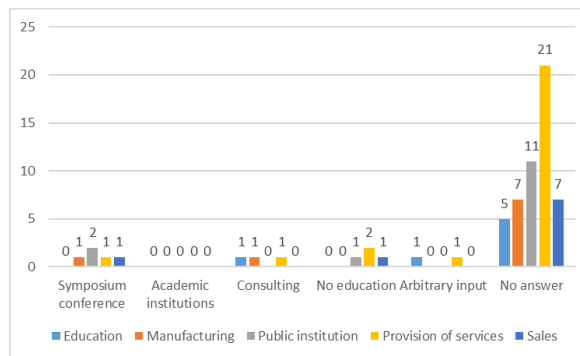


Figure 9. Results of answers to question (10)

As can be seen in Figure 9, a small number of respondents in the field of education have certified testers in penetration testing. The same trend is shown in other organizations as well, although there are organizations which do have employees who are regularly certified by prestigious international organizations from this field. From this, a conclusion can be drawn that the presence of an organization like this is more than necessary in Central Banat District and wider.

The third survey segment is related to the field of creating security phrases or codes used by organizations on domain accounts and implemented ICT systems. Figure 10 gives the graphic view of the analyzed answers to question (11).

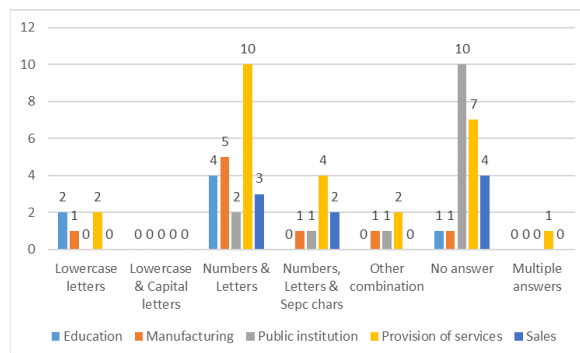


Figure 10. Results of answers to question (11)

As can be seen in Figure 10, six out of seven respondents from the field of education have created their security passcodes using lowercase or combination of lowercase and uppercase. These points to the fact that they are weak and subject to brute force attacks. The state in other organizations is not drastically different and the trend is almost identical. There are a small number of these using strong passwords, consisting of lowercase and uppercase letters, numbers and special characters.

Figure 11 gives a graphic view of the analyzed answers to question (12).

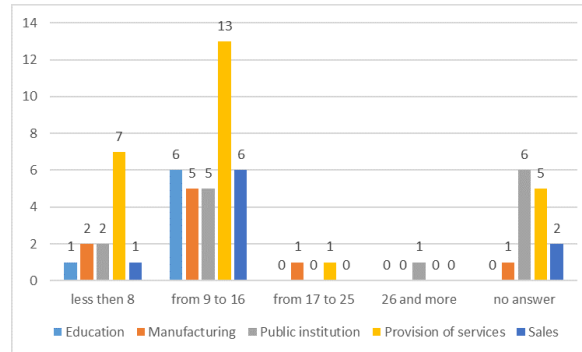


Figure 11. Results of answers to question (12)

As can be seen in Figure 11, the largest number of respondents in the field of education has answered to be using passwords with 9 to 16 characters of length.

However, one of the respondents answered to be using password shorter than 8 characters. The trend is the same for the answers obtained in other organizations, with some of the respondents using passwords longer than 17 characters.

The last question in this segment is related to using application for safe storing of the passwords. Figure 12 gives the graphic view of the analyzed answers to question (13).

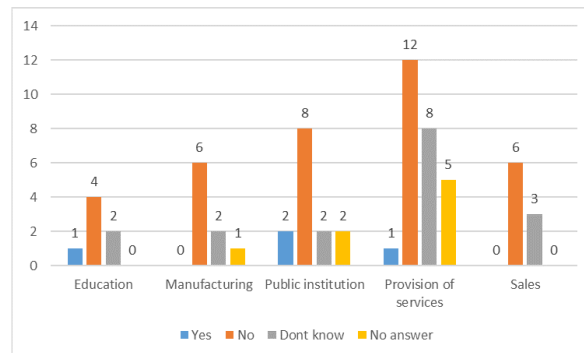


Figure 12. Results of answers to question (13)

As can be seen in Figure 12, a large number of respondents, 6 out of 7, do not use or do not even know what these applications are used for. Only one respondent did know what it is about and what it is used for. The trend of responses to the question (13) in other organizations is the same. The largest number of respondents does not use application for safe recording and storing of security passphrases. Moreover, a large number of these have never used such applications.

If the aforementioned is perceived with the obtained answers to questions (11) and (12), it can be concluded that security passphrases, used in educational organizations, are weak and subject to a large number of malicious attacks. Moreover, their storing is not done using specialized applications, so it can be concluded that the security passphrases are most probably from the users' everyday life. Everything mentioned undoubtedly proves that the passphrases are subject to a large number of attacks and that there is a large possibility that the future will lead do their compromising.

The last survey segment is related to establishing whether the business organization has a wish to improve the responsible people's knowledge in the field of penetration testing, as well as the way in which they would like to more about it. Figure 13 gives the graphic view of analysis of answers to question (14).

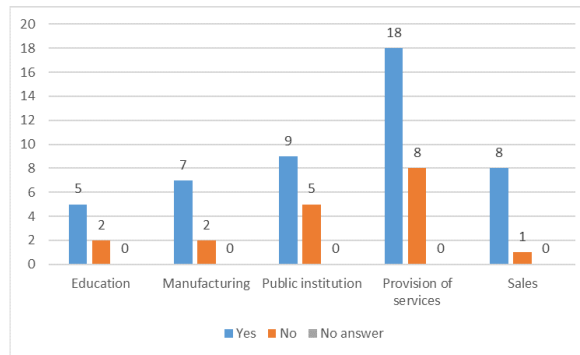


Figure 13. Results of answers to question (14)

As can be seen in Figure 13, a large number of respondents, regardless of whether belonging to the education or another area, have responded positively to the question if they would like to know more about penetration testing and improve the safety of their IT and ICT systems. The fact that the responsible people recognise the consequences of poorly protected IT and ICT systems is encouraging. Also, they are ready to invest significant financial resources improving their employees' knowledge. It is also very important to point out that the respondents have recognised the deficiency in specialised literature within the field, in our region.

Figure 14 gives graphical view or the responses to question (15).

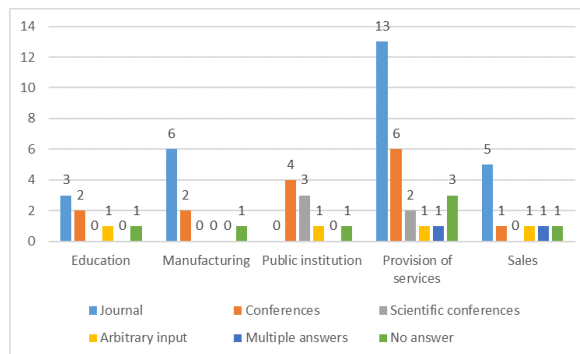


Figure 14. Results of answers to question (15)

As can be seen in Figure 14, the largest number of respondents from the educational institutions, answered to be willing to learn more about penetration testing from journals and conferences/forums. It can be said that the answers largely match the ones from the other organizations, where responsible people showed a wish to learn about the issue in the same way.

Based on the last survey segment, it can be concluded that the wish and will for change do exist and that the people responsible for protecting the IT and ICT systems wish to raise the protection to the highest possible level. Of course, the process to do it is long and requires significant investment in IT and ICT infrastructure of the organization itself, as well as investing into all employees, in the form of education.

V. CONCLUSION

The rapid development of IT and ICT systems brings upon a large number of new security vulnerabilities, and continuous tracking of the trends and education in the field of protection and penetration testing are only a few forms of protecting these systems. As it has been shown in the paper, doing business in a company can largely depend on the ways in which it protects its confidential data from malicious attackers. Therefore, a comparative analysis has been done between educational institutions and other ones, regarding their awareness with penetration testing and data protection.

Even though scientific research worldwide point to the increase of awareness of the data security, this issue is still in its beginning in our country. A small number of organizations, including academic institutions, take proper care of their IT and ICT systems today. The knowledge in the given area, as shown by the collected answers to the survey presented in this paper, is at the elementary level. Even though a large number of organizations showed awareness of penetration testing, today, however, there is no course, academic lectures or a forum on this issue in our region.

It can also be concluded on the basis of the obtained results, that the use of security passphrases comes down to 'weak' passwords subject to social engineering or another form of malicious attack. When it comes to the people responsible for protecting the IT and ICT systems in educational institutions, the information collected from them point to use of passwords of 9 to 16 character of length. This form of protection is at a really low level given the fact that these institutions store large amounts of data about the students, who are minors.

Finally, the fact that the respondents showed a will to improve their knowledge through various forms of informing should be pointed out. The respondents in responsible positions have emphasized the need to start forums and journals on the given issue for their own improvement and also to raise the level of total security of their business organizations.

Therefore, it can be concluded that the future research can be done in the area of creating models to transform organizations towards data security. It is also necessary to start creating academic courses, scientific journals and a form to present most recent research and news in this field.

ACKNOWLEDGMENT

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THE EDUCATIONAL IMPACT OF USING MULTIMEDIA IN TEACHING MATHEMATICS - ACTION RESEARCH

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Review Article

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Abstract: This paper presents the results of the use of multimedia approach in teaching beginner's mathematics. The research was conducted in two stages. The first stage examined the frequency of use of multimedia approach in teaching as well as students' opinions on the effects of this kind of teaching. The first stage of the study involved 100 students from the first grade of primary school. After that, based on the initial testing done and on the basis of school achievement, while using descriptive grades, two groups of students were selected - the first as control group and the second as experimental group. In the control group, teaching was done using traditional teaching aids, while the students from the experimental group were taught using multimedia presentations. Based on the sample size and the basic stages, this research can be defined as action research. The results obtained show that traditional teaching is the prevailing teaching method, and that students have a positive attitude towards multimedia teaching. In the final measurement stage, students from the experimental group had significantly better results than the students from the control group who were taught the same topics but using traditional teaching aids.

Key words: multimedia, teaching mathematics, students' achievements, action research

I. PEDAGOGICAL IMPLICATIONS OF INTRODUCTION OF INFORMATION TECHNOLOGY IN TEACHING

The development and expansion of institutional education is accompanied by the efforts for its modernization and linkage with current social, economic and individual needs. Conclusions of the efficiency analysis of the educational process with respect to the above criteria indicate a certain level of inefficiency, low-level functionality of knowledge acquired and the lack of flexibility of various aspects of the organization of teaching. These drawbacks mentioned are usually a result of traditional education, which is reflected in an insufficient differentiation of teaching material and in the use of teaching methods where teacher is more active than students. In such an environment, there is a lack of sensory, motoric and cognitive activities of students, which results in lower educational achievement. Traditional school and the above drawbacks are particularly prominent in this time of fast technical and technological changes that are reflected in the computerization of all segments of society. Many aspects of the education system are making efforts and seeking ways to overcome the existing weaknesses and to increase the overall quality of the educational process. In relation to such efforts, particularly in this time of the so-called computerization, there are numerous effective and scientifically based attempts to improve the effectiveness of the educational process by using the information technology in teaching.

Didactic literature identifies the use of modern technical and technological solutions in teaching as *teaching* or *educational technology*. In this regard, didactic literature distinguishes between narrower and broader interpretation of the concept of educational technology. Narrow interpretation of teaching technology includes the use of technical resources in teaching, where it is considered that the use of a full set of technical equipment in teaching is a way to achieve maximum efficiency classes. Broader view of the *teaching technology* includes lesson planning, teaching methods and the use of state of the art teaching means (Vilotijević, 1999: 392). Based on the type of teaching resources used in the classroom, *teaching technology* includes technology of verbal words, technology of the written word, technology of organized observation, technology of manipulative and operational techniques, audio and visual teaching

The survey was conducted in the first grade of primary school. There were a total of 100 students, or 4 first grade classes in the first stage of the research. Based on the initial testing done and on the basis of school achievement, two groups of students were selected - the first as control group and the second as experimental group - which was the second stage of the research. The experimental group of students was taught using multimedia presentations, while the control group of students was taught using traditional teaching aids. In the course of the experiment, the following teaching topics were covered: *replacing summands and pairing of summands; subtraction, the minuend, subtrahend, the difference; connection between addition and subtraction and addition and subtraction.*

III. RESULTS

This section of the paper shows the results relating to the frequency of use of multimedia approach in teaching as well as students' opinions on the effects of this kind of modern teaching. This stage of the research involved 100 respondents who were first explained the concept of multimedia teaching and how to complete the questionnaire before asking them to fill it out. The answer to the first question (Figure 1) was the same by the majority of students – they responded that they would prefer to have multimedia used in teaching. As many as 65% of the surveyed students had a positive opinion of the possibility of the use of multimedia in teaching.

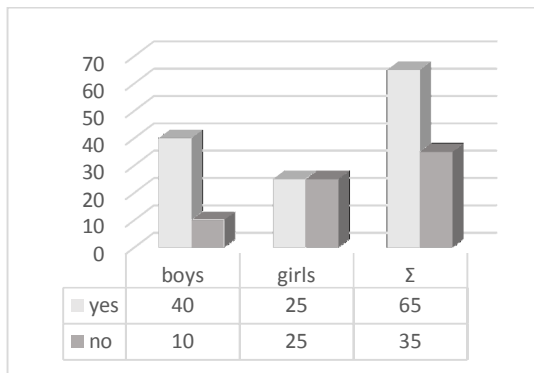


Figure 1. Opinion on the use of multimedia in teaching

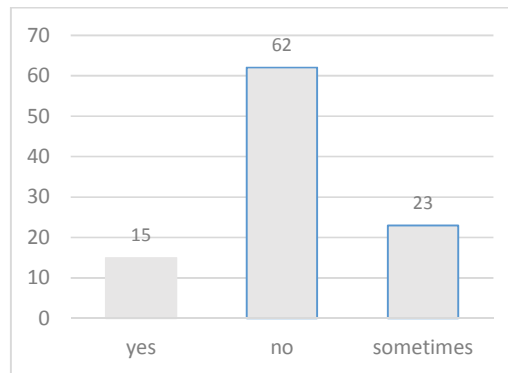


Figure 2. Frequency of use of multimedia in teaching

Figure 1 shows that the majority of students would like to have multimedia used in teaching.

The second question (figure 2.) examined the frequency of use of multimedia in teaching. The distribution of answers to this question is presented in the following graph.

Significance of differences in the distribution of answers was examined using χ^2 -test, based on the assumption of equal distribution. The result of χ^2 test ($\chi^2 = 37.94$, $p < 0.01$) shows that the difference is statistically significant reflecting the lack of use of multimedia in teaching. The following table shows the answers to the questions about the use of multimedia in teaching mathematics.

Table 1. Students' evaluation of efficiency of multimedia teaching of mathematics

Question	The level of agreement			χ^2	sig
	3- completely	2- mainly	1 - not		
1. Teaching of mathematic using multimedia is very successful	41 (41%)	39 (39%)	20 (20%)	8,05	p<0,05
2. Mathematics lessons are more interesting using multimedia	46 (46%)	30 (30%)	24 (24%)	7,75	p<0,05
3. It is easier to understand the task when using audio-visual recordings	43 (43%)	33 (33%)	24 (24%)	5,41	p<0,05
5. I like to do homework using the computer	51 (51%)	19 (19%)	30 (30%)	9,86	p<0,01

The results in Table 1 show that the surveyed students generally have a positive opinion about the effects of multimedia in teaching. As it can be seen from the answers to question 2, the students especially emphasize the motivational importance of the use of multimedia in teaching mathematics. The surveyed students particularly emphasize that multimedia lessons of mathematics are interesting (Question 2). If the responses from category 3 (completely agree) and 2 (mainly agree) are merged, then

76% of the students have a positive opinion on the effect of multimedia used in mathematics lessons. The largest, significant difference was found in Question 5, which means that students want to use more computers when doing homework.

In the second stage of the research, based on gender, school achievement (descriptive grades) and the results of the initial testing done (test results were converted into appropriate grade categories), out of the four grades which were surveyed using the questionnaire, two groups of students were selected - the first as control group and the second as experimental group. In the control group, teaching mathematics was done using traditional teaching aids (blackboard, books, worksheets, frontal instruction, and oral presentations by teachers). The students from the experimental group were taught the same mathematics topics using multimedia Power Point presentations. The following section of the paper presents the results of the initial and final tests. It should be noted that the groups' results were matched based on pairs of students, that is, for each student from one group, a student with the same or similar result was found in the other group. The results of students who did not have an adequate pair in the other group were not taken into account when analyzing the data.

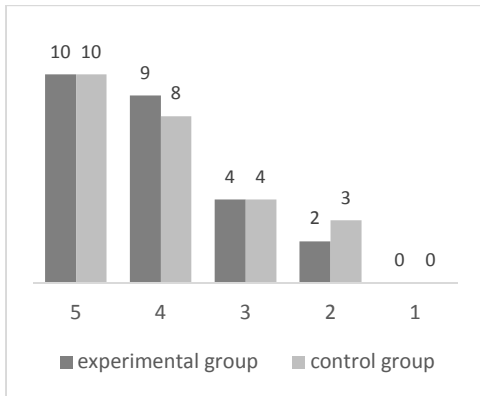


Figure 3. Groups matching based on academic achievement

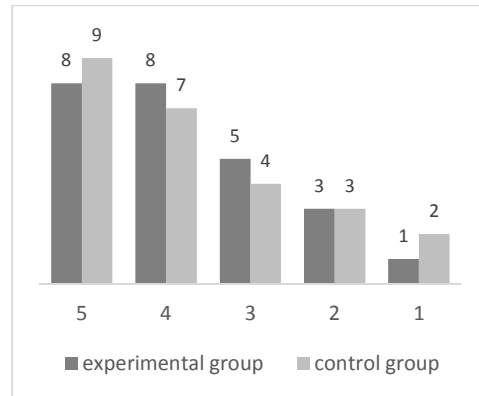


Figure 4. Groups matching based on results of initial testing converted into grades

Graphic display of the results of initial tests shows that the groups are pretty uniform when looking at their knowledge in mathematics, based on academic achievement and test results that were translated into school grades by previously converting them into the corresponding z-values.

After the roll-out of the experimental program, final measurement was done using a parallel test (8 tasks total). Test results in the final measurement stage were converted into school grades, which was then followed by the analysis of results of experimental and control group of students, for every question separately.

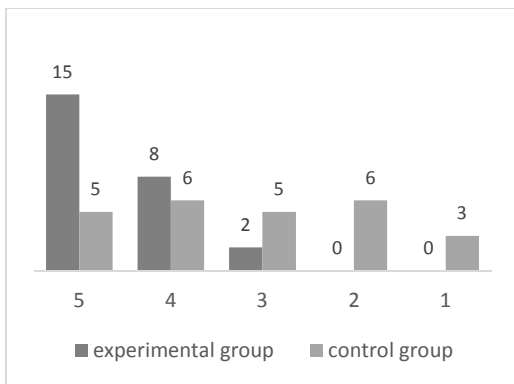


Figure 6. Results of final measurement converted into school grades

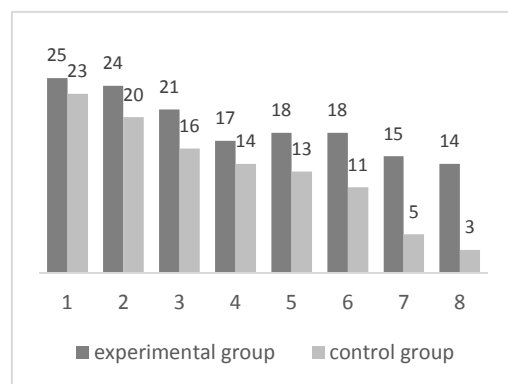


Figure 7. Results of experimental and control group for each question separately

Results of the final measurements show that the students had better test results that are presented as school grades, as well as the results for each individual question. In order to examine the significance of

differences, the mean value and standard deviation for each group were calculated, and then the t-test was done. Mean value and standard deviation for the experimental group was $M = 6.08$, $\sigma = 1.8$, while for the control group it was $M = 4.2$ $\sigma = 1.6$. T-test value ($t = 3.91$, $df = 48$) showed a statistically significant difference ($p < 0.01$). Based on this and on the academic achievements of students we can conclude that the use of multimedia and computers in teaching contributes to a greater efficiency of teaching. Since this research has the characteristics of action research, certain qualitative observations of students' activities during the implementation of the experimental program should be mentioned. Namely, the students from the experimental group showed a higher level of interest and engagement during the teaching by asking questions, participating in discussions with the teacher and expressing satisfaction with this way of teaching.

IV. DISCUSSION AND PRACTICAL IMPLICATIONS

The study which is presented in this paper shows that students have a positive attitude on the use of multimedia in teaching, in particular during beginners' mathematics lessons. However, in the specific environment in which the research was conducted, it can be concluded based on respondents' answers that multimedia aids are not used enough. Given the positive attitude of students on multimedia teaching, the reasons for its insufficient use might be the following: untrained teachers and no technical equipment and resources in schools. Moreover, a significant majority of students think that multimedia lessons are very successful, interesting and they facilitate understanding of teaching material. Bearing in mind that in this modern social and technological age, the majority of students have a computer at home, it could have been expected they would have a positive opinion on the use of computers when doing homework. These results correspond to the research findings presented in the theoretical part of the paper (Pavlović). The paper also presented the results of the experimental research on the impact that the use of multimedia teaching has on student achievement. For this purpose, an experiment with equivalent groups was organized. The groups were equalled on the basis of academic achievement and the initial test of knowledge. After the experiment was completed, the final measurement was done which showed that the students from the experimental group were significantly more successful than the students from the control group. In accordance with this, the students from the experimental group were more successful in all individual questions from the test. These results also corroborate the findings of some more extensive research done in mathematics teaching in elementary school classes (Parezanović), which were referenced in the theoretical part of this paper.

Based on the sample size and character of the research (action research approach), the results obtained cannot be generalized and replicated to the wider school population. However, the fact that the results of this research match the results of other larger studies encourages further research and practical use of multimedia aids in teaching. This means that the effects of the use of multimedia in teaching should be examined, especially for technical courses. Furthermore, based on the tests of teachers' knowledge of this topic, it was concluded that it would be required to further train them to use multimedia, but not only to merely use multimedia aids, but rather to be able to create and plan such multimedia lessons. This would create preconditions to improve the quality of the overall teaching process.

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Text mining in e-Government and Education

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Review Article

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Abstract:Information and communication technologies have the capacity to improve the process by which public administration involves citizens in the creation of public policy and public projects. Although a large part of government services (regulations) can now be found in digital form (often available on-line) due to their complexity and diversity, it is not easy to identify those that are relevant to a particular content. Likewise, by the emergence of numerous online forums, social sites and blogs, the possibility of collecting citizen petitions and stakeholders' views on government policy, as well as making proposals. However, the scope and complexity of analyzing unstructured data makes this process not easy. On the other hand, the process of analyzing the data contained in the text has gone a long way from simple keyword search to discipline that can deal with much more complicated tasks.

Key words: Text mining, e-Government, Data mining, Question answer, Educational data mining (EDM)

I. INTRODUCTION

Transformation of conventional government services into e-Government services announces a new era in the work of public services. Traditional government services can be replaced by e-government services that are of better quality and quality and can meet needs and increase citizen satisfaction, using Information and Communication Technologies (ICT). e-Governance aims to establish interaction between government and citizens (G2C), government and business entities (G2B) and ministries within the public administration in order to carry out the work (G2G) in a more transparent and cost-effective way [1]. An increasing number of information texts related to government decisions, directives, rules and regulations are now distributed on the web using various portals, so that citizens can search and review them. This implies that those who seek information are able to resolve numerous and complex formal legal documents [2]. The regulations are extensive, unrelated to each other and often ambiguous. Government information is in unstructured or semi-structured form. Sources are multiple (state or local government bodies), and formats are different, which creates a serious obstacle for ordinary citizens in their search, understanding and use of information.

Within the G2G, ministries have an even greater need for a system capable of providing information retrieval, data exchange, homogeneity of metadata and proper dissemination of information through administrative channels of national, regional, state and local authorities [3]. The growing demand and complexity of state regulations on various aspects of economic, social and political life requires the establishment of an advanced and knowledge-based framework for the collection, flow and distribution of information. For example, if policy makers intend to pass a new act, they should know well all existing acts concerning the same topics, whether the content of the new law is contrary to existing ones or already included in existing acts. Likewise, regulations are often updated and therefore tools are needed that can reveal doubts, inconsistencies and contradictions [4] given that the rules, amended provisions, legal pretenders and guidelines together create a mass of semi-structured documents with potentially similar content, but with possible differences in format, terminology and context. Information infrastructures that can consolidate and compare regulatory documents will greatly increase and help in understanding existing regulations and making new ones.

It is desirable that government regulations are easy to find and understood by lawyers, policymakers, and the general public, i.e. citizens. In spite of many attempts, it is considered that e-Government has not

yet established services aimed entirely at citizens, but mainly services focusing on internal efficiency [1]. Taking into account the opinions of citizens, obtained through electronic media through participation in forums and discussions, can be more reliable than traditional methods based on public opinion research and help to avoid false statements. This also drastically changes the methods of analyzing the trends of citizens' opinions, as well as the accuracy of the assessment of their opinions. This reduces costs, increases citizen participation and ensures timely information. It is possible that arguments that lead to significant changes in opinion can be revealed. However, the scope and complexity of unstructured data analysis make this much more difficult. Text mining(TM) can process unstructured data that leads to a greater understanding of the text in the interpretation of others on the same topic. This is especially important when it comes to expressing public opinion, where arguments for and against a particular position are important for identification and assessment, but it is extremely difficult to extract them because of their storage in a natural language format [5].

In addition, the DM application is suitable in the education process and is called Educational Data Mining (EDM). EDM can be defined as a scientific research area, focused on creating discovery within unique types of data that emanate from educational settings, and using these methods to better understand learners and settings that are taught in [6]. The methods used in EDM are similar or slightly different from the DM method. The difference is in explicitly exploiting the multiple levels of meaningful hierarchy in educational data. EDM is the field of study concerned with mining educational data to find out interesting patterns and knowledge in educational organizations.

The use of TM in education is of great importance due to the large amount of unstructured data and documents that have arisen since the emergence of computers to date. The education system is based on the use of professional literature, doctoral and master work, as well as on the use of scientific and expert papers. These documents are most often found in printable formatting formats: PDF, DOC, XLS, and the like, so the in-depth analysis of the text itself is complex. Each faculty faces a certain amount of such a material that, without a serious TM approach, is used to a small extent and not adequately. Over time, this kind of educational material will become more and more so that the very importance of the depth analysis of the text will be even greater.

II. DATA MINING AND TEXT MINING

Data mining (DM) was conceived in the 1990s as a means to solve the problem of analyzing the enormous amount of data available to mankind and increasing continuously. Considering the fact that most data (over 80%) is stored as text, DM has even greater potential [7]. DM is a relatively new interdisciplinary area that combines the fields of statistics, machine learning, information retrieval, linguistics, and natural language processing. It is said that the computer has discovered new, until then unknown information, by automatically extracting data from various written sources [8]. TM differs from text search or web searches, where the goal is to discard non-essential material in order to identify what the user is searching for, in the context of text search, where the user knows what he is looking for and that (written) material already exists. One of the key elements in TM is to get unknown information by linking existing text data to create a new fact or hypothesis. Therefore, TM is very reminiscent of DM, and some consider it a wider version of it. The essence of abandoning DM discipline is in the type of data to be analyzed. While DM deals primarily with numerically structured data, TM deals with unstructured data. However, the task of the TMS-based Decision Support System (DSS) which is based on TM looks like a bigger challenge than an analysis of structured data, and the existence of an enormous amount of information in electronic text format has led to intensive research of TM techniques, and many of these challenges have already been overcome.

The greatest potential of TM application is in areas where a large amount of textual data is generated or collected during transactions. For example, jobs such as publishing, law, health, and pharmaceutical research, as well as areas such as consumer complaint management (feedback) and marketing programs focusing on particular groups will be the largest area of TM application. Innovative applications in the context of personalization in B2C e-commerce, competitive intelligence, customer satisfaction analysis and e-mail filtering have been discussed for a long time in numerous scientific articles [9-12].

Techniques used in TM include: Information Retrieval, Information Extraction (IE), classification, clustering, topic tracking, generalization, Question Answer and detection of association rules.

Extraction of information: algorithms for extracting information identify key phrases and relationships within the text. This is done by searching for pre-defined sequences in the text, through a process called "pattern matching". Algorithms draw conclusions about relationships between all identified sequences in order to provide meaningful insight to the user. This technology can be very useful when it comes to large amounts of text.

Classification: The classification implies identifying the main topics of the document by placing a document in a predefined set of topics. The classification does not attempt to process current information, such as data extraction. During the classification, only the words that appear in the text and after counting, identify the main topics covered by the document. The classification often relies on the lexicon of synonyms for which the topics are defined in advance, and the relationships are identified by searching for wider and rational meaning, synonyms and related terms.

Clustering: Clustering is a technique used to group similar documents, but it differs from categorization in that documents are grouped on the basis of mutual similarity instead of using predefined topics. The basic clustering algorithm creates a term vector for each of the documents and measures how well that document fits well into each of the predefined clusters.

Tracking the topic: The theme tracking system works by maintaining user profiles and based on the document the user views provide and other documents of interest to the user. Some of the better TM tools allow users to choose specific categories of interest, and they can even automatically give a conclusion about the user's interest based on his reading or clicks on that information.

Summarization: Summarizing the text is extremely useful as an attempt to understand whether a extensive document meets the needs of the users or not and, based on this, concludes that it is worth reading the document for additional information. The key to summarizing is to reduce the length and detail of the document, keeping its main parts and overall meaning.

Question answer (QA): Another area of TM application is to provide a question answer, which deals with finding the most adequate response to a query that QA can use more than one TM technique.

Detection of association rules: In learning the rules of the Association Rules, the focus is on studying relationships and relationships between topics or descriptive terms used to present a series of related texts. The goal is to find important rules in learning through association within a corpus, so that the presence of a set of topics in an article may involve the presence of other topics of the same corpus.

III. TECHNIQUES TM

Although relatively new techniques, they are considered mature enough to be included in almost all commercial DM software packages. By observing the characteristics of some of the popular DM software that have TM modules, it has been observed that TM has moved from the field of research into the domain of industrial technology and can be used in many demanding applications, such as those in e-Government (Figure 1).

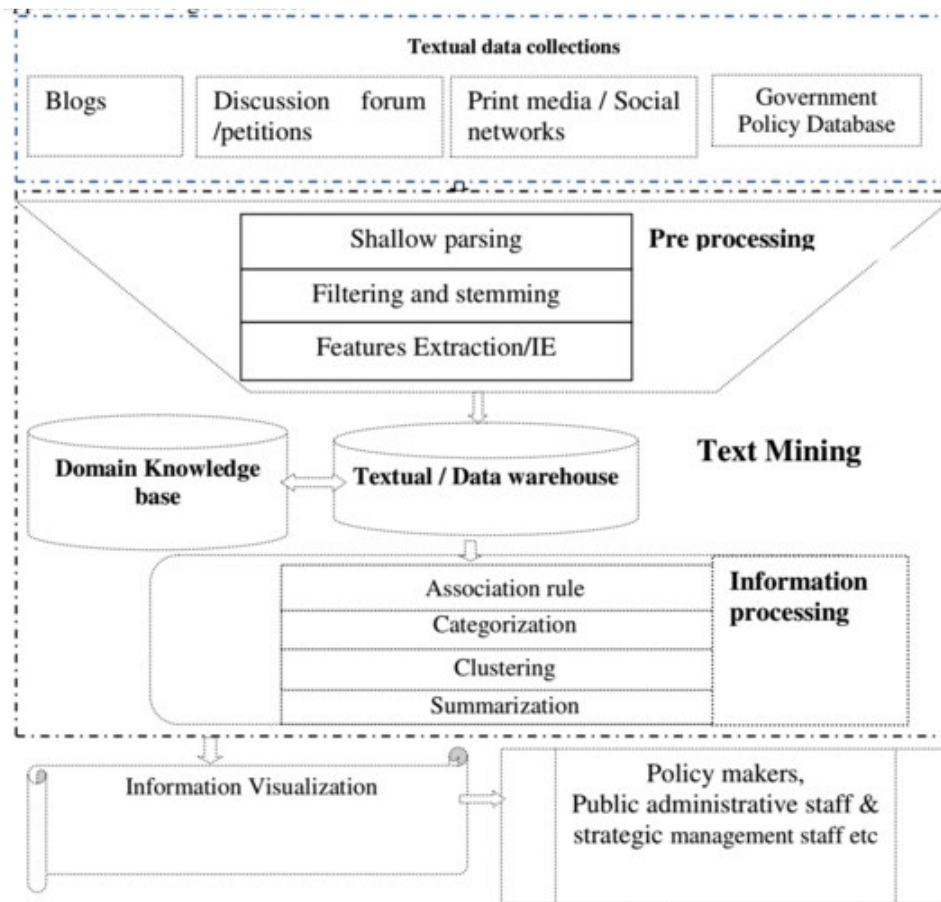


Figure 1: DSS archeture based on TM for e-Government

In order to implement an intelligent system in general, it is first necessary to determine the necessary data sources, such as the databases of the Government of a country, citizens from relevant web portals, on-line forums (in order to enable the citizens to discuss the prestigious projects of the Government) and ultimately , but no less significant, social networking. Social networks have huge popularity in today's time, especially from which some data can be extracted, based on which one of the interested parties can be created. When analyzing raw data from different sources and in different formats (PDF, DOC, DOCKS, XML, JPG, HTML and others), the transformation of the transformed documents into a format that has the ability to manage raw and semi-structured data should be used. The next task is to search for information by keyword, i.e. characteristics. That means applying the process of tokenisation, filtering, streaming, indexing and purification. However, in the case where a traditional technique, such as keyword extraction, is not able to be supported, another technique for extracting features that implies generic characteristics, domain specific characteristics, and extracting the concept, which also requires the processing of the database itself. After the characteristics and information are stored in the text stock, i.e. data can be translated into the implementation of the rules of analysis of association, clustering, classification and generalization in order to process it in substantial information.

The module for managing the extraction of the response to a query as an integral part of itelligent QA systems is based on the TM approach. The purpose of the existence of these modules in QA systems is to find as much as possible adequate descriptions for the requested term from the definition catalog in an automated way.

Since form definitions lead to the creation of a catalog of definitions, they contain a variety of information, including incomplete and incorrect descriptions for many terms. However, more accurate information is expected to be more than incorrect. This expectation supports the idea of using TM techniques to make the difference between adequate and less likely responses to a given query.

The application of the extraction management module includes the following steps:

1. **Creating a catalog:** At this stage, the pattern definitions detected in the previous stage (in the model for pattern detection) apply over the collection of target documents. The result is a set of matching segments that are presumed to contain the term and its description. A catalog form definition is created by collecting all matching segments.
2. **Filtering the description:** When it is about concrete question this procedure from the definition catalog extracts all descriptions corresponding to the desired term. As expected, these "probable" descriptions may contain incomplete and incorrect information. However, many of them are expected to contain, as a subset, a required response.
3. **Answer mining:** This process aims to find only one response to a given query from a set of extracted descriptions. It consists of three main stages: data preparation, data analysis and response ranking:
 - Data preparation phase focuses on the homogenization of the description in accordance with the required concept. The main activity is to transform these descriptions into formats for use cases.
 - Data analysis phase uses an algorithm for sequence analysis to obtain all very frequent word sequences from a set of descriptions. Each sequence indicates an eventual response to a given query.
 - In the ranking phase of the response, each possible response is evaluated based on the frequency of the occurrence of its subsequences. The idea is that a potential answer consisting of frequent inequalities has a greater likelihood of accuracy than one composed of rare sequences. The sequence with the highest ranked results is selected for the correct answer.

An example of the answer extraction process in the method for defining the response to a query via the Cross-Language Evaluation Forum-CLEF [13] is shown in Figure 2. The example illustrates the situation when a query in Spanish is asked: "Who is Diego Armando Maradona?".

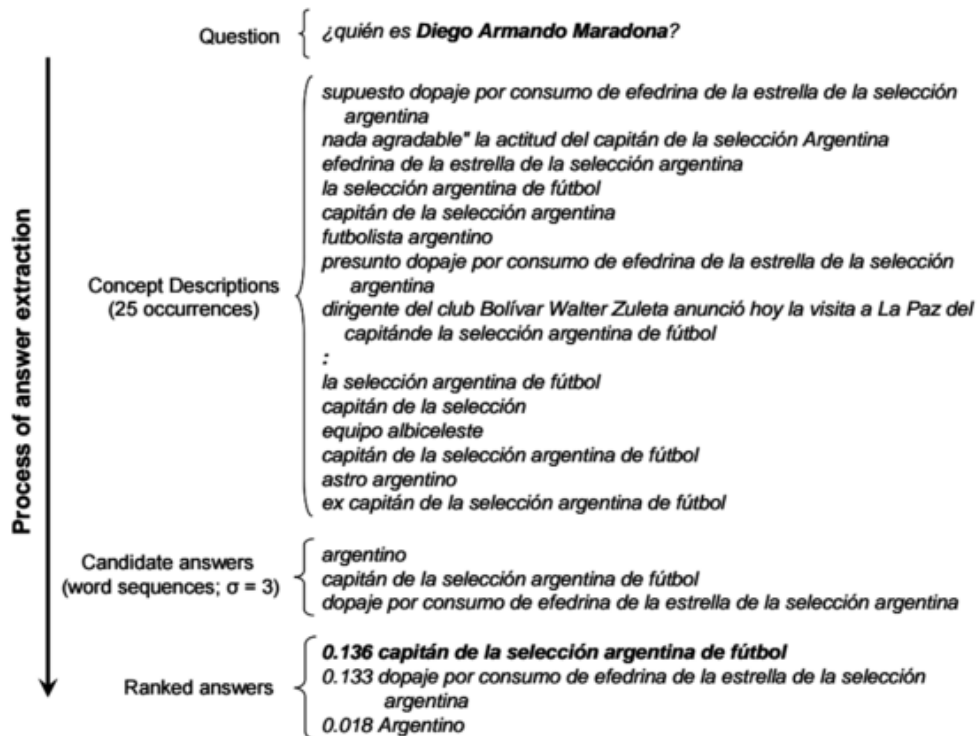


Figure 2: Data flow in the extraction answers process

It is important to clarify that the query can have more accurate answers. In line with CLEF, the answer is correct only if there is a passage that supports it. For this reason, there are other correct answers, such as "former captain of the Argentine national football team" and "Argentinean star".

IV. MINING MAXIMAL FREQUENT WORD SEQUENCES AND RANKING SEARCH RESULTS

a. Mining Maximal Frequent Word Sequences

Suppose D is a set of texts (the text can represent the entire document or just one sentence) and each text consists of a string of words. Then, we have the following definitions [14]:

Definition 1. The sequence $p = a_1 \dots a_k$ is a subsequence of sequences q if all points $a_i, 1 \leq i \leq k$, occur in q , and they appear in the same order as in p . If the sequence p is a sub sequence of the sequence q , we also say that p occurs in q .

Definition 2. Sequence p is a frequent sequence in D if p is a sequence at least σ texts D , where σ is a threshold frequency.

Definition 3. Sequence p is a maximally frequent sequence in D if there is no sequence p' in D so that p is a sequence p' and p' is frequent in D .

After the introduction of the maximally frequent word sequences, the problem of analyzing the maximally frequent word sequences can be formally defined: the given collection of texts D and the arbitrary value of the integer σ which is $1 \leq \sigma \leq |D|$, it is possible to count all the frequent word sequences in the set D .

The implementation of the sequence analysis method is not a trivial task because of its complexity, and the algorithm itself is described in detail in [15].

b. Ranking score results

This measure aims to create a better response to the query. Bearing in mind the set of possible responses (the maximum frequency sequences obtained from the set of the description of the terms), this measure selects a final unique answer, taking into account the frequency of the occurrence of its subsequences. The result of ranking R for the sequence of words points to its relevant frequency. It is calculated as follows:

$$R_{p(n)} = \frac{1}{n} \sum_{i=1}^n \sum_{j=1}^{n-i+1} \frac{f_{p_j(i)}}{\sum_{q \in S_i} f_{q(i)}} \quad (1)$$

In this formula, the following labels were introduced for simplicity. S_i denotes the set of the sequence of size i , $q(i)$ is the sequence q of size i , $p_j(i)$ is the j -th of a subsequence of size i which is included in the sequence $p(n)$, $f_{q(i)}$ determines the frequency of the sequence sequence q a set of description of the concept, i.e. term and finally $R_{p(n)}$ denotes the relevant frequency of the sequence p .

The idea of this ranking of the results is that the offered response, composed of frequent subsequences, has a greater likelihood of accuracy than that created on the basis of rare subsequences. The frequency of the stop-words phenomenon is not taken into account when calculating ranking results.

V. MULTILINGUAL TEXT MINING – MLTM)

It can be noticed that there is a need for multilingual TM applications (10, 20 or more languages), but currently available systems have only a small number of languages. Existing machine learning solutions are particularly promising when it comes to achieving multilingualism. Taking into account the facts and many different views [16], multilingual text processing is certainly useful, since then the content of information in different languages is complementary. To find multilingual information, a TM method is proposed, which is used to separate links between multilingual texts. Documents written in different languages are first grouped and organized according to the hierarchy principle using a hierarchical self-organizing map model. It also emphasizes that in the domain of multilingual TM it has to pay more attention to establishing a hierarchy of multilingual documents and drawing links from such hierarchies of multilingual documents [17]. Some TM applications suggest a Cross-Lingual Text Retrieval (CLTR) concept, using a basic MLTM approach and MLTM approach for automatically detecting multilingual

knowledge by searching multilingual texts in accessible content that are alternatives to hand-built language resources. By exploiting a parallel corpus covering multiple languages, it is automatically achieved by building an independent linguistic concept that "catches" all conceptual relationships between multilingual terms [18].

VI. SOFTWARE PACKAGES FOR TM

In addition to commercial TM packages, a large number of open source software packages are also available. Most of these packages, which are currently available for free or at low cost, can be useful for pilot projects and can allow start-up users to go one step further without excessive financial costs. The following table (Table 1) lists some of the open source package for TM analysis.

(Open Source System)	Description
Carrot2 http://project.carr ot2.org	Carrot2 is an open source browser based on machines for grouping search results. It can automatically organize small collection of documents, e.g. Search results in thematic categories. Carrot2 offers ready-made components for finding search results from a variety of sources, including Google API, Bing API, eTools Meta Search, Lucene, SOLR, Google Desktop, etc.
GATE http://gate.ac.uk	Open source software that can solve almost every problem of word processing, all types of language processing and applications, including voice of users: cancer research, drug research, decision support, webmining, information extraction, semantic remarks. Many educational institutions have already included GATE in their TM techniques.
Natural Language Toolkit (NLTK) http://www.nltk.org	A set of libraries and programs for symbolic and statistical processing of NLP using the Python programming language. NLTK is followed by numerous structured texts, simplified grammar, skilled models, etc. NLTK is suitable for courses in many areas, including natural language processing, computer linguistics, empirical linguistics, cognitive science, artificial intelligence, information retrieval and machine learning.
RapidMiner http://rapid-i.com/content/view/181/190	Formally Yet Another Learning Environment (YALE) is an environment for machine learning, DM, TM, predictive and business analytics. The plug-in component is specially designed to prepare a text document for analysis, through the process of tokenisation, stop-words and streaming. Additional components of RapidMiner are Java libraries that need to be further installed in lib \ plugins directories.
Unstructured Information Management Architecture (UIMA) http://uima.apache.org	Originally developed by IBM. It is an open, industrially powerful, flexible and expandable platform for creating, integrating and deploying unstructured information management solutions by combining semantic analysis and search components. The goal of UIMA is to provide the basis for joint collaboration between the industrial and academic community around the world and to accelerate the development of those technologies that are crucial to discovering the vital knowledge present in all the more extensive sources of information.
Text Mining package http://cran.r-project.org/web/packages/tm/index.html	This package offers functionality in managing text documents, shortens the document management process, and facilitates the use of heterogeneous text formats. This package has back-based support based on integrated data to minimize memory requirements. Improved metadata management is used to collect text documents to make it easier to use large (enriched with metadata) document sets.

Table 1: Open source packages for TM analysis

VII. CONCLUSION

Automated business processes of the Government and the development of e-Governmen's web services for citizens, representatives of business entities and employees in public administration, resulted in the appearance of large quantities of documents. These documents are usually in the form of a printable format: PDF, DOC, DOCX, XML, JPG, HTML and others. Searching for these documents and extracting

significant data and knowledge is possible using data mining and text mining techniques. Techniques used in TM include: Information Retrieval, Information Extraction, classification, clustering, topic tracking, generalization, Question Answer and detection of association rules. The paper presents a model based on DSS architecture based on TM for e-Government. The application of the extraction management module includes the following steps: Creating a catalog, Filtering the description and Answer mining. For example, query in Spanish is asked: "Who is Diego Armando Maradona?", Detailed data flow in the extraction answers process is given in detail.

Mining Maximal Frequent Word Sequences can be used to count all common word sequences in the document. Implementation of the sequence analysis method is not a trivial task because of its complexity. Ranking score measures aim to create a better response to a given query, given the set of possible responses. This measure selects a final unique answer, taking into account the frequency of the occurrence of its subsequences. The idea of this ranking of the results is that the offered response, composed of frequent subsequences, has a greater likelihood of accuracy than that created on the basis of rare subsequences.

In addition to commercial TM packages, a large number of open source software packages are also available. Most of these packages, which are currently available for free or at low cost, can be useful for pilot projects and can allow start-up users to go one step further without excessive financial costs. The paper provides an overview of some of the open source packages for TM analysis.

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