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MODEL OF CROWDSORCE ENVIROMENTAL APPLICATION BASED ON MOBILE PHOTOS

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Original Research

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Abstract - Smartphones have become easy affordable and powerful tool for sharing information among people. Using applications, cameras, internet connectivity, and GPS location ability, smartphones can be used for gathering information from different sources. Sources can even be ordinary people from different places, but obtained knowledge can be helpful even to scientists in process of finding most appropriate solution of some particular problems, where data from different places is crucial. In this paper we present our model of interactive, fun and easy to use application that uses geo tag photos taken from mobiles to identify the changes of environment and to increase the environmental awareness among people. We also give a brief review of existing applications that have something in common with our proposed model and present our idea for creating a "timeline".

Keywords: smartphones, GPS, mobile application, android, photo

I. INTRODUCTION

We all live in a dynamical world. While in the past the human being was able to travel a few kilometers per day, today the whole world can be circled in less than 24 hours, at the same time meaning one person is able to see and experience more than ever. However, the evolution does not stop here, thanks to the smartphones and the internet, today's people can be present anywhere in the world, can attend and follow events live directly from their homes. The industrial growth in today's society has "skyrocketed" and it is not slowing down.

Smartphones have revolutionized the Information and communication technology (ICT). In a matter of a decade of their existence, the smartphones have integrated many devices including camera, GPS receiver, watch, and the computer. Most of the smartphones today possess vast computational power providing opportunities to support powerful mobile application. Soon as we approach inevitable IoT (Internet of Things) revolution, smartphones can provide a platform for connecting smart devices and sensors that will be deployed everywhere.

Mobile app have unique features that can engage public in issues that affect them, making Citizen Science which is a form of research collaboration involving the public in scientific research projects to address real-world problems. Often the information that citizens produce has a GPS tag producing volunteered geographic information (VGI). Crowdsourced VGI is spatial information that is generated and donated by citizens, usually using spatially enabled mobile devices [1] [2].

Smartphone mobile applications are ideal and most usable tool for developing citizen science and crowdsourcing [3] [4].

Crowdsourced VGI mobile app can educate and engage the public in conservation issues. Recordings made using mobile apps with GPS devices can be made and used to plot the location, count, and spread and of pollution, animal and plant biodiversity, diseases, natural and made disasters. This data made by

citizens in the field can be used in searchable databases and map visualizations of these phenomena. This kind of spatial information donated voluntarily by citizens can be used as a low cost labor way to find solution of some global problems in different fields of science. Our aim is to create an app that is easy to use by ordinary people so it can be easily acceptable by them. Taking photos by mobile phones is the easiest and most widely used way to perceive memories. Therefore, we decided to use mobile photos as a crowd sourced information to monitor the change of the environment, because one picture is worth a thousand words.

All people are part of the planet and all of them are responsible for the changes that affect the nature and environment. Having that in mind, our model of application is quite simple. When a person or a user identifies something that is worth acknowledging (wheatar is a positive or negative) simply takes a picture from his smartphone and uploads it. Photos connected with their geo location are stored in a database, so any other user can see the photo can like or dislike it, leave a comment or can go and visit that place from the picture.

This paper reviews other existing mobile android applications, which have similar elements with our model. We present a brief review of their characteristics and way of their working. Then, we explain our proposed model and explain its main characteristics, features and technologies needed.

II. REVIEW OF EXISTING APPLICATIONS

There are other existing mobile android applications, which have similar elements with our model. We will review some of them like: C: geo, PhotoMap, PhotoTracker, Geology Sample Collector, Aumentaty Geo, Jeco Guides, My Augmented reality, Blue green map of Serbia, What is around?, GPS Photo Viewer with GoogleMap and GPS Photo Viewer with Here map.

C: geo [5] is open source, full-featured client for geocaching.com that supports other geocaching platforms (like Opencaching). This application uses Google Maps or OpenStreetMaps and user can view caches on a Live Map. The users can search for caches by various criteria, can navigate using maps or compass and can store cache information on his device for later offline access. User on every location can easily see and find all nearby places on the map. This app has more than 1.000.000 users and the c:geo interface is shown in Figure 1.

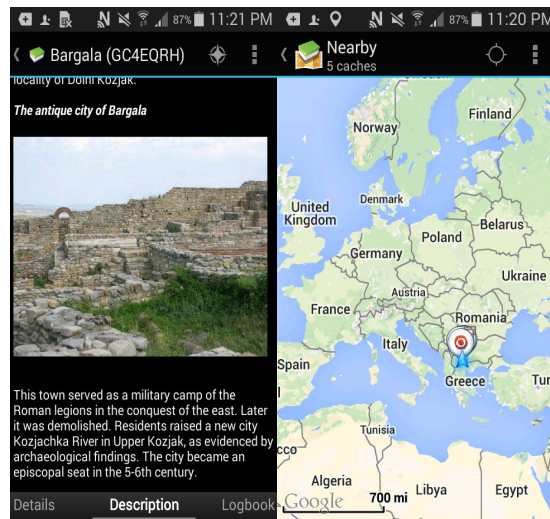


Figure 1. Screenshots from the interface of C: geo app

PhotoMap [6] has 100.000-500.000 downloads. The purpose of this app is to relieve a user's vacation by virtually travelling from one location to another. In this app, photos taken from the camera, when camera's GPS is enabled, are automatically added to the locations on the map. There is also a chance to take a photo in the app itself, because it has integrated camera starter. Photos from one user are not available to others, but there is an option to share these photos on the social networks. This app interface is shown in Figure 2.

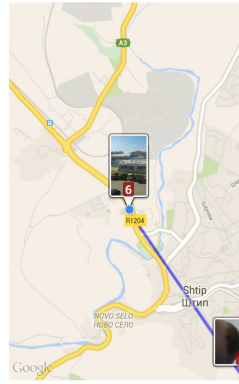


Figure 2. Screenshot from the interface of PhotoMap app

My GPS photo maps [7] is very similar to Photomap and uses photos taken from camera with GPS tag. This app only shows the user's photos with their GPS position on Google maps. This application is personal to the user and user cannot see pictures from other users but only photos taken from his camera. This application can be used to re-live user's travels. When more pictures are taken from the same place, they are grouped together on the same mark. This application has 5.000-10.000 installs.

PhotoTracker [8] is an app suitable for people interested in travelling and photography. This application shows users' photos on a map with their geo-tag and presents photos from photo-sites such as Flickr and Panoramio. Photo Tracker is not only a photo-viewer, but also allows geo-tagging photos taken from an ordinary camera without a GPS navigator. It is also gives locations of many interesting places on the map taken from Wikimapia. User using this app can explore the most photographed places in the world, also places in his neighborhood and can filter displayed photos. This app has 10.000-50.000 users. This app interface is shown in Figure 3.

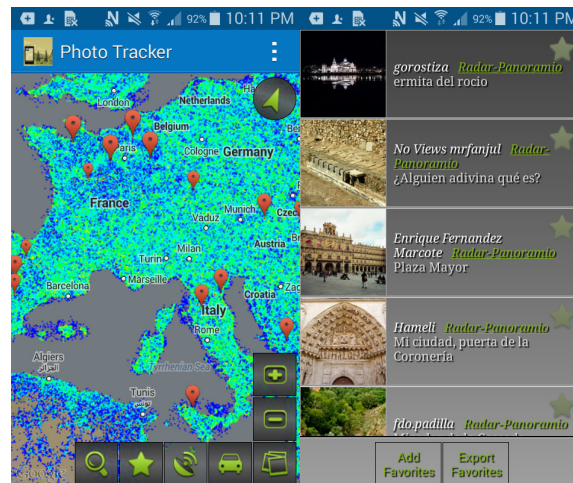


Figure 3. Screenshots from the interface of PhotoTracker app.

The Geology Sample Collector [9] is an app specially designed for geologists that allows the user to track and save his collected images, video or audio recordings. For all collected media this application saves time and place of taking, using GPS, and the user is allowed to write some other details too. This app is synchronized to a website where user can edit and/or share his work with others through social networks, e-mail, etc. Once the collecting is uploaded to the website, the user can edit the data, create reports and/or maps, and download the data or reports to spreadsheets or other documents. Once the collecting is completed, the user can automatically create a power-point or video of the sampling. Other users of the app can view only shared collections and not all collections and uploaded media from this application. Geology Sample Collector has 10.000-50.000 installs. In Figure 4 are given screenshots from this application's interface.

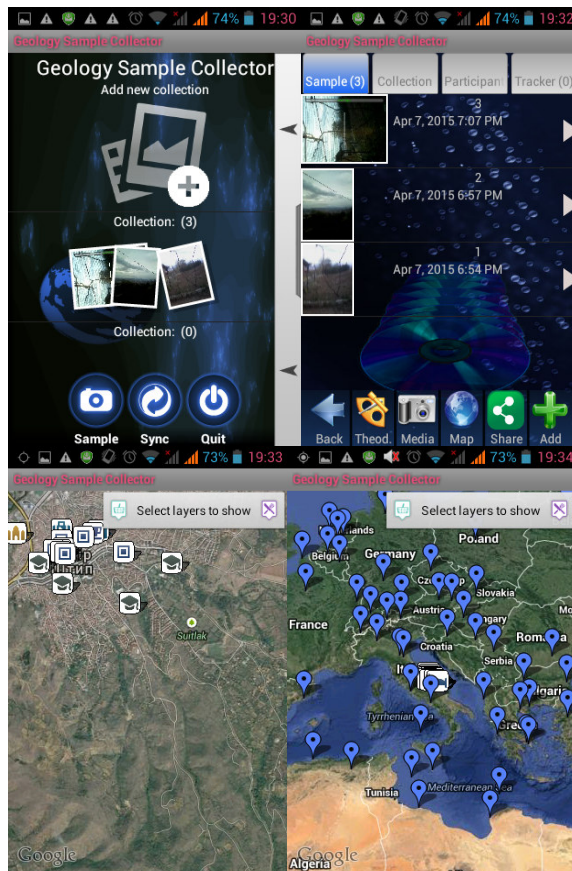


Figure 4. Screenshots from the interface of Geology Sample Collector app

Aumentaty Geo [10] is app that points most popular created routes and helps users discover new places. Geo Aumentaty combines augmented reality and geo-locations and is used to show real-time information of the points of interest created by users. The geographic augmented reality uses the physical coordinates and compass of the user's device to display overlays virtual items and place them in real positions. Users can also comment, upload contents, linking points of interest and create their own routes. Geo Aumentaty consists of two parts, a content management system and mobile application. The mobile application allows users to find the routes that have been created by other users, get the points of interest of each route, show the associated information, locate it on a map and provide direction. In addition, users can rate every route and every point of interest. Aumentaty Geo allows users looking through the camera of their mobile devices to explore the environment around them is searching for selected locations. This application has near 1.000 users. The features of mobile Aumentaty Geo mobile application and content management system are shown in Figures 5 and 6.

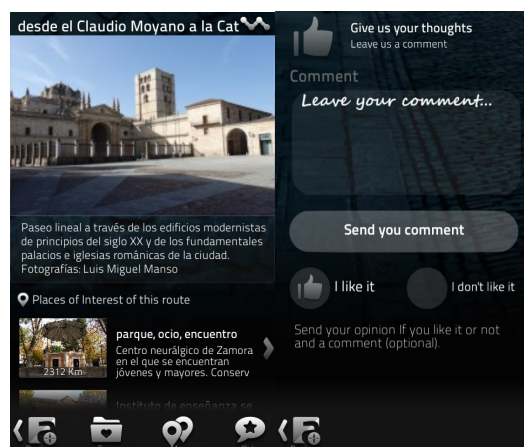


Figure 5. Features of Aumentaty Geo mobile application

In Figure 6 is given screenshot from Aumentaty Geo content management system.

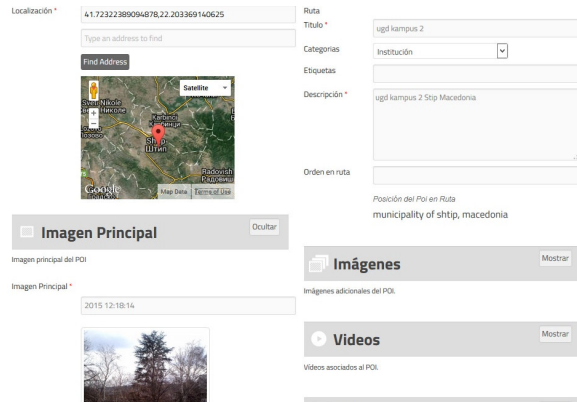


Figure 6. Screenshot from Aumentaty Geo content management system.

Jeco Guides [11] app is actually a kind of library of interactive and multimedia guides. This guide can be edited by local authors. Jeco Guides allow the user to discover and explore interesting places around him. There is List, Map and Augmented Reality view. Local authors can edit guides through the Authoring Tool. Augmented reality gives information about near places around user's camera display. There is also the possibility to download the guides and they can be accessed without internet access. This app can locate the user's position and show nearby places saved with the map. This app is easy to use and drive the user in an interactive and multimedia experience. There is also cloud app where users can save guides and free up mobile memory. This mobile app has nearly 5.000 downloads. The mobile app is shown in Figure 7 and the cloud app in Figure 8.

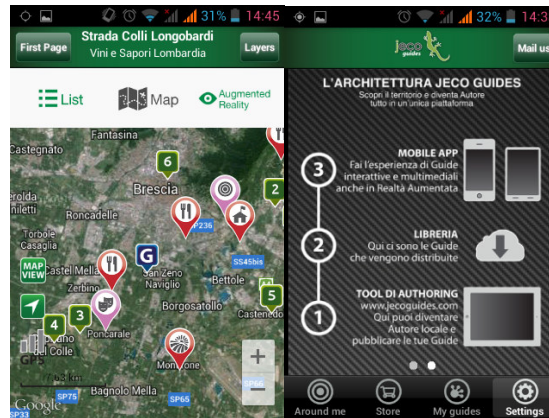


Figure 7 Screenshots from Jeco Guides mobile application's interface

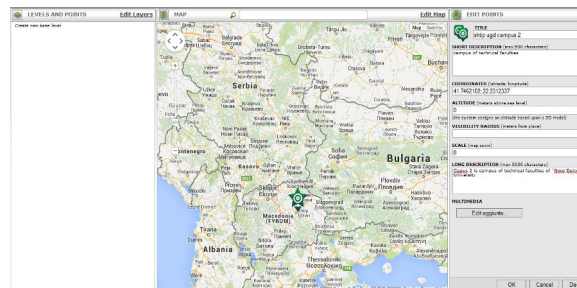


Figure 8 Screenshot from Jeco Guides cloud application's interface

My Augmented reality [12] app is used to store locations that user has been to, or intends to go and wants to find those places later. The user takes pictures from places he stores and then can use Map view or Augmented Reality (via the phone's camera) to find his saved places. It uses Google maps and only saved locations are pinned on the map. This app has more than 10.000 users. Some screenshots of this app are given in Figure 9.

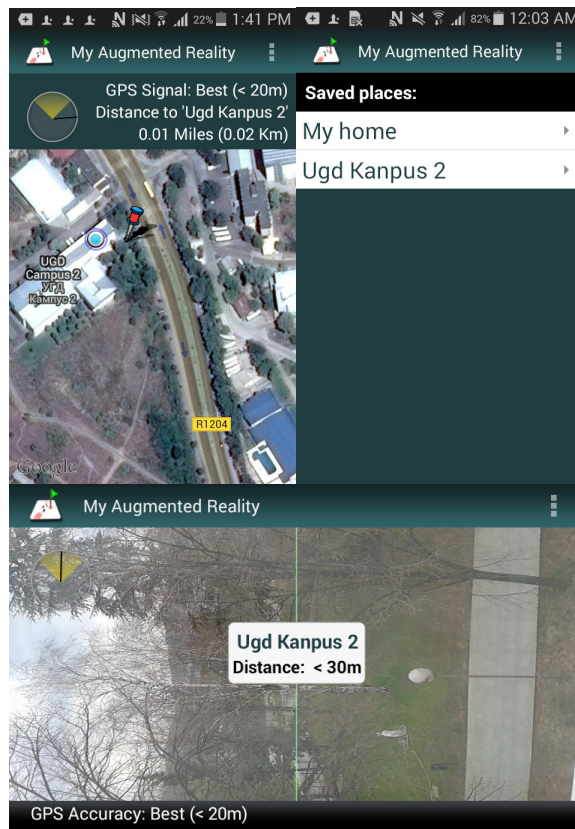


Figure 9. Screenshots from My Augmented reality app.

Blue green map of Serbia [13] is specially named for travelers to Serbia. User can discover all interesting places and can get relevant information. Also in this app there is a possibility to use augmented reality to find locations of user's interest. There is no chance for user to import photos. This application has just 50 users.

What is around? [14] is an app that combines geo tagging with augmented reality and allows users to explore and discover places around their current location and other places on the map. User can search and explore chosen area by choosing source like: Yellow Pages, Open Table bars and restaurants, Flickr, Instagram and Panoramio pictures, Twitter, Last.fm events, Foursquare and Wikipedia places, YouTube videos. There is no option for user to take pictures and upload any kind of media, but he can search for already upload media thought mentioned sources. If a user is searching places around his current location than he/she can use augmented reality option to find places from where some content is uploaded and shared. This application has around 500 installs. Some screenshots from the application are given in Figure 10.

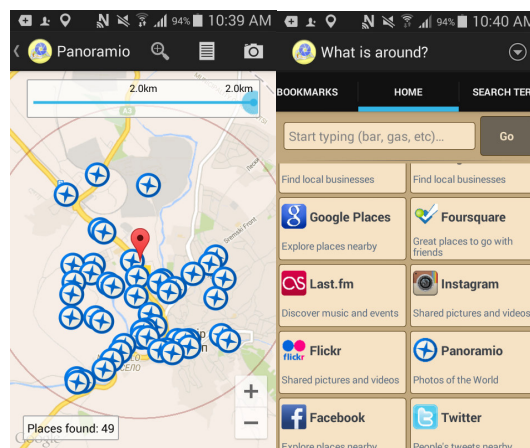


Figure 10. Screenshots from What is around? Application

GPS Photo Viewer with GoogleMap and GPS Photo Viewer with Here map [15] [16]. These applications are working on the same way but they are using different maps. The first one uses GoogleMap and the second Here map. They work better when camera's GPS is enabled and can make difference between photos which have GPS info and those which don't. Applications connect the photos with their location and show them on GoogleMap or Here map.

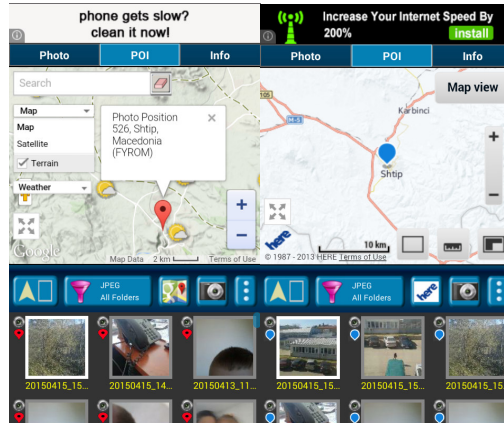


Figure 11. Screenshots from GPS Photo Viewer with GoogleMap and GPS Photo Viewer with Here map

The aim of these applications is users to share photos with friends and if they like the place then they can go there. Both apps are from same developer and the application that uses Googlemaps has 10.000-50.000 installations and the other one has 1.000 to 5.000 installations. Not all photos placed on the maps can be viewed from all users of the applications; users just can share their photos and locations on social networks or e-mail. There is not user account for using these applications. Screenshots of this app are given in Figure 11.

III. MODEL APPLICATION

Our aim is to build application which is easy to use, user friendly and use multiple technologies and platforms that are already proven and recognized by users. The app starts when a person or a user identifies something that is worth acknowledging (wheatear is a positive or negative) simply takes a picture from his smartphone and uploads it. Every upload and location are stored in a database, thus every other user nearby can go to the same location and take recent image on top of the previous one creating a "timeline". Through the course of time with the users' photos for each location can be collected enough data to identify the changes of a particular environment. Therefore, the main objective of the application is to increase the environmental awareness among the ordinary people.

The main concept is to keep things as simple as possible and connect users' data with an adequate GEOSS maps (and data). In addition, our application will provide a qualitative and quantitative information accessible for scientists at any given time. The "timeline" is a novel feature, which is not implemented in any environmental mobile/web application.

The application will be developed using available open sources software and technologies and deployed on the Cloud (Amazon Web Services, Google cloud platform, Xen cloud platform). The model is consisted of a mobile and cloud application.

A. Mobile Application

Mobile app is planned to have Android and afterwards an iOS version. With the start of the mobile app, it will activate the mobile phone GPS. The users can take a photo (Instagram style) and add it to his profile. The starting interface will present a map with locations gained from the database with a determined radius from the smartphone position, shown on the left in Figure 12. When clicking on a location it will show number of likes/dislikes (Facebook style) and additional button "info" that will contain comments (Twitter style), GEOSS maps and essay.

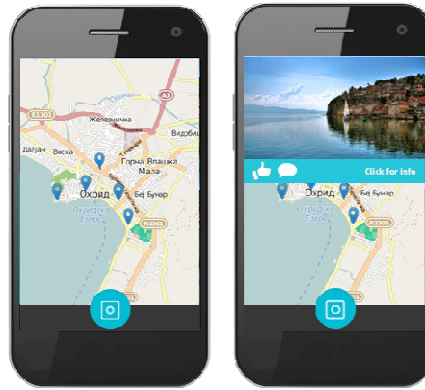


Figure 12. Prototype design of the our mobile interface

The user will have options to take a photo from the current location or to go to a location that has a timeline. If the user selects the first option, he will take the photo, put like/dislike, make comment and choose a category of based on predefined GEOSS maps. All these features are optional except the like/dislike. This first picture can be a foundation for other users to make a timeline.

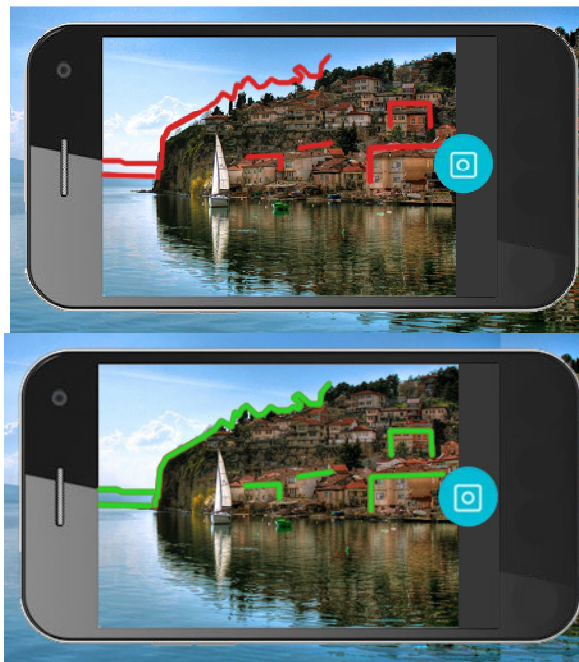


Figure 13. Prototype design of the ecoFrame contour mode mobile interface

If the user wants his photo to be part of a timeline, he/she will be needed to go to the location and get to the same position. Using GPS mobile signal and selecting the previous photos/timeline, the user will get a contour photo interface that will show contours of the previous photos/timeline, show in Figure 13. If he decides to make a photo, his photo and attributes will be part of the timeline. The timeline will contain all contributing users' comments aggregated.

The user profile will contain information about a specific user, pictures, comments and others. The prototype user profile interfaces are shown in Figure 14.



Figure 14. Prototype design of the photo mode mobile interface

From the mobile app, the user can preview other users' photos/timelines and put additional like/dislike or comment on the photo only if he is on the same position where the photo was taken (in a predefined radius). This option will prevent users commenting or like/dislike photos that they have not seen in reality.

B. Cloud Application

The users can register on the cloud application as shown in Figure 14. The registration page is the same for registered or new users and contains two forms (sign in and sign up). Each user will have its own username and password, and from the cloud application he/she will be able to view his own photos. Users will be able to see its history, visited places, photos, comments etc.

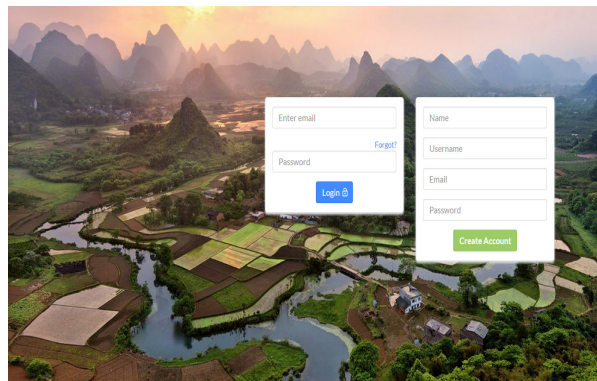


Figure 14. Cloud application registration page

The cloud application interface is composed from OpenStreetMap, menu bar and search bar. Our cloud application presents the map of Europe containing multiple locations sorted by the popularity of the event/photo (likes, dislikes, tweets). Each different zoom (layer) collects new multiple most popular events for the desired scope. We plan in the further development of the application to have several filters to select different points on the map depending on their properties (attributes), similar to Booking.com when a hotel is selected based on price, location, reviewers etc. When one event is pressed a pop up is open that presents the essential information about the location, shown in Figure 15.

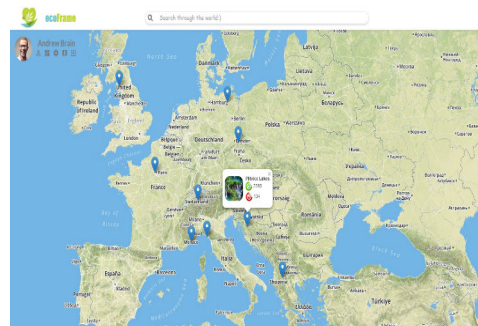


Figure 15. Cloud part application interface

The users can select from a defined GEOSS maps that are categorized in several themes: Agriculture, Biodiversity, Climate, Disasters, Ecosystems, Energy, Health, Water and Weather. The Figure 16 contains the layer of forest maps in Europe as a background. For example, the user can make a photo of a forest and connect it to the background forest map of Europe from GEOSS [22], presented in the Figure 16.

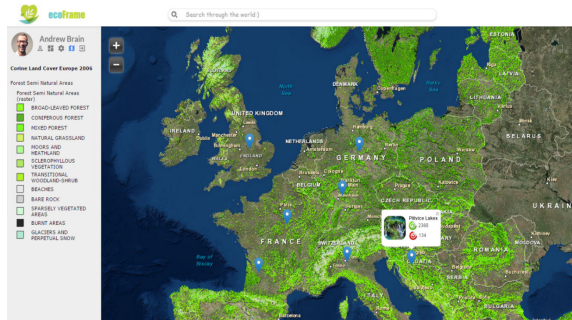


Figure 16. GEOSS integration with the forest map of Europe in our model of application

C. Architecture and technologies

The application workflow, shown in Figure 17, begins with starting the application on the smart phone. The smartphone gets the position from the GPS coordinates, which are sent to the server that returns the “hotspots” nearby locations. The mobile app asynchronously connected with the cloud app. The cloud application can be accessed from a web browser and has the functionalities described before.

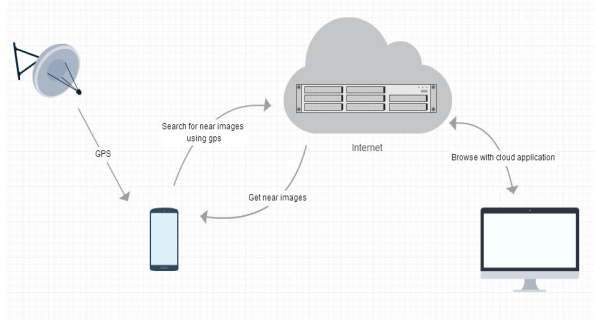


Figure 17. Application workflow

The application will be able to store temporary data about near location’s hotspots in SQLite database. In addition, we plan to use OpenCV, as a technology for image processing. After the photo is taken it will be automatically uploaded to the server. The mobile technologies used are shown in Figure 18.



Figure 18. Technology required for developing mobile application

The cloud application technology and software will be based on Amazon Web Services (AWS), Google Cloud Platform and Xen cloud server. The Geomatics laboratory at the University Goce Delcev

has its own test server based on the Xen cloud platform that can support this application. We have experience in developing specialized cloud/web GIS application based on open source software similar to this application [17] [18] [19] [20].

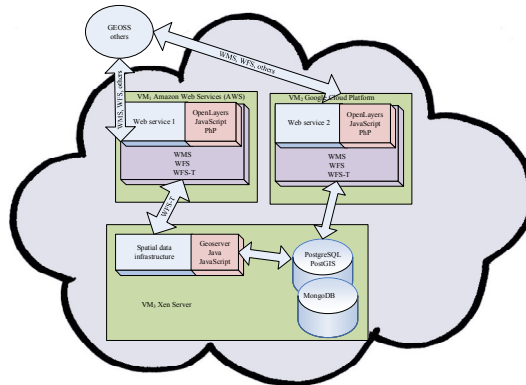


Figure 19. Preliminary our model's cloud application architecture

The front end of the cloud application will be coded in JavaScript, Node.js, Ajax and PHP. The OpenLayers library will be used to support geospatial web operations based on OGC - Open Geospatial Consortium standards (WMS, WFS, WFS-T). GeoServer is planned as a middle tier and the database can be built on PostgreSQL and PostGIS. MongoDB will be used as a database for improved scalability. All of the previous mentioned software components are open sources, interoperable and scalable. The preliminary architecture of our cloud application is shown in Figure 19. The proposed architectures and software are interoperable and portable to any platform. The MongoDB is successfully used as noSQL solution in geospatial application [21].

IV. CONCLUSION

This paper describes a model of the prototype crowdsourcing mobile and web/cloud application, and its main concepts, mobile and cloud application, key features and benefits, and preliminary architecture and technologies. Also, is given a review from all existing similar applications.

The new feature that can attract attention and users is the timeline. Our model is combining several concepts that are already proven including likes/dislikes (Facebook), comments (Twitter) and pictures (Instagram). All these concepts are integrated together with the GEOSS maps and open data sources.

Another important advantage of the proposed model application is that is based on open sources software and technologies. The cloud application software and technologies are PostgreSQL, PostGIS and MongoDB for a database tier, GeoServer as a middle tier and geospatial data management, and OpenLayer library that supports the (OGC) standards (WMS, WFS, etc.) and custom code in PHP, JavaScript and AJAX. This architecture is scalable, interoperable and deployable on different platforms. This paper presents the main idea, design and a preliminary plan for the application development.

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DYNAMIC OF LOGISTIC EQUATION

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Scientific Paper

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Abstract – Recently we have learned that object around us can display chaotic behavior. The theory of chaos is especially interesting for the analysis in modern science. In order to understand chaos we provided some of basic concepts of one-dimensional dynamical systems. Through the example of discrete logistic equation, which nowadays plays an important role in the first introduction of chaos theory to undergraduate students, we illustrate that chaos is possible in one dimensional discrete systems. Mathematica is used for visualisation of presented results.

Keywords: Logistic Equation, Discrete Dynamical Systems, Chaos, Bifurcation Points, Periodic Points, Lyapunov Exponents

I. INTRODUCTION

A. Dynamical system

Dynamical system is a mathematical model of a physical system that helps us track changes happening during time that occurs within the (physical) system. These mathematical models help us track aforementioned changes for as long as possible. In order to do that, it is necessary for us to construe an appropriate model for observing and determining changes within the physical system. Firstly, it is necessary to detach the system from its environment; then, the system becomes a detached dynamical system that can be presented with various physical laws from which follows the equation of the time change of the system. This equation is called *the equation of the system movement*. One type of these equations are differential equations, and the other are difference equations or *iterative functions*. We use differential equations in order to describe physical systems in which the time t is understood as continuous independent variable ($t \in \mathbb{R}$). In the other hand, the time in difference equations is understood as a discrete independent variable ($t \in \mathbb{Z}$).

In this article we will focus on *dynamical systems*, which are described by difference equations. When studying dynamics of discrete system, it is important to determine fixed points and hence to analyze their stability and asymptotic stability, as well as to find periodic points and examine whether will chaotic behavior occur.

The great applicability of differential equations in science and technology brought about widespread examination of differential equations. However, although difference equations are not being studied as much as differential equations, the iterative functions have also great applicability in science, and amongst many others, they serve as a tool for analyzing the differential equations themselves. For instance, in digital electronics it is useful to observe time as a discrete variable. Also, iterative functions are very useful tool for studying chaos; in seemingly simple equations, emerges the phenomenon of chaos. For more information about application see [5].

B. Chaos

The theory of chaos is especially interesting for the analysis in modern science. Those data that at first appeared to be accidental, and previously were not measured and leaved aside without any further analysis, because it was believed that it was some kind of error, today can be explained via very simple laws. Chaos can help us to determin order in different systems. It was proved that the movement of the planets in our solar system, molecules in the atmosphere, particles of water in the streams, the functioning of heart and brain, all exhibits chaotic behavior. [1]. Let us mention that chaos is not only an appropriate metaphor for instability, and an explanation for every accidental behavior. Also, if it is determined that

certain system is chaotic, that fact cannot be of further use, that is, it cannot simplify predictions of possible of the system. In modern science, there is no, at the moment, univocal meaning of the term *chaos*. Hence, in this article we will consider chaos in terms of certain attributes most common to the system considered as chaotic.

In this article we will show chaotic behavior of logistic iterative function. The question is whether we can or cannot know that some system of equation that describes certain physical system is being chaotic, prior to its analysis. Non linearity of the system, although it is its significant attribute, is not enough for us to infer that the system is being chaotic. Autonomy, that is, non autonomy of dynamical system does not guarantee the emergence of chaos. A universal applicable criterion as an answer on aforementioned problem does not exist. There is no some universal criterion that can help us answer to aforementioned problems. However, there is a mathematical criterion that can help us determine those systems that will never turn out to be chaotic. That is a consequence of the Poincare-Bendixson theorem. This theorem represents one of the key results in nonlinear dynamics, and from it follows that chaos cannot occur within systems $n < 3$. It is important to highlight that this theorem considers the systems that can be described with differential equations. In discrete systems this is not the case. One of the most known iterative equations in chaos theory is logistic iterative equation. Logistic equation is an example of chaotic equation and its example that chaos is possible in one dimensional discrete systems.

II. ONE DIMENSIONAL ITERATIVE FUNCTIONS

A. Theoretical overview of one dimensional discrete dynamical system

We will investigate dynamics of the first order difference equation (iterative equation)

$$x_{n+1} = f(x_n), \quad n = 0, 1, 2, \dots \quad (1)$$

where $f: \mathbb{D} \subseteq \mathbb{R} \rightarrow \mathbb{R}$ is a given function. We shall refer to (1) as to *one dimensional discrete dynamical system*. In other words, a discrete dynamical system consists of a function and its iterates. Let $x_0 \in \mathbb{D}$, $f(x_0)$ is the first iterate of x_0 for f , $f(f(x_0))$ is the second iterate of x_0 for f . Moreover, if n in positive integer, and x_n is the n th iterate of x_0 for f , then $f(x_n)$ is the $(n+1)$ st iterate of x_0 for f . More generally, $f^{(n)}(x_0)$ is the n th iterate of x_0 for f . Function f is called the *map* associated with (1). Our investigation is based on theoretical results studied at [2],[3],[4].

Given a dynamical system, we would like to know where each point goes as we iterate the function and what route it takes to go there.

Definition 1. The orbit of x_0 for a discrete dynamical system (1) is the sequence

$$\gamma(x_0) = \{x_0, x_1, x_2, \dots\} = \{x_0, f(x_0), f(f(x_0)), f(f(f(x_0))), \dots\}.$$

The kinds of orbits that are possible for various values of x_0 and for different functions constitute the basis for study of chaos.

Definition 2. Let x^* be in the domain of f . Then x^* is a *fixed point* of map f or *equilibrium point* of dynamical system (1) if $f(x^*) = x^*$.

Definition 3. Fixed point x^* of f is said to be *stable* if for any $\varepsilon > 0$ there exists $\delta > 0$ such that whenever $|x_0 - x^*| < \delta$, the points x_n in the orbit $\gamma(x_0)$ satisfy $|x_n - x^*| < \varepsilon$.

Definition 4. Fixed point x^* of f is said to be *asymptotically stable* or a *sink*, or an *attracting* fixed point of the function f if it is stable and, in addition, there exists $r > 0$ such that for all x_0 satisfying $|x_0 - x^*| < r$, the iterates x_n satisfy $\lim_{n \rightarrow \infty} x_n = x^*$.

Definition 5. Fixed point x^* of f is a *source*, or a *repelling* fixed point of the function f on an interval I if there exists $r > 0$ such that for all $x_0 \in I$ with $0 < |x_0 - x^*| < r$, there exists $N \in \mathbb{N}$ such that $|x_N - x^*| \geq r$.

There is no standard definition in the literature for attracting and repelling fixed points.[1]. We have chosen definitions that seem reasonable for our purpose. It is important to see that not every fixed point is attracting or repelling, other kinds of fixed point that are neither attracting nor repelling can occur. For most functions it is not so easy to prove directly from definition that a given fixed point x^* is attracting

(or repelling, or neither). However, if f is differentiable at x^* , than a useful criterion exists, which we will state in Theorem 1.

Theorem 1. Suppose that f is differentiable at fixed point x^* ,

- If $|f'(x^*)| < 1$, then x^* is attracting.
- If $|f'(x^*)| > 1$, then x^* is repelling.
- If $|f'(x^*)| = 1$, then x^* can be attracting, repelling, or neither.

Beside concepts of orbit and stability, notion of periodicity is central to the study of dynamic and chaos theory.

Definition 6. Let d be in the domain of f . Then d has *period k* (or is *period k point*) if $f^{(k)}(d) = d$, and in addition, $d, f(d), f(f(d)), \dots, f^{(k-1)}(d)$ are distinct. If d has period k , then the orbit of d , which is $\{d, f(d), f(f(d)), f(f(f(d))), \dots, f^{(k-1)}(d)\}$ is a *periodic orbit* and is called an *k – cycle*. Orbits that are not periodic are said to be aperiodic.

Definition 7. A periodic point d of equation (1) of period k is said to be *stable*, *attracting*, *repelling* if d is, respectively, *stable*, *attracting*, *repelling* of f^k .

By this definition, fixed points are periodic points with period 1. If the point has period, then we will refer to it as a fixed point. A function may have many fixed and periodic points. Later on, we will see that logistic equation has periodic points of any period for certain values of parameter p . Besides fixed points and periodic points function may have eventually fixed and eventually periodic points.

Definition 8. The point x is an *eventually fixed point* of the function f if there exists N such that $f^{n+1}(x) = f^n(x)$ whenever $n \geq N$. The point x is *eventually periodic with period k* if there exists N such that $f^{n+k}(x) = f^n(x)$ whenever $n \geq N$.

In other words, an eventually fixed point is a point some iterate of which is fixed point and an eventually periodic point is a point some iterate of which is periodic.¹

B. Logistic equation

Most famous nonlinear discrete equation used to model a single species is *logistic equation*, given by

$$x_{n+1} = f_p(x_n) = px_n(1 - x_n), \quad n = 0, 1, 2, \dots \quad (2)$$

where $p > 0$ is a parameter that measures the reproduction rate and $0 \leq x_n \leq 1$ represents the scaled population size at time n .

Models using the logistic equation assume there is an absolute limit on the size of the population and designate the actual size of the population as a fraction of the limit. Hence, the size of any population is denoted by a number in the interval $[0, 1]$. If x_0 is the population in the first time period, than the population in the next time period is $x_1 = f_p(x_0) = px_0(1 - x_0)$. As x_n approaches to 1 the population grows at a slower rate. If x_n is large enough, then the population declines.

For parameter values $p = 2$ and $p = 4$ there exists explicit solution of logistic equation. For all other parameter values it is not known whether explicit solution exists or not. Main idea is to try to find solution of given dynamical system without actually solving equations which describes this system. In that matter, we will first find fixed point of a map associated with a given discrete dynamical system. If we want to find fixed point of f_p we have to solve the equation $px^*(1 - x^*) = x^*$. By doing that we obtain solutions $x_1^* = 0$ and $x_1^* = 1 - \frac{1}{p}$. Using Theorem 1 we will conduct stability analysis of those fixed points. Since $f_p'(x) = p - 2px$, it follows that

¹ The phenomenon of eventually fixed points and eventually periodic points does not have a counterpart in differential equations, whenever the solutions are unique.

$$f_p'(0) = p \text{ and } f_p'\left(1 - \frac{1}{p}\right) = 2 - p$$

From Theorem 1 it follows that $x_1^* = 0$ is attracting if $0 < p < 1$ and is repelling if $p > 1$. Also, it follows that $x_2^* = 1 - \frac{1}{p}$ is attracting if $1 < p < 3$, and is repelling if $p > 3$. To find period – two solutions we have to solve equation

$$f_p(f_p(x)) = p^2 x(1-x)(1-px(1-x)) = x.$$

Points $\bar{x}_1 = \frac{1}{2p}(p+1 + \sqrt{(p-3)(p+1)})$ and $\bar{x}_2 = \frac{1}{2p}(p+1 - \sqrt{(p-3)(p+1)})$ are period – two point when $p > 3$.

As parameter p changes, the qualitative behavior of solutions also changes. With f_p we emphasize the fact that the function in (2) depends on parameter p . A collection of functions such as $\{f_p\}$ is called a *parametrize family of functions*, and p is the parameter of the family.

Definition 9. A parametrized family $\{f_p\}$ has a *bifurcation* at p_k , or *bifurcate* at p_k , if the number or nature (attracting, repelling) or periodic points of f_p changes as parameter p passes through p_k . In this case p_k is said to be a *bifurcation point* of the family.

Now, we will observe what will happen with population in logistic equation when we vary parameter. Graphical illustration is provided on Figure 1 – 4. Starting with initial value x_1 of the population we are interested in what will be with this population in the future for a given parameter. Eventually, we will get to sensitive dependence to the initial condition for certain values of parameter which is a road to chaos.

- For a parameter value $p < 1$ population will always extinct

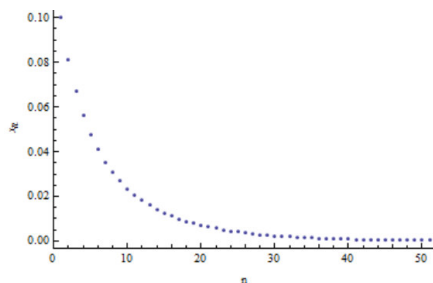


Figure 1. Extincting of population for initial value $x_0 = 0.1$ and parameter value $p = 0.9$

- For parameter value $p \in (1, 3)$ population will grow and reach constant value, different from zero

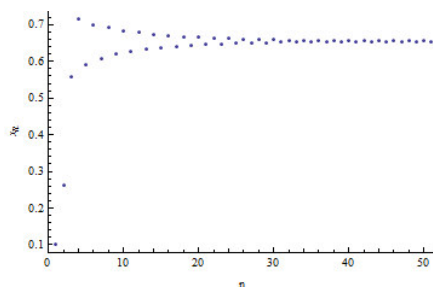


Figure 2. Population for initial value $x_0 = 0.1$ and parameter value $p = 2.9$

- For parameter value $p > 3$ will grow but this time it will oscilate around constant value

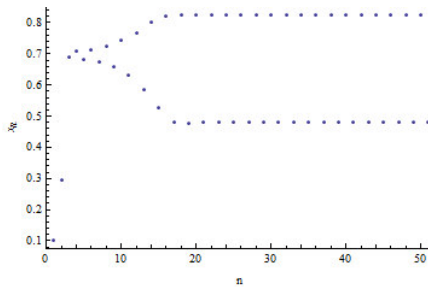


Figure 3. Population for initial value $x_0 = 0.1$ and parameter value $p = 3.3$

- For $p = 3.5$ population has a cycle of period 4.

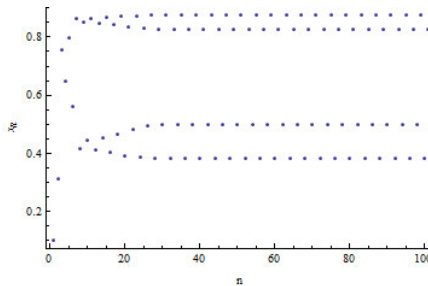


Figure 4. Population for initial value $x_0 = 0.1$ and parameter value $p = 3.5$

We saw that we have two period – two points \bar{x}_1 and \bar{x}_2 when $p > 3$. Now, let us show that orbit with period – two is stable for parameter value $p \in (3, 1 + \sqrt{6})$. Stability analysis of periodic orbit is based on stability of periodic point. Points \bar{x}_1 and \bar{x}_2 are fixed points of f_p^2 , so if we want to see whether points \bar{x}_1 and \bar{x}_2 are stable we have to observe $|(f_p^2(f_p(x)))'|_{x=\bar{x}_{1,2}}|$. Since $(f_p^2(f_p(x)))' = -p^2 + 2p + 4$ we obtain that period – two cycle is asymptotically stable for $|-p^2 + 2p + 4| < 1$, that is for $p \in (3, 1 + \sqrt{6})$.

We saw that bifurcation values of parameter are $p_0 = 1, p_1 = 3, p_2 = 1 + \sqrt{6}$. If we continue to next bifurcation value p_3 we can show that to this value corresponds period 4 cycle. Next bifurcation value of parameter is p_4 with 8 period cycle, and so on.

As we have shown that for $p \in (3, 1 + \sqrt{6})$ period – two cycle is stable, we can in the similar fashion show that for $p \in (p_2, p_3)$ period – four orbit is stable while all period – two orbit is now unstable.

If we continue with this analysis we will eventually arrive to the sequence of bifurcation values $\{p_k\}_{k=0}^{\infty}$ with following characteristic: for $p \in (p_k, p_{k+1})$ period 2^k solution is stable, while the periodic solutions of all periods $2, \dots, 2^{k-1}$ has become unstable. This phenomenon is known as the *period – doubling bifurcation route to the chaos*. The sequence of period doubling bifurcations ends at the value which is approximately $p = 3.56994 \dots$, where logistic equation has the periodic solutions of all periods as well as some nonperiodic solutions. The last situation is often described as *chaotic behavior* or *chaos*. The last period that can arise in this bifurcation process is period 3.

Theorem 2. (Period Three Implies Chaos) Let $f: I \rightarrow I$ be a continuous map on an interval I . If this map has a periodic point of period 3, then for every $k=1, 2, \dots$ there is a periodic point of period k .

This theorem equips us with an easy and intuitively clear geometrical method to determine whether map has a point of certain period. For example, if we want to see if our logistic map has period – three point we have to plot on a same graph three functions: $y = x, y = px(1 - x)$ (for certain p) and $y = f(f(f(x)))$ as it is showed on Figure 5. If the graphs of the functions $y = x$ and $y = f(f(f(x)))$ intersect at least one point, that is not fixed point of a given logistic map, then periodic point of period 3 exists. Hence, Theorem 2 states that periodic points of all period exist.

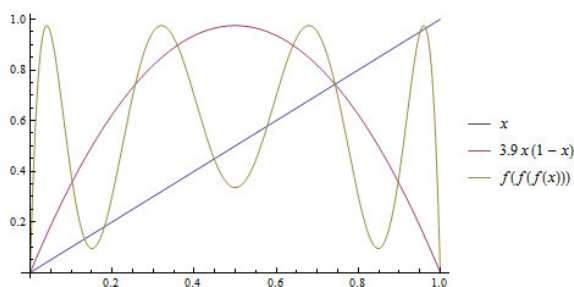


Figure 5. Grafical illustration of existence of period 3 point for logistic equation $y = 3.9x(1 - x)$

Bifurcation points are of a great interest since map qualitatively changes its structure. Bifurcation values can be easily read from bifurcation diagrams. Figure 6 shows bifurcation diagram for logistic equation.

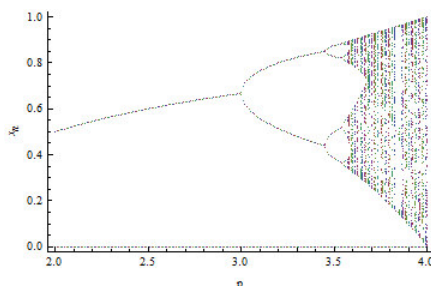


Figure 6. Bifurcation diagram for logistic equation with initial condition $x_0 = 0.5$

Sensitive dependence on initial conditions, along with the closely related notion of the of the Lyapunov exponent are the two main characteristics of chaotic maps. Still there is no unique definition of the term chaos, which is why we have choose for this purpose to use following one: a function f is chaotic if is satisfied at least one of the following conditions:

- f has a positive Lyapunov exponent at each point in its domain that is not eventually periodic
- f has sensitive dependence on initial conditions on its domain.

Lyapunov exponent is a measure of the divergence of two orbits starting with slightly different initial conditions.

Definition 9. Let f be smooth map on \mathbb{R} and let x_0 be given initial point. *Lyapunov exponent* $\lambda(x_0)$ of a map f is given by

$$\lambda(x_0) = \lim_{k \rightarrow \infty} \frac{1}{k} (\ln|f'(x_0)| + \dots + \ln|f'(x_{k-1})|),$$

provided the limits exists. In the case when any of the derivatives are zero, set $\lambda(x_0) = -\infty$.

If y_0 is near x_0 , and if the iterates of x_0 and y_0 remain close together, than $\lambda(x_0)$ is going to be negative because of the presence of the logarithm. By contrast, if the iterates separate from one another, than $\lambda(x_0)$ is going to be positive. It can be shown that for logistic equation $f_p(x_n) = px_n(1 - x_n)$, $0 \leq x_n \leq 1$, where $1 < p < 3$ and $p \neq 2$ holds $\lambda = \ln|2 - p|$. Because $\ln|2 - p| < 0$ whenever $1 < p < 2$ or $2 < p < 3$ it follows that $\lambda < 0$ for such values of p . As p approaches 2, $\ln|2 - p|$ approaches $-\infty$. Consequently, we can conclude that $\lambda < 0$ for all $p \in (1, 3)$. Also, if $p \in (3, 1 + \sqrt{6})$ and if x is not eventually periodic point, then $\lambda(x) < 0$. However, as p increases toward 4, λ oscillates more and more wildly between positive and negative values. Finally, for $p = 4$ Lyapunov exponent $\lambda(x) = \ln 2$ whenever $0 < x < 1$ and x is not eventually periodic. Figure 7 illustrates all previously said about Lyapunov exponent.

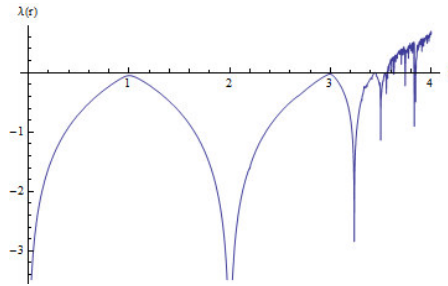


Figure 7. Lyapunov exponent for logistic equation for different value of parametar p

III. CONCLUSION

Main idea of this paper is an attempt for finding a solution of given dynamical system without actually solving equations describing this system. Hence, it is important to determine fixed points and then to analyze their stability and asymptotic stability, as well as to find periodic points and examine whether will chaotic behavior occur. With conducting such analysis, using bifurcation diagram, Lyapunov exponents and presence of period 3 point for a logistic map, we conclude that discrete logistic equation shows chaotic behavior.

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POSSIBILITIES OF INTERACTIVE EDUCATIONAL SOFTWARE APPLICATION WITH CHILDREN WITH SPECIAL NEEDS

UDC: 004.4:376.1-056.26
Original Research

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Abstract - A computer can be very useful and it offers great possibilities for students' active participation in the process of education. In order to realize that idea it is important that there is understanding of the way special needs children are to use the computer. One of the great computer functions is momentous and permanent feedback designed for the person using the text, pictures and sound. Teachers are able to predict children's reactions, and the children do not always give the feedback at the same time, or in the manner expected by the teacher. Multimedia can also offer consistent programmes and incentives to the children with serious disabilities and limited perception which they can use in order to take active part in their usual activities.

Key words: Educational software, E-learning, Google sites, influence, motivation, children with special needs

I. INTRODUCTION

The main concern of this work is positive influence of information and communication technologies on special needs children learning process, with special regard to educational computer software.

The research is both theoretical and operational. The descriptive method is used because it sees issues the way they actually are (description of the issues). The data on contemporary paedagogical issues are collected by that method. It relies on survey as a data collection method.

The theoretical part of the research explains in details education of students with special needs (with special regard to Montessori programme), IT application as means to support students with learning difficulties, E-learning and the organisation of E-learning with special needs students. It also deals with research of the software used while working with students.

Operational research is designed to confirm the established hypothesis that educational software use with special needs children has an impact on their attainments and learning motivation.

Available information on hitherto scientific theory facts and relevant literature on computer application with special needs students are used in theoretical research.

Descriptive data collection method is used in operational research. A questionnaire and an assessment scale designed as a survey form taking subjective results from the students are used as instruments.

An objective result of the research is obtained by comparison of outcomes definitely achieved in the learning process by classical method and computer-supported method.

II. METHODOLOGY OF RESEARCH

A. The Problem of Research

A computer can be very useful and it offers great possibilities for students' active participation in the process of education. In order to realize that idea it is important that there is understanding of the way special needs children are to use the computer.

One of the computer functions is momentous and permanent feedback designed for the person using the text, pictures and sound. Teachers are able to predict children's reactions to a certain degree.

The main concern of this work is the influence of information and communication technologies on special needs children learning process, with special regard to educational computer software.

B. The Object of Research

The object of this research is the attainment of special needs children who learn in a classical manner and by the use of information and communication technologies.

C. The Aim of Research

It is possible to determine the aim of this research on the basis of formulated research object, which is to establish possible differences in students' attainments while bearing in mind used working methods.

The theoretical part of the research explains in details education of students with special needs (with special regard to Montessori programme), IT application as means to support students with learning difficulties, E-learning and the organisation of E-learning with special needs students. A part of it represents research of the software used while working with students.

An established hypothesis that computer in TIE (Technical and Information Education) lessons with special needs students makes learning easier to a considerable degree while increasing learning motivation as well is to be questioned during the operational research.

D. Research objectives:

1. Systematisation and analysis of the available literature;
2. Design of the software for children with special needs;
3. Testing of the software for children with special needs;
4. Design of a site for children with special needs;
5. Determine the attainments of the students after they have used classical learning method;
6. Determine the attainment of the students after they have used educational software in the learning process;
7. Compare the obtained results and
8. Determine a degree of motivation for one or the other way of learning..

E. Research Hypotheses:

The major hypothesis of this research is:

Educational software application with special needs children has an impact on their attainments and learning motivation.

Additional hypotheses are:

1. Educational software use has a positive influence on students' attainments.
2. Educational software use has an influence on the increase in motivation and learning interest.

F. Research Variables

In this case independent variable is the method of the learning content processing, while the dependent variable is represented by the students' attainments.

Therefore, the change of students' attainments due to the change of learning methods is being considered.

G. Research Methods

A method is applied here in accordance with the research problem, its object, goal, objectives and established research hypotheses. The method of theoretical analysis is used in theoretical view of the problem, with the aim to define the research problem factors, to determine the research goals, objectives and hypotheses, and to realise the importance and the need of the given problem research as well.

Descriptive data collection method is used in operational research, as well as the comparison of obtained results method.

H. Research Techniques and Instruments

A paper- pen test and an electronic test as well are used as instruments. An objective result of the research is obtained by comparison of outcomes definitely achieved in the learning process by classical method and computer-supported method.

I. Research Sample

Fifteen special needs students in the fifth grade of primary school are taken as a research sample. The questioned learning content was a part of TIE lessons. The monitored and questioned students were learning while using the educational software and in a classical way. Their attainments are analysed. The same students' sample is questioned about the motivation for the educational software use.

All sample students are being educated according to the IEP 2 Individual Education Plan and according to the Classification of Functioning, Disability and Health- Children and Youth Version they could be in the category of children with multiple disabilities, which actually means they have different disorders, whereas not even one disorder is specific in a way to classify the child into a category of children with only one clear disorder.

J. Organisation and Development of the Research

The research was conducted in primary schools in Valjevo at the beginning of the first term (September and October) of the school year 2015/2016. The research was conducted during TIE lessons. The attainments were checked out during a relatively longer period (during a number of classes), while the survey on motivation was conducted after the analysis of the students' attainments during one lesson providing support from both teachers and parents.

III. GOOGLE SITES

A site can be very useful and it offers great opportunities for students' active participation in classes. In order to realize that idea it is important that there is understanding of the way special needs children are to use the site.

The site ***“Hand in hand”*** is specially designed for children with special needs. The idea is that parents can follow all that is prepared for their children on the site's pages, and all that is essentially important for children with special needs as well.

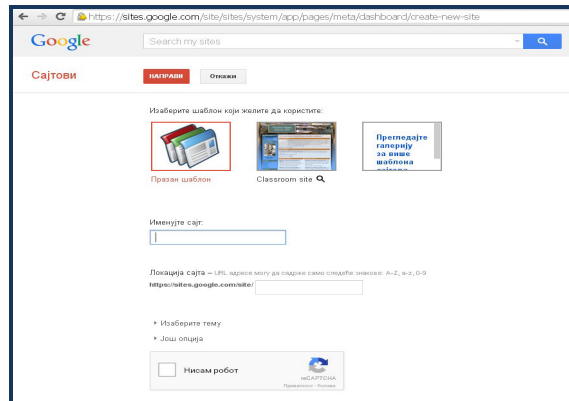
The latest information, legal solutions and good practice examples are to be presented to the parents so that that could fully support their children in the process of education. A number of interesting issues that might ensure free time spent in a high quality manner will be published on the site.

The whole content of the site will influence the development of the children's abilities and in that way help learning process as well. Various games, videos, interesting test and useful information will be a part of the site..

A. Site creation and management

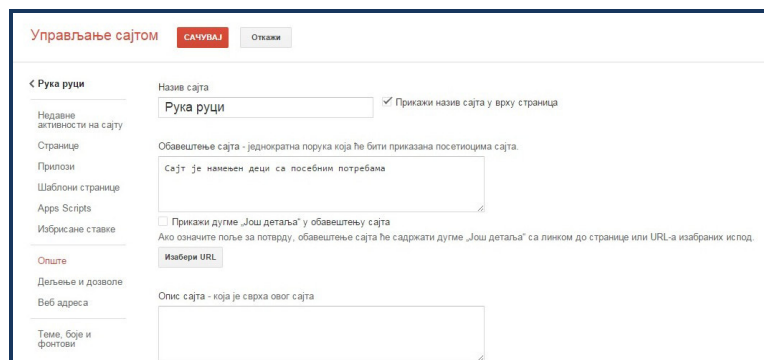
Apart from an open Google account it is also necessary to type in the address **sites.google.com** in order to create a google site. A page that offers a possibility for a new site creation will be opened, as shown in the picture 1.

The first to be done is to choose the site pattern which later can be changed and adopted according to necessities.



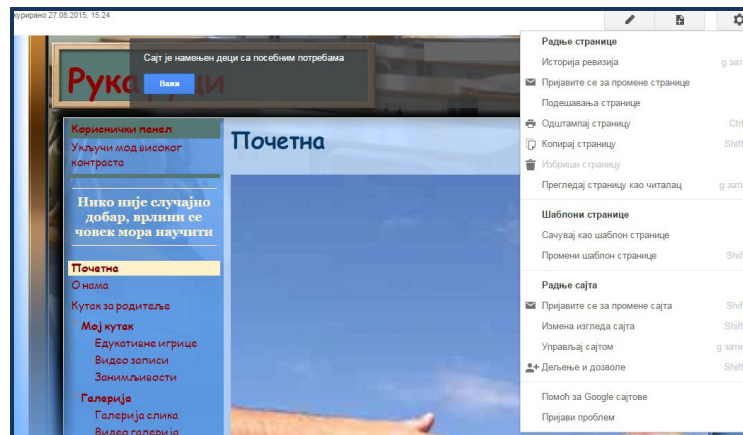
Picture 1. Site Creation

The following step is to name the site and supply a short description of the purpose of the site. It is necessary to bear in mind that the name will appear in the site address.



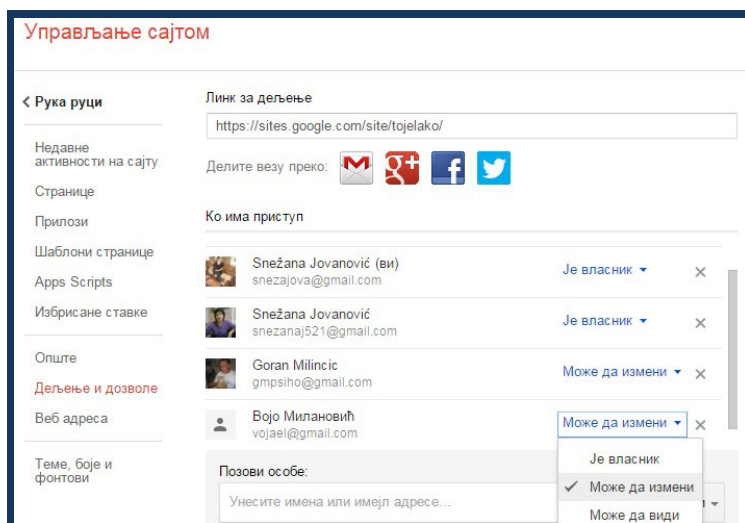
Picture 2. Naming the Site

The site items have to be orderly arranged. When a user starts using the site they need to get all that refers to the themes of the site on the homepage.



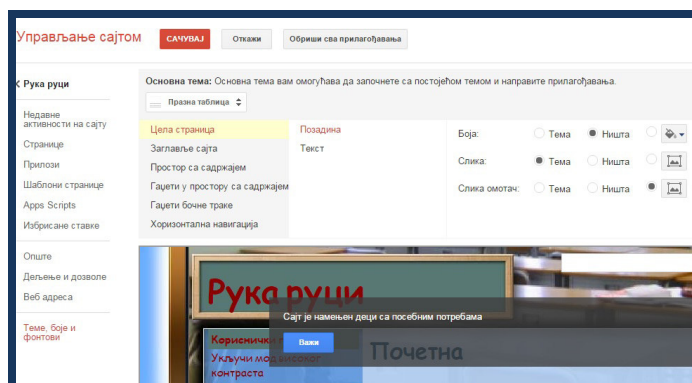
Picture 3. The Site's Appearance

The same site can be edited by more than one person, which is to be arranged by choosing Site management in settings, and then using the Sharing and permissions option. People having access to the sight may have different roles such as is the owner, can see, can change, as shown in the picture 4. In this card a lot of settings, changes and managing can be done, for example recent activities on the site, pages, additions, page patterns, deleted items, general settings etc.



Picture 4. Sharing and Permissions

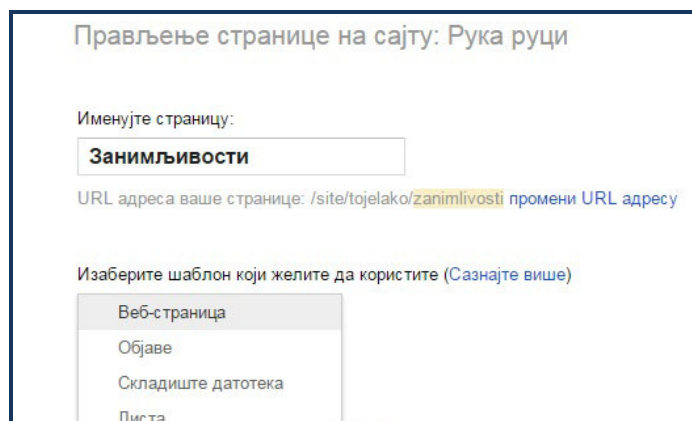
The appearance of the site can be changed if Topics, Colours and fonts is chosen in the option Site Management. The manner in which a complete wallpaper change of the whole page is possible is shown in the picture 7, and it is possible to change the text within the page as well. It can be seen that the heading appearance, content space, gadgets in the content space, gadgets in the side bar and horizontal and vertical navigation are also subject to change.



Picture 5. Change of the site's appearance

B. Page addition and change of the site's appearance

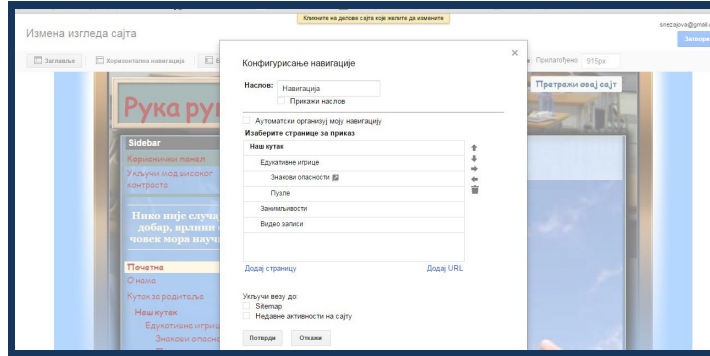
In the process of creating a new page, apart from assigning a name to it, it is necessary to choose a pattern to be used, i. e. whether the new page is to be a web-page, an announcement page, a data base or a list.



Picture 6. Creation of a new page

After the page has been created the configuring of navigation is to be done. The pages can be divided in several related parts.

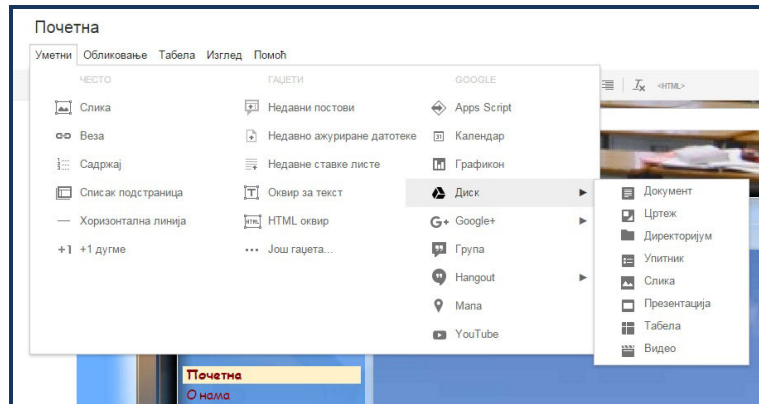
The navigation can be horizontal or vertical, and while configuring the navigation pages can be chosen from the created pages list or from URL, whereas a page can be named and it can be chosen whether the page is to be opened in a new window or in the same one.



Picture 7. Configuration of navigation

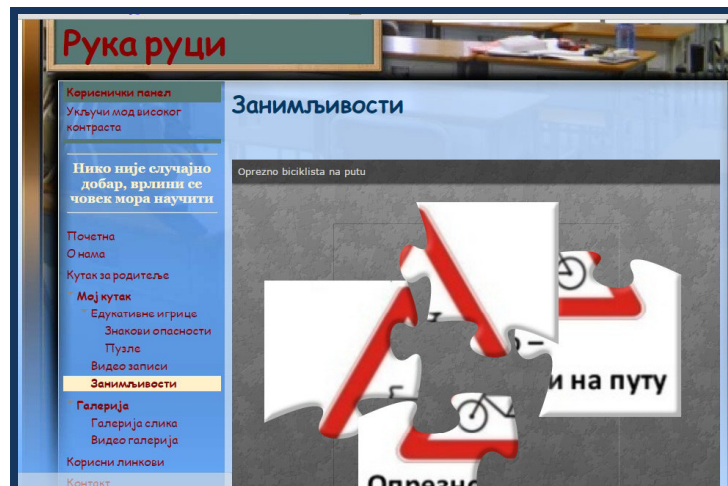
C. Content Addition

Various contents located on a computer, Google disc (documents, sketches, pictures, questionnaires, presentations, videos etc), Google +, You Tube etc can be added to the site



Picture 8. Content embedding or change of the page appearance

A window that is to be opened when a page is to be edited or changed is shown in the picture 8, while the page with an embedded game for special needs children is shown in the picture 9.



Picture 9. The page with the embedded game

IV. RESEARCH METHODOLOGY

A. Research Problem

The computer can be very useful and it offers students vast possibilities to actively participate in lectures. In order to make this happen, a profound understanding of the way in which children with special needs should use computers is required.

One of computer functions is temporary and permanent feedback to students who utilize pictures, text, and sound. To a certain extent, teachers can foresee students' reactions.

The research problem in this paper is the influence of information and communication technologies, and especially the educational software program on the learning process of students with special needs.

B. Research Subject

This research deals with the achievements of students with special needs who adopt teaching materials in the usual way, as opposed to those who do it by using information and communication technologies.

C. Research Goal

Based on the defined research subject, we can set the goal of this research, and that is to determine whether there is a difference in students' achievements based on the learning method.

The theoretical section of the research explains in detail the education process of students with special needs (with reference to the Montessori program), with use of IT as a support system for students with learning difficulties, E-learning, and E-learning management for students with special needs. One part of this section covers research on software programs used for working with students.

The practical section is to examine the hypothesis that computers significantly facilitate learning and increase learning motivation in DT in students with special needs.

D. Research Tasks

The tasks of the research are following:

1. Systematization and analysis of available bibliography;
2. Creating a software program for children with special needs;
3. Testing the software program for children with special needs;
4. Creating a web-page for children with special needs;
5. Determining students' achievements with traditional learning methods;
6. Determining students' achievements with educational software program utilization;
7. Comparing the results and
8. Determining the level of students' motivation for either one of these methods.

E. Research Hypotheses:

The main hypothesis of this research is as follows:

The educational software program utilization when working with children with special needs increases their achievements and learning motivation.

Additional hypotheses are as follows:

1. The educational software program utilization increases students' achievements.
2. The educational software program utilization increases students' motivation and interest for learning.

F. Research Variables

The independent variable of this research is the teaching materials adoption method, while students' achievements are the dependent variable.

Hence, we follow the changes in students' achievements based on the changes of learning methods.

G. Research Methods

The method used has been adjusted to the research problem, subject, goal, tasks, and the set hypotheses. In the theoretical approach, we used the method of theoretical analysis with the aim to define the factors of the research problem, to determine goals, tasks, and hypotheses and to recognize the importance of researching the given problem.

In the operational research we used the descriptive method of gathering data, as well as comparing the results.

H. Research Techniques and Instruments

The instruments used are a paper-pen test and an e-test. The way to get an objective result is to compare the specifically achieved outcome in the learning process using the traditional method and the computer supported method.

I. Research Sample

The research has been conducted on the sample of fifteen students with special needs, who are attending the fifth grade of primary school. The teaching material tested was from the DT curriculum. The students who were observed and tested adopted materials using the traditional and the computer supported methods. Their achievements were analyzed. Also, the same students were given questionnaires about their motivation for using the educational software program.

All research participants attend lectures based on the Inclusive Education IE-2 and belong in the category of children with multiple disorders. This means that they have the most various disorders, none of which are specific enough to place the child in a single category, with one predominant disorder.

J. Research Organization and Process

The research has been conducted in primary schools in Valjevo, during the beginning of the first semester (September and October) in the school year of 2015/16 in DT classes. The achievements were being checked during a relatively long period of time (in multiple classes), while the questionnaire about motivation was conducted after the analysis of students' achievements in one class with the support of teachers and parents.

V. RESEARCH RESULTS

A. Achievements Research Results

Research results will be presented in the form of a table first. The average result for both material adoption methods will be determined. Then the analysis will be conducted.

Table 1

Student	Traditionalmethod	E-method
1.	2	1
2.	0	2
3.	2	5
4.	3	4
5.	0	0
6.	2	4
7.	2	4
8.	4	6
9.	5	6
10.	4	5
11.	4	3
12.	6	6

13.	3	4
14.	2	4
15.	1	2
Average	2.67	3.73

Chart 1. Achievements

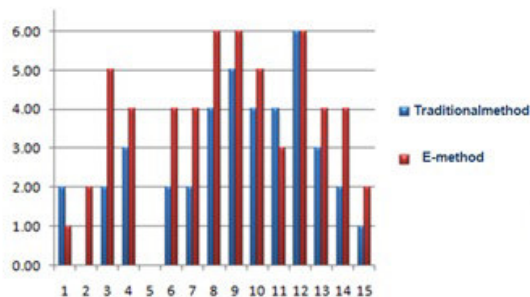
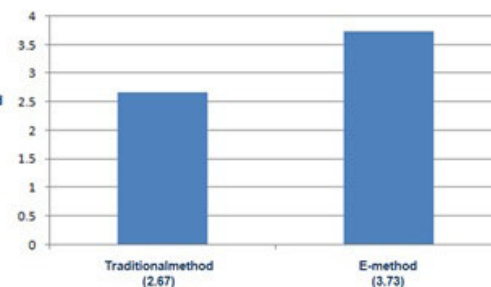


Chart 2. The average result



Observing the table we can notice that the average achievement result testing the traditional method test is 2.67, while the one testing the e-method is 3.73.

Both tests were composed of six questions, each one corresponding to one of the six traffic signs which students had been learning: the traditional test dealt with information signs, and the e-test dealt with danger warning signs. Both tests can be found on the *Ruka ruci* web-page.

Right away we can notice that the achievements made by using the traditional method are lower than 50 per cent, i.e. on average, students did not acquire half of the planned material.

On the other hand, the achievements went above 50 per cent, i.e. every student learned 3.37 traffic signs on average when learning from a computer game.

The table also shows that three students had the maximum score on the e-test, while only one did so on the traditional test. It is clear that some students had a significantly higher score when they learned by playing a computer game. There are five of these students, i.e. 33.33 per cent. This information is obviously statistically significant because it supports the hypothesis that the students shall achieve better results when using the educational software program.

Another noticeable piece of information is the achievement made by the student no. 2, who did not provide a single correct answer on the traditional test, but managed to answer two questions, i.e. one third of the e-test. It is important to notice that there is a student who failed to answer any questions on either one of the tests, which goes to show that an individual education plan should be provided to this student, and that the reasons for failing both tests should be looked into.

Having summarized the data, we can clearly see that the part of the main hypothesis dealing with students' achievements and the first additional hypothesis have been confirmed by this research, i.e. the educational software program utilization greatly increases students achievements in DT lectures.

B. Motivation Research Results

Table 2

Question No.	Yes	I do not care	No
1.	11	3	1
2.	14	1	
3.	15		
4.	9	4	2
5.	6	8	1
6.	15		
7.	10	4	1

8.	13	1	1
9.	13	2	
10.	14	1	

Chart 3. Students' Responses

1. I enjoy using the computer



2. I like hearing sounds



3. I find it nice that I can try again if I make a mistake



4. I see learning as a game



5. I find it difficult to learn from a book



6. Praise makes me happy



7. Giving an incorrect answer makes me sad



8. I enjoy learning other subjects on a computer as well



9. I memorize more easily if I learn on a computer



10. I can't wait to learn from a computer game again



Table 2 and Graph 3 show that eleven (73.73 per cent) students prefer using the computer, which is directly connected to the students' motivation for learning with the educational software program. Only one student (6.66 per cent) does not like using the computer.

93.33 per cent of students agreed with the statement *I like hearing sounds*, which unequivocally indicates that students prefer having multiple senses engaged, which in turn enables them to learn data with larger overall capacity.

All students were pleased that they can attempt answering a question again if they make a mistake.

As many as 60 per cent of students see learning as a game, which speaks volumes about the high motivation rate for this learning method. Four students do not care about this, while only two students do not see learning as a game.

Forty per cent of students have difficulties learning from a book, while 53.33 per cent say that they do not care how they learn. This can be a result of the fact that educational software program utilization is not present enough in education of students with special needs.

As expected, praise is a very effective means of increasing learning motivation, which can be clearly seen from the questionnaire answers. We can freely conclude that students with special needs intensely ask for praise for what they have done.

In accordance with the statement above, the largest number of students (66.66 per cent) does not like it when they provide an incorrect answer, which also supports their learning motivation.

A high percentage (86.67 per cent) of students would like to learn other subjects through computer games, while only one student disagrees with this.

The same percentage (86.67 per cent) of students find it easier to memorize data if they processed it with the help of a computer, which shows how motivated they are to utilize the educational computer software.

Fourteen out of fifteen students (93.33 per cent) are eager to learn from an educational software program again.

This is just another indicator of students' motivation which directly confirms the part of our main hypothesis dealing with motivation, as well as the second additional hypothesis.

VI. CONCLUSION

The research conducted in this paper has shown and confirmed the hypotheses that educational software program utilization in education increases achievement rates on tests in students with special needs, as well as that students with special needs are significantly more motivated to learn using computers. Students with special needs find it agreeable to have multiple senses engaged, which enables them to learn with greater overall capacity.

As expected, praise is a very effective means of increasing learning motivation, which can be clearly seen from the questionnaire answers. We can freely conclude that students with special needs intensely

ask for praise for what they have done. The educational software program enables students with special needs to attempt answering a question again if they have made a mistake, which motivates them.

Students see utilization of the educational software program as a game, which shows how motivated they are for this learning method.

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THE SELF-EVALUATION OF THE QUALITY OF THE SCHOOL WITH BILINGUAL TEACHING IN THE FIELD OF MANAGEMENT

UDC: 005.96:[37.02:81'246.2
Original Research

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Abstract - This paper will present the results of self-evaluation of employees in the management field of the school through professional competence and leadership ability. The sample is selected so that it covers only schools with bilingual teaching. Bilingual teaching in this survey refers to Montenegrin and Albanian language. The survey was conducted through a questionnaire which is taken from a manual for self-assessment and evaluation of the school. The results of self-evaluation authorities "Professional competence (Q1)" indicate that the school headmaster meets the requirements prescribed by law. The results of self-evaluation area "leadership ability (Q2)" suggest that although all employees feel that it is very important that the headmaster is taken as an example to school employees, about 65% of respondents answered that it was indeed in practice and present.

Key words: Self-evaluation, management, headmaster, school, bilingual education.

I INTRODUCTION

Not one sphere of human activity is so constantly under scrutiny as the sphere of education. This conclusion is not surprising considering that the educational activity is still one of the key areas that depend and that completely permeates all others. The field of education has become a global problem. International institutions such as UNESCO suggest recommendations to ministers of education on the need to establish a global network of information on education. This network primarily refers to the importance of sharing experiences, comparing different educational systems in order to achieve successful reforms in those countries where the educational system is not satisfactory, as is the case with our country.

The education reform, which is a daily topic of public debates, should not be the goal for itself. A critical relationship of theory and practice by their own experience is necessary, but also by the experience of others. It is necessary to consider the benefits of our present educational system (which undoubtedly exist), but also to determine what should be changed. The decision is necessary to adopt on the basis of theoretical analysis and research results. Therefore, it is necessary to realistically consider the work; the method of self-evaluation results can provide a clear view of what needs to be changed on micro and then on the macro level in the area of management and organization in a school. The goal of self-evaluation is to improve the quality of work of schools. Self-evaluation is also a sign that the school is willing to accept responsibility for its own work and development. This is not the only form of work, but it is the basis for other types of evaluation. Self-evaluation frees the school from the tension that occurs as a result of the external evaluation as the only sight of the monitoring and evaluation of the work of educational institutions until now. The introduction of schools' self-evaluation becomes an equal partner to external evaluators who will conduct the evaluation with identical indicators, which are presented in the manual for self-evaluation work of school [21]. By the opinion of some world famous authors, every organization in the public sector should act as a private corporation, which is it should support the market model of behavior [5]. Educational institutions have to improve their leadership to the

next level i.e. the level of viewing the operation as a private owner so the education results would be better. The transfer of management principles of private organizations in public administration requires the creation of a new subsystem HRM. This important part of the reform in the Republic of Serbia has not been conducted yet [16]. Regardless of whether it is a private or a state organization, it is defined by the following: "The organization is such a social structure in which a group of people achieves a certain goal, establishing lasting relationships among themselves in work and applying the pre-defined models of work." [19]. A modern social environment in which we live has imposed new goals, values and challenges and, consequently, new approaches to education and bringing up. In order to be more successful and to achieve the set goals of a complex modern curriculum better, which are primarily related to the change in the method of performance of classes that should be directed towards a student [15] and educational standards [18], it is necessary to address to the management of the schools. This will give a prerequisite for the proper functioning of staff to students. Previous studies of leadership and management of schools were held in several directions, depending on which the starting points in explaining the functions of management were represented by their authors. First, the researches were focused on detecting the characteristics and the personality of director [1]. The second researches [14,10,7,8] are more focused on strategies, concepts and models of leadership. Meanwhile, the third [11,17,4,9,3,12] researches are focused on analyzing the competencies required for leadership. Regardless of the approach, all studies emphasize the importance of teaching factors for efficiency and quality of educational service, and the extraordinary significance for the leading functions.

II METHODOLOGY

The subject of research

The subject of this research is to examine employees' satisfaction in school with bilingual teaching in the field of management. In this the following indicators area were perceived:

1. Professional competence and
2. The leadership ability.

As we previously mentioned, self-assessment is a procedure that evaluates its own practices and their own work. This paper seeks to determine the opinion of teachers and school employees with bilingual teaching about the quality of school work in the field of school management.

The aim and objectives of the research

The aim of the research is determining the strengths and weaknesses of the observed school with bilingual teaching in terms of management and improvement of the same. The tasks of the research were based on the determination of employees' satisfaction with management of the school in terms of professional competence and management skills.

The organization of the research

Research that was conducted was related to self-evaluation of employees in the area of management of the school. The sample (N 45) is selected so that it covers only schools with bilingual teaching. Bilingual teaching in this survey refers to the Montenegrin and Albanian language. The survey was conducted through a questionnaire which was taken from a manual for self-assessment and evaluation of school [21].

Theory and research questions

All schools with bilingual classes compile an annual report on self-evaluation, whose essence should be based on the evaluation of the responses received on the basis of criteria of Quality standards of educational institutions with Additional standards of quality of schools with bilingual teaching, as well as other relevant internal and external models of quality. In compiling the report on self-evaluation, schools with bilingual teaching should draw conclusions on their performance and to identify strengths, weaknesses and other aspects of their educational offer in which there is a need for improvement. Self-evaluation is a procedure that evaluates its own practice and work, starting from the analysis of what it is and how it is done. Three basic questions are central to the process of self-evaluation:

1. How good is our school?
2. How do we know?

3. What should we do to make it even better?

Answers to these questions can be provided primarily by those who govern the school. Management of the school is performed by the director. The director has several functions in a school, and because the director has the role the school headmaster, the individual responsibility is big, even though many decisions are made with the support of the school board. Director's job is primarily complex because it is an individual body of school management and thus between him and other employees is set up so-called "the horizontal relationship" or the relationship of a superior and a subordinate, which sometimes brings problems. The director manages the school and acts in accordance with the decisions of school governance structures. The director is primarily the person who has a major role in operating mode in all labor organizations and represents its "personality". The director has to supervise the work of teachers and professional associates, takes measures for the improvement of teachers, and announces competitions for vacancies, attends meetings as a member, attends meetings as an organizer. Based on the research results, Staničić [17] said that a successful manager could simply be described as a person who has a clear vision and permanently introduces positive changes in order to achieve the vision. The director knows how to work with people and successfully resolves conflicts that impede the realization of the curriculum. The director is honest, has confidence in his/her people and is intensely committed to work. The person who is selected as the Director, in addition to its education which owns, he/she must have a multidisciplinary education. A man learns while he is alive! Practically, this means that the Director should work on his/her education every day and to constantly improve. With the development of technic and technology, we have a constant influence from the environment on education. If the director is educated and follows new technical achievements, he/she will quickly and easily allow the new technology achievements and innovations to enter the school. In these cases the school represents an open form of organization that is willing to accept and implement new ideas. The organization of the school director means to provide all the resources that are considered essential and necessary for the normal process of school work (material, human, financial, space for teaching, firewood) [20]. Experiences from the school show that it is better to be an average teacher, whom the students will memorize by the appropriate level of knowledge and expertise, than to be the director of who the students and colleagues will remember by ignorance, illegal work, arbitrariness and dictatorship [2,6,13].

From all the above, we can see that for the good functioning of the school, the manager / director has a very important function, thus resulting in the following research questions:

Q1: Are the employees satisfied with the professional competence of the head of the school with bilingual instruction?

Q2: Are the employees satisfied with the ability of management of school with bilingual teaching?

III RESULTAND DISCUSION

The results with discussion in the area of evaluation of management in terms of professional competence and management skills.

On the basis of the following testimony: "The director with his work and behavior serves as an example to school employees", 24 employees (or 60% of total respondents) responded with "very important" and 14 employees (35%) believe that the claim is "entirely accurate" and the present. 16 respondents (40%) responded with "important", and 14 employees (35%) believe that the claim is "more present". Not one employee has responded with a "little matter" nor with "unimportant". 10 employees (25%) have answered "true to a lesser extent", and 2 employees (5%) gave the answer "false". Based on the answers, we can conclude that employees have a very positive attitude towards the importance of such statement. A positive attitude towards the claims and accuracy prevails, i.e. that the director with his/her work and behavior serves as an example to other school employees.

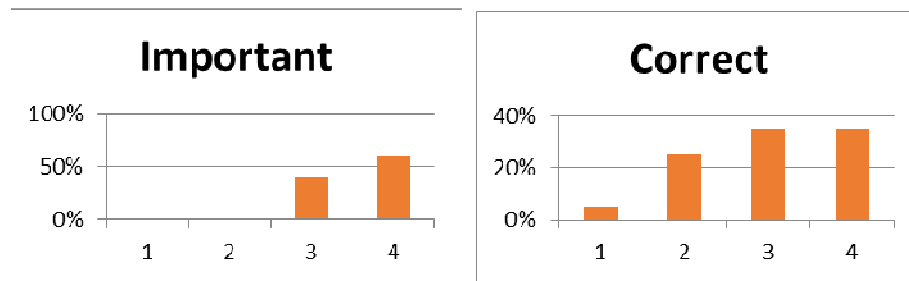


Figure 1. The statement: "The director with his work and behavior serves as an example to school employees"

On the basis of the following testimony: "The contributions recognition and reputation of the school", 22 employees (55%) responded that it is "very important", 14 (35%) believe that it is "completely correct". That statement is "important" is considered by 16 employees (40%), and that it is "to a great extent present" is considered by 18 respondents (45%). 2 employees (5%) have responded with "less important", and 4 of them (10%) that it is "true to a lesser extent". None of the respondents answered "not important" and 4 respondents (10%) gave the answer "false". From the obtained results we conclude that there is a positive attitude towards the importance of claim. Regarding the degree of applicability of claim in practice, a positive response, i.e. that the statement is present to a greater extent and completely present believe the majority of respondents; the opinion is represented that the director contributes to the affirmation and reputation of the school.

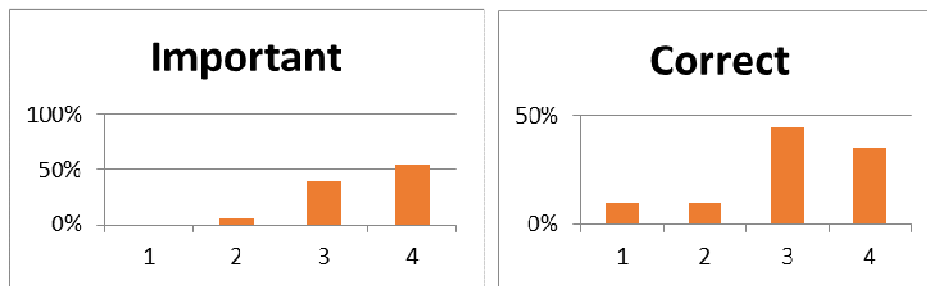


Figure 2. The statement: "The contributions recognition and reputation of the school"

On the basis of the following testimony: "Develops confidence, respects different opinions and provides good interethnic communication", 20 employees (50%) responded that it was "very important" and 14 respondents (35%) believe that it is "completely correct". 20 employees (50%) believe that the aforementioned claim is "important", and 14 of them (35%) that it is "present to a greater extent". Not one employee believes that the claim is "less important" or "unimportant". 6 employees (15%) responded that it is "true to a lesser extent", and 15% (6 respondents) believe that it is "false". Based on the answers, we can conclude that all employees have only a positive attitude towards the importance of claims. Regarding the degree of presence-accuracy of that assertion in practice, the positive attitude that the director develops confidence, respects different opinions and provides good inter-ethnic communication dominates, while 30% of them consider it inaccurate and rarely present.

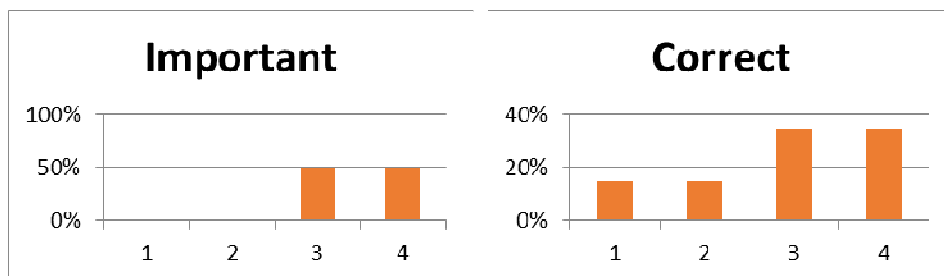


Figure 3. The statement: "Develops confidence, respects different opinions and provides good interethnic communication"

On the basis of the following testimony: "Successfully overcomes conflicts", 32 employees (80%) responded with "very important", while 16 (40%) believe that it is "completely true". 8 employees (20%)

believe that it is "important", and 14 (35%) that it is "to a great extent true". Not one employee has responded with "a little matter" or with "irrelevant". 6 respondents (15%) believe that the claim is "true to a lesser extent" and 4 (10%) that it is "irrelevant". By analyzing the received responses, we come to the conclusion that it is solely a positive attitude towards the importance of claim, and that there is a positive attitude towards its applicability and presence in practice, i.e. that the director successfully overcomes conflict situations.

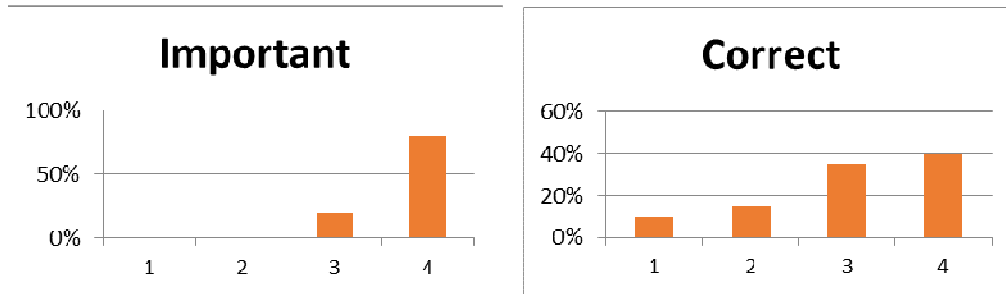


Figure 4. The statement: "Successfully overcomes conflicts"

On the basis of the following testimony: "He/she is ready to take responsibility in making decisions", 32 employees (80%) responded with "very important", 36 employees (90%) consider that it is "very important" and that the claim is "entirely accurate" is considered by 24 of them (60%). That it is "important" is considered by 4 respondents (10%) and that it is "to a great extent present" 14 (35%). No respondents chose the answer "slightly important" or "unimportant". 2 employees (5%) believe that it is "present to a lesser extent", and none that it is "incorrect". By reviewing the responses obtained, we conclude that there is a purely positive attitude towards the importance of claim. The majority of respondents consider the claim present in practice, while a smaller number of those who consider it inaccurate or less present.

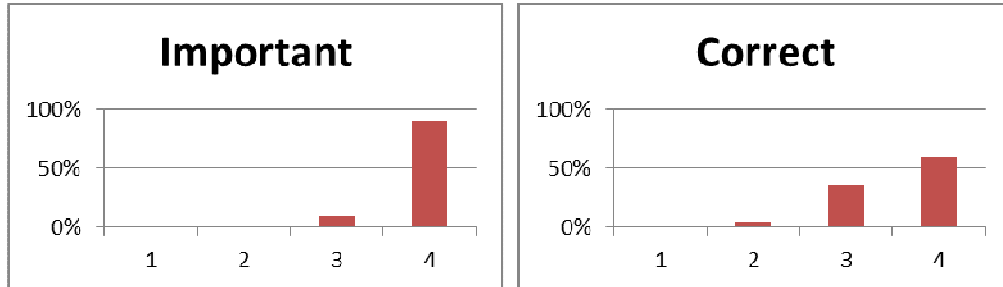


Figure 5. The statement: "He/she is ready to take responsibility in making decisions"

On the basis of the following testimony: "Requests responsibility and work discipline", 34 employees (85%) believe that it is "very important", and 4 (10%) that it is "completely correct". 6 (15%) employees responded with "important", and 12 (30%) with "to a great extent true". None of the employees considers the claim "of little importance" or "irrelevant". That it is "true to a lesser extent" is considered by 16 employees (40%), and 8 respondents (20%) that it is "incorrect". We get the conclusion that there is only the positive attitude of employees towards the importance claim. As for its accuracy, or the presence in practice, employees consider it less present.

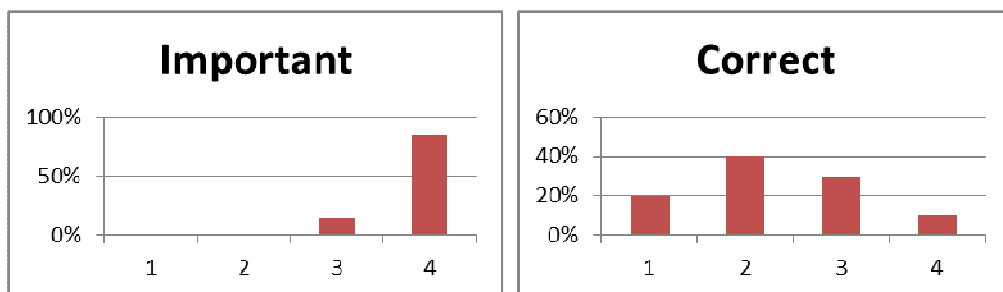


Figure 6. The statement: "Requests responsibility and work discipline"

On the basis of the following testimony: “Timely informs employees”, 28 employees (70%) believe that the claim is “very important”, 8 of them (20%) believe that it is “completely true”. 12 respondents (30%) responded with “important”, and 14 (35%) that it is “to a great extent present” in practice. No employees considered that it is “of little matter” and “false”, while 10 of them (25%) believe that it is “present to a lesser extent” and 8 (20%) that it is “incorrect”. On the basis of the obtained answers we conclude that all the respondents have only a positive attitude towards the importance of the claim. Regarding the degree of presence in practice, there is a positive attitude; the director promptly informs employees.

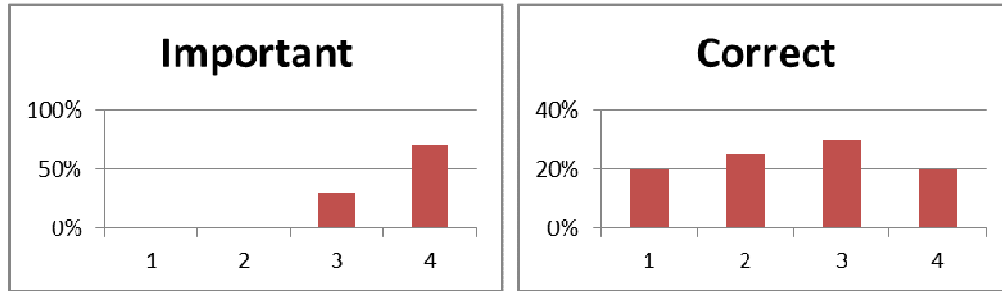


Figure 7. The statement: "Timely informs employees"

On the basis of the following testimony: “Sets clear, precise requirements that contribute to the effectiveness of the school”, 30 respondents (75%) opted for the answer "very important" and 4 (10%) that it is “completely true”. 10 employees (25%) consider it is “important” and 20 respondents (50%) replied that it is “to a great extent present”. The claim is not considered “little important” and “unimportant” by a single participant. That it is “present to a lesser extent” and “false” is considered by 8 respondents (20%). By observation and analysis of the received responses we conclude that there is, the same as for the previous claims present exclusively a positive attitude towards the importance of such statement. In terms of the degree of accuracy-presence in practice, positive thinking is widespread.

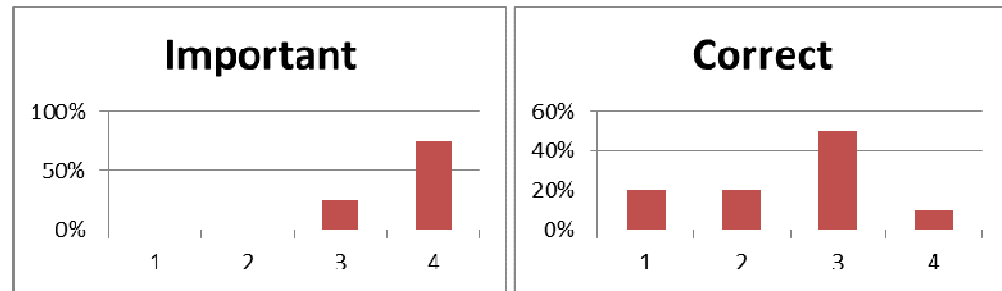


Figure 8. The statement: "Sets clear, precise requirements that contribute to the effectiveness of the school"

On the basis of the following testimony: “Motivates employees to a professional attitude towards work”, 26 respondents (65%) consider it “very important”, and 6 (15%) believe that it is “completely correct” 14 respondents (35%) answered that statement is “important”, and that it is “to a great extent present” 20 (50%) of them. Nobody chose the answers “slightly important” or “unimportant”. 6 respondents (15%) think that the statement is “true to a lesser extent”, and that it is “incorrect” consider employees 8 (20%). Again, there is a positive attitude towards the importance of the statement. A positive attitude to its presence in practice prevails, i.e.accuracy; the director motivates employees to a professional attitude towards work.

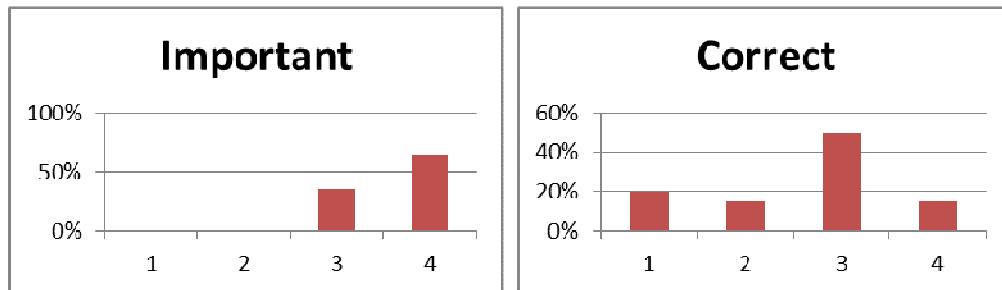


Figure 9. The statement: "Motivates employees to a professional attitude towards work"

On the basis of the following testimony: "He/she directs and coordinates the work of school professional bodies", 28 (70% of employees) responded with "very important", and 6 (15%) with "completely true". 12 (30%) consider that the claim is "important" and "present to a greater extent". That it is "of little importance" and "incorrect" is not answered by one of the respondents. 16 employees (40%) consider it "to a lesser extent present" and that it is "incorrect" is considered by 6 (15%). By reviewing the responses obtained, we conclude that employees have a positive attitude towards the above statement with regard to its importance, and that a negative attitude towards its presence-accuracy degree in practice prevails.

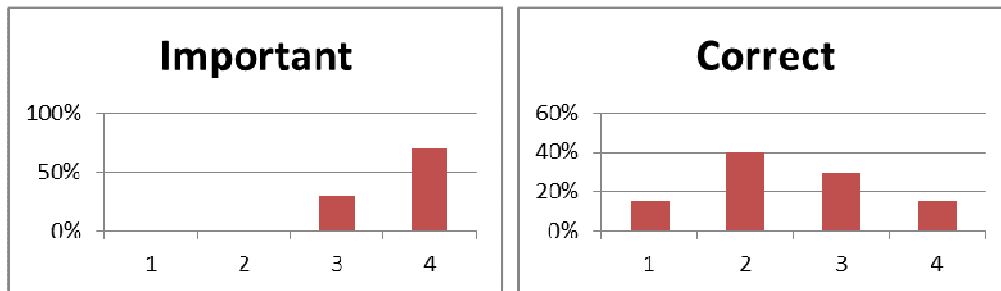


Figure 10. The statement: "He/she directs and coordinates the work of school professional bodies"

On the basis of the following testimony: "Promotes, encourages and organizes teamwork", That the statement is "very important" is considered by 22 employees (55%) and 4 (10%) consider it "fully correct". That the statement is "important" is considered by 16 respondents (40%) and that it is "to a great extent present" replied 18 employees (45%). That it is "of little importance" is considered by 2 employees (5%) and 10 of them (25%) answered that it is "present to a lesser extent". None of the respondents considered that it is "irrelevant" and 8 (20%) gave the answer "false". By the analysis of the responses obtained in the survey, related to a given claim, we conclude that there is a positive attitude towards the importance of claim, and that the majority of respondents believe that it is present in practice.

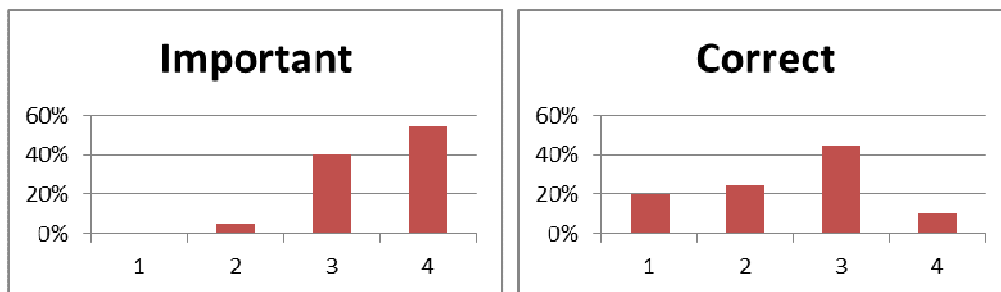


Figure 11. The statement: "Promotes, encourages and organizes teamwork"

On the basis of the following testimony: "Encourages and supports the professional development of employees", 34 employees (85%) believe that the statement is "very important", 18 of them (45%) that it is "completely true". That it is "important" is considered by 6 respondents (15%), that it is "to a great extent true" is considered by 8 (20%) employees. None of the employees responded with "a little important" and "unimportant". That the statement is "true to a lesser extent" is considered by 10 employees (25%) and that it is "incorrect" is considered by 4 respondents (10%). Based on the answers, we can state a positive attitude towards the importance of the above given claim. A positive attitude towards its accuracy-presence in practice prevails.

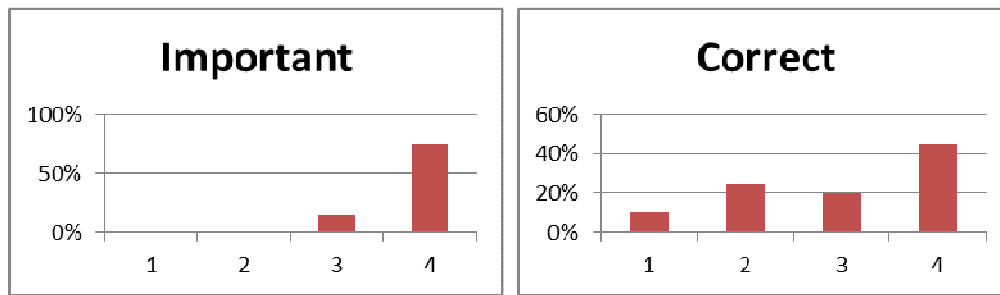


Figure 12. The statement: "Encourages and supports the professional development of employees"

On the basis of the following testimony: "Creates conditions for the participation of students in making decision about the organization and life of the school", 20 employees (50%) answered "very important" and "completely true". Also, 50% (20 employees) responded "important" and 30% (12 respondents) that it is "to a great extent present". None of the employees answered with "little matter" or "unimportant". That the claim is "to a lesser extent true" or "false" is considered by 4 employees (10%). By reviewing the responses given by employees, we re-conclude a very positive attitude towards the importance of such statement. Also, a positive attitude dominates to wards its presence in practice.

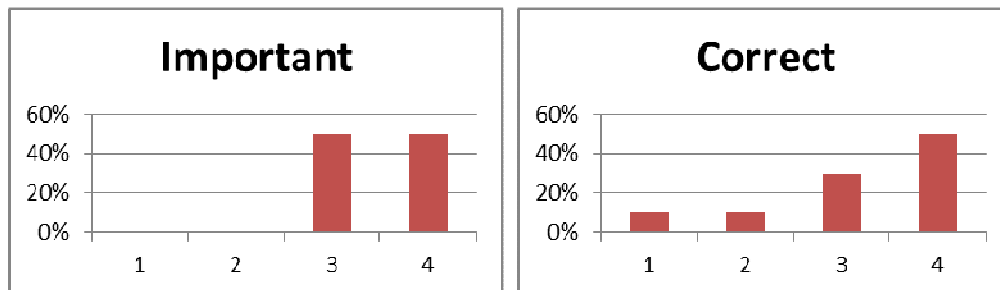


Figure 13. The statement: "Creates conditions for the participation of students in making decision about the organization and life of the school"

On the basis of the following testimony: "Cooperates with parents", the answer "very important" was given by 20 employees (50%) and 14 of them (35%) believe that the claim is "entirely accurate". Also, 20 employees (50%) answered with "important" and 18 (45%) that it is "present to a greater extent". Nobody chose the answers "slightly important" and "unimportant". That it is "present to a lesser extent" and "inaccurate" is considered by 4 employees (10%). After examining the obtained responses, we can give the conclusion that there is a purely positive attitude towards the importance of claim. When it comes to the extent of its presence in practice, there is a positive attitude.

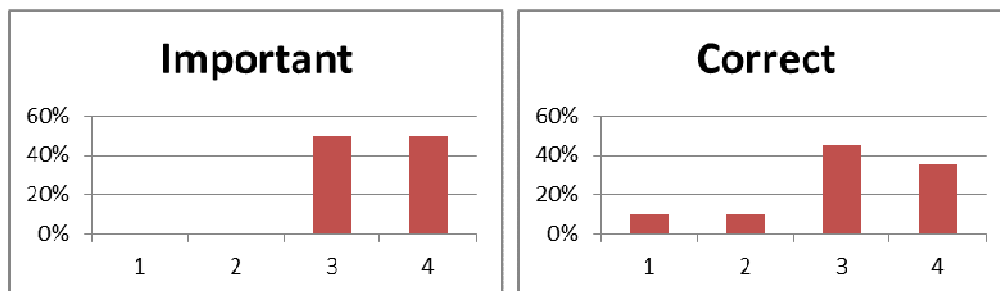


Figure 14. The statement: "Cooperates with parents"

On the basis of the following testimony: "Cooperates with other organizations", 26 employees (65%) responded that it is "very important" and 50% (20 employees) believe that it is "completely true". That statement is "important" and "to a great extent present" answers were given by 14 respondents (by 35%). That the assertion is "present to a lesser extent" is considered by 6 (15%). Nobody chose the answers "slightly important", "unimportant" or "false". Based on the answers, we come to the conclusion about the positive attitude that is present when it comes to the importance of such statement and when it comes to its accuracy, i.e. presence in the practice.

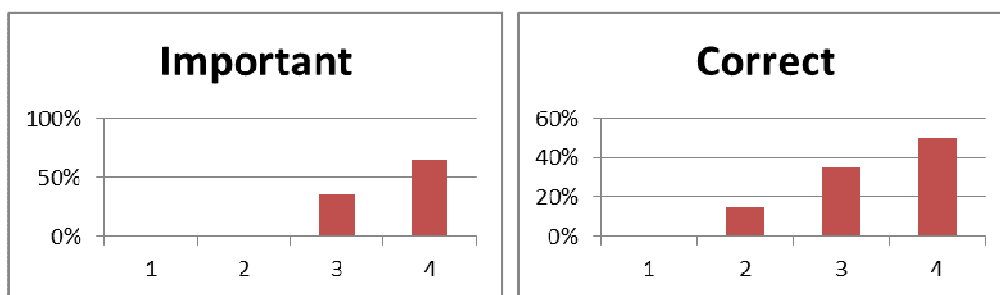


Figure 15. The statement: "Cooperates with other organizations"

On the last statement of the survey "Provides marketing of school", the answer that is "very important" was given by 24 employees (60%) and the answer that is "completely correct" by 14 employees (35%). That statement is "important", the answer was given by 16 respondents (40%) and that it is "to a great extent present" by 12 (30%). No one answered that the claim is "of little importance" and "unimportant". That it is "present to a lesser extent" replied 10 employees (25%) and that it is "incorrect" 4 (10%). By observation and analysis of the received responses, we can only conclude a positive attitude when it comes to the importance of the claim. When we consider its degree of accuracy, we come to the conclusion that a positive attitude about the extent of its presence in practice dominates.

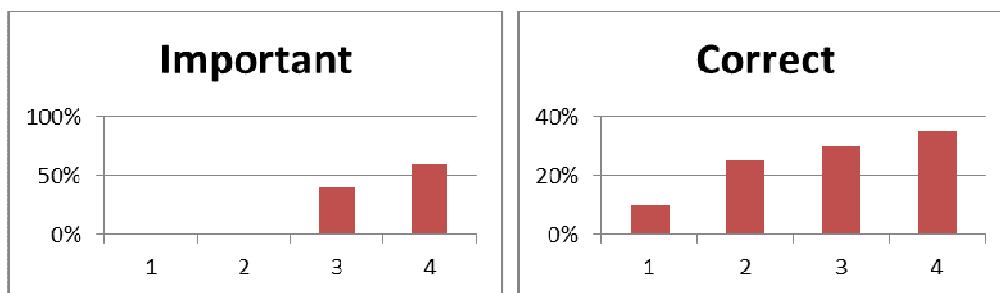


Figure 16. The statement: "Provides marketing of school"

IV CONCLUSION

Self-evaluation of the area "management satisfactory" has enabled to assess the quality of school work on a regular basis, to see what is done so far and what else can be done to achieve even better results. The results of self-evaluation of the area "Professional competence (Q1)" indicate that the school director meets the requirements prescribed by the Law: has a high education degree, a license for teachers and 5 years of work experience. Was not prosecuted and does not have a legal proceeding against him. The head of the school takes regular professional training, attends seminars in classroom teaching as well as in other areas. The results of self-evaluation of the area "Leadership ability (Q2)" suggest that although all employees feel that it is very important that the director with work and behavior serves as an example to school employees, 60% of respondents answered that it was indeed in practice and present. However, the belief that the director improves trust, appreciates different opinions and supports good communication is present in a larger extent (65%), that the director fulfills the requests and takes the responsibilities for making decisions (90%). 65% of employees believes that the director motivates other employees to a professional relationship towards work and 75% of them believe that the director successfully surpasses the conflicts. 85% of them gave a high grade for the director's cooperation with parents and other institutions. They also think that the director is interested in contributing to the school's reputation and affirmation. A large number of employees (80%) think that the director enables the students' participation in making decisions about the organization of a school while 65% claims that the director ensures a good presentation of a school. The results may serve as the start points of an action plan whose aim would be to correct all the faults obtained by the self-evaluation. By correcting those faults, we directly improve the quality of teaching management and, by doing this, we improve the education which was the goal of self-evaluation; by that, the goal of this research is fulfilled.

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PARENTAL ATTITUDES ABOUT THE WORKLOAD OF FIRST GRADE STUDENTS ELEMENTARY SCHOOL HOMEWORK

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Original Research

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Abstract - This paper discusses the results of which were gathered during the questioning of parents' views on the workload of first grade students of elementary school homework. Special attention is given time (quantitative) workload students homework. It has come to the conclusion that the majority of the parents of first grade of primary school is considered that their children time overloaded homework. This question is even 68% of respondents answered in the affirmative. This conclusion can be reached on the basis of data on how many hours on average on weekdays and weekends, children spend doing homework. Also, tabular or graphical data were presented that were obtained on which the course the biggest burden on students; whether parents admonish students to work and whether they help in doing homework; whether students have ongoing obligations outside of school and that; how students spend their free time; whether to help parents with household chores; they have the right to play; whether parents are pleased with the success of their child; do you see signs of weariness among students and whether they have any physical damage caused demand on homework; suggestions of parents on the alleviation of homework.

Keywords: homework, workload, elementary school

I INTRODUCTION

In the theoretical part of this paper we discuss concepts burdens of first grade students of elementary school homework. In the empirical part of the paper presents the research methodology and research information on how to test the parents of first grade students of primary schools in Vrsac see and understand the burden of their children's homework assignments, with an emphasis on the workload of the time. Data are presented on what the test parents think about the burden of their children homework. In the final part of the paper are the conclusions that have been reached starting from the theoretical concepts of student workload and research findings on the attitudes of parents of the burden of their children homework.

II TERM RELIEVE STUDENTS

Of the purpose of the research will be used to load the definition of students from the “Encyclopedia of dictionaries pedagogy” which reads: “Load students - the totality of physical and mental effort students in the classroom, where they are exposed to a certain unit of time”[13].

The problem of load students there are several aspects of [5]:

- 1) the quantitative aspect (ie. time burden expressed in number of hours for compulsory education);
- 2) a problem loading certain types of activities or inability optimal alternation of different types of activities and
- 3) the problem of overloading in terms of the adequacy of intellectual programming content age students.

The focus of this research will be on the quantitative aspect of the burden of students, or the students of the weather load which is stated the number of classes for the school work.

Under the school obligations in this study include:

- 1) mandatory curricular activities,

- 2) mandatory extra-curricular activities (Classroom Meeting, additional work, društvenokorisni work) and
- 3) optional extracurricular activities (additional work, free aktivost).

Under school duties outside the school, ie homework, in this study include:

- 1) homework;
- 2) reading reading material,
- 3) drawing and drafting different items to school,
- 4) collect different materials for teaching,
- 5) visit events, exhibitions and museums and
- 6) other tasks for the school.

III DEFINITION OF HOMEWORK

One of those who dealt with the definition of this term and M. Vilotijević who points out: "Homework is an independent student extracurricular activity"[3].

In Pedagogy 2 in the newsroom P. Šimleša stated: "Domestic work is students' activities arising from the everyday responsibilities of teaching: serve the realization of teaching tasks, but are performed outside the classroom"[15].

In didactics T. Prodanovic and R. Ničković not speak specifically about homework, but about school and homework: "The role of local and school assignments is essentially unique, because both, but in different ways, contribute to the training of students to independently acquire knowledge, acquire skills and habit forming therefore, to coordinate what 'understanding' with what 'know how' and designed to apply their knowledge, skills and habits to the changing situations of life and work, relationships and attitudes" [12].

In *General pedagogy* in the newsroom S. Pataki provides a similar definition: "Domestic work students are an integral part of teaching. They come out of the teaching are re-engage in it at different moments of the teaching process and in different forms" [9].

As already pointed out, common to all definitions of the term domestic work is that they are considered activities that are closely related and determined work on teaching time.

IV TYPES OF HOMEWORK

As various authors meet different division of domestic tasks.

In its didactics T. Prodanovic and R. Ničković point out that in modern teaching applies more kinds of home and school tasks and creative:

1. preparatory,
2. complementary,
3. control,
4. corrective,
5. creative
6. differentiated and
7. optional homework.

V RELIEVE STUDENTS HOMEWORK

Although the workload students fairly old phenomenon (this is discussed already in the period of humanism and intense since the mid-nineteenth century) yet the actuality of the topic sometimes stronger, sometimes weak. Usually the issue of workload is updated during major reform of the educational system, and after these reforms on the workload of students speak a lot less. This means that a very strong burden on students is manifested as an indicator of the crisis of education [16].

At the end of the nineteenth and early twentieth century appeared a large number of studies that deal with this topic, and their authors that their research attention focused on load testing students are:

Thorndyke, Kepelin, Claparede, Bine, Sikorski and others. Those in their studies indicate that adult workday decreased, and that the working day time students and intellectually increased.

A load of our students curriculum and didactic-methodological organization of teaching and learning is very critical (professional competencies in) and correctly write Svetozar Markovic, Radoje Domanovic and Vasa Pelagic. For us, the question of overburdening pupils subject to more intense consideration after the Second World War. Among the first to deal with this issue as far back as 1953 and 1957 A. Banovic and 1954 M. Markovic. In their study Problem of our students' A. Banovic [2] on the basis of theoretical study of world literature and empirical research in our answers to the questions "What afflict our students," "The consequences of weight" and "relief measures" which will be an incentive for further work in this direction, the scientific basis for First school reforms in the country after the Second World War (1958) and essential reading in further study load of primary school students with us.

Of burdening students examined the increasing number of researchers. The research results, compared with D. A. Lerdovim standards burdens students indicate that our students are more burdened by the standards that he established and that "50 to 60% of the time norm" that is Laird predicted for classes and homework, students in certain grades.

VI FACTORS RELIEVE STUDENTS HOMEWORK

As factors burdening students homework assignments are given:

- the volume of material,
- the weight and complexity of teaching material,
- the organization and methods of teaching,
- time load of students to school and extracurricular activities,
- books,
- parents,
- teachers and
- the student himself.

VII CONSEQUENCES IMMODERATE RELIEVE STUDENTS HOMEWORK

Consequences of excessive workload students homework can be classified into several groups:

- educational,
- intellectual,
- educational and social,
- and physical
- emotional.

Every load that exceeds the limit of optimal, adverse effect on the development of the child and his or her health and is one of the main reasons that students in school do not achieve better results [20].

VIII NEED FOR TIME TO RELIEVE STUDENTS FROM HOMEWORK

In alleviation plays a major role, relieving students of oral and written homework because it contributes to the doubling of student's working hours and the transfer of teaching from school to home work. It should be appreciated vacation time students and do not assign them homework then [2].

On Sundays, public holidays and during school holidays do not need to burden the students homework, because it was a time when they can play, socialize or engage in other activities.

IX VIEWS OF CHARGE OF STUDENTS IN THE WORLD

Professor of the University of Pennsylvania Gerald Le Tendre has recently published the results of their ten years of research. He especially paid attention to the fact that homework even in the nineteenth century were used only to the student punished and deprived of free time. In the rating of mathematical literacy TIMSS 2011, the last place is occupied countries in which students spend most of their time in learning at home, doing homework and meeting other school obligations - Algeria, Kuwait and Morocco.

On the other hand, Taiwan, Hong Kong and Japan, students receive on average less homework than their peers in the world [19] But because the "Asian tigers" surpass all other peers on all ratings, with all the knowledge Olympiad bring backpacks full of pupils medal.

In the Netherlands, every fifth student in general not done their homework, and the students of the country occupied 12th place in the rating of mathematical literacy TIMSS 2011, and Russia, whose students of notebooks with homework sitting until the first roosters, 10th in the rating [19].

X RESEARCH METHODOLOGY

The research problem is the time burden on students from the first grade of elementary school homework. Based on the opinion of parents can determine if parents feel that their children are burdened with homework time.

The aim of this study is to determine the level of burdening students from the first grade of elementary school homework.

The aim will be operationalized through the following groups of tasks:

- 1) To determine the daily commitment of a first grade elementary school homework.
- 2) Determine the share of individual subjects that particularly burden the students.
- 3) To determine the level of warning children and helping children by parents in homework.
- 4) Identify the parents about the burden of their children homework.
- 5) Identify signs of fatigue that can occur in the opinion of parents, as well as physical impairments in children.

Research Hypothesis

According to the parents of first grade of primary school, their children are overloaded homework time.

The survey was conducted **descriptive method**, which describes the most common factors burdening students homework, and in the theoretical part and which were interpreted results of the research.

In accordance with the above mentioned method, as a technique of research, in this paper we introduce two techniques: surveys and content analysis. In this paper, as a major element of the study were used **anktetni leaves**.

Determine the level of burdening students with school duties outside of teaching, constituted the appropriate **protocol registration weather calendar students certain types of activities outside the school**.

The instrument used was a **questionnaire for parents of first graders**.

The investigation will cover parents of first grade students of primary schools in total three departments. **The sample** consists of a total of 200 parents. The research will include parents of first grade students of elementary school "Mladost" from Vrsac, "Olga Petrov Radišić" from Vrsac and "The concept of crime" from Vrsac, school 2014/2015. year.

The survey respondents was conducted from 19 to 26 January 2015. Protocols calendar time students in performing school duties outside the school's parents led in the course of one week, and from 19 to 26 January 2015. The survey was carried out in agreement with homeroom teachers who are in classes departmental community disciples shared the questionnaires that they took the parents to fill them out and then returned to homeroom teachers who forward them to me.

Upon the completion of the poll, the data obtained by surveying are classified, after which Executed their processing and calculation of frequencies. This was followed by a qualitative analysis and interpretation, and finally draw conclusions and implications of the results.

XI SURVEY RESULTS

Table 1 shows the average time that children according to their parents' workdays spend studying and doing homework. Data from Table 1 show the important fact that the highest percentage of children spend a day from 2.5 to 3 hours studying and doing homework.

Table 1. The average time a child spends on hallmark studying and doing homework at home

TIME	to ½ hours	½ to 1.5 hours	from 1.5 to 2 hours	2 hours up to 2.5 hours	2.5 to 3 hours	more than 3 hours	I do not know
f	3	4	12	65	97	17	2
%	1,5	2	6	32,2	48,5	8,5	1

According to their parents the highest percentage of students taught regularly at weekends (Saturdays and Sundays) as high as 93%. Table 2 is a table of the average time that a child spends weekends studying and doing homework at home.

Table 2. The average time a child spends weekends (Saturdays and Sundays), teaching and doing homework

TIME	to ½ hours	½ to 1.5 hours	from 1.5 to 2 hours	2 hours to 2.5 hours	2.5 to 3 hours	more than 3 hours	I do not know
f	4	6	40	36	70	42	2
%	2	3	20	17	35	15	1

Use the graph is given the view that teachers cases especially burdening their children.

According to parent their children most burdened by English (51%), followed by Serbian language (32%), Mathematics (12.5%) and the world around us (4.5%). Other cases are cited.

When asked why these items are most pressing, the most common answer is that the material in those subjects most extensive and the most difficult for their children.

Table 3 shows the number of responses of parents to warn you that your child is doing homework. Most said yes, which can be read from the table.

Table 3. Dunning children by their parents to do their homework

ANSWER	YES	NO
f	166	44
%	83	17

Asked whether helping children with homework most parents responded affirmatively.

Table 4. Help children with homework

ОДГОВОР	ДА	НЕ
f	144	56
%	72	28

Graph 1 presents the parents about the burden of their children homework.

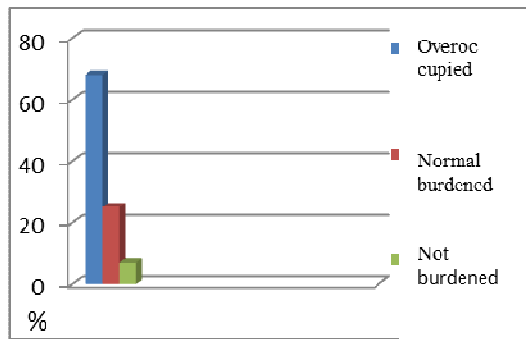


Chart 1 shows the parents of the burden of their children's homework.

From this chart it can be concluded that the majority of parents felt that students are too burdened with domestic tasks.

The table shows the parents whether their child has enough free time.

Table 5. Do children have enough free time

RESPONSE	YES	NO
f	70	130
%	35	65

According to the responses of parents, students spend their free time watching cartoons, playing outside with friends / girlfriends, siblings and playing games on the computer.

When asked whether their children have ongoing obligations outside of school, 42% of parents said yes, and 58% negatively. Those who responded affirmatively stated the following ongoing obligations to their children:

Table 6. Permanent obligations outside of school

RESPONSES	Foreign language	Music school	Ballet	Sport Society	Team Scouts
f	44	44	24	72	16
%	22	22	12	36	8

On the question of whether children help their parents with housework, 32% of parents said yes, and 68% negatively. Those who responded affirmatively stated that their child spends on average following time doing housework:

Table 7. Average time to help with household chores

TIME	to ½ hour	½ to 1.5 hours	from 1.5 to 2 hours	2 hours to 2.5 hours	2.5 to 3 hours	more than 3 hours	I do not know
F	26	84	40	26	18	4	2
%	13	42	20	13	9	2	1

Table 8. Other free time children spent on children's reading newspapers, listening to radio and watching TV.

TIME	about 1 hour	about 2 hours	about 3 hours	about 4 hours and more
f	24	56	76	24
%	12	28	38	12

On the question of whether the game is children of this age need 95% of parents said yes, while only 5% negative.

Graph 2 shows how many hours sleep children average daily.

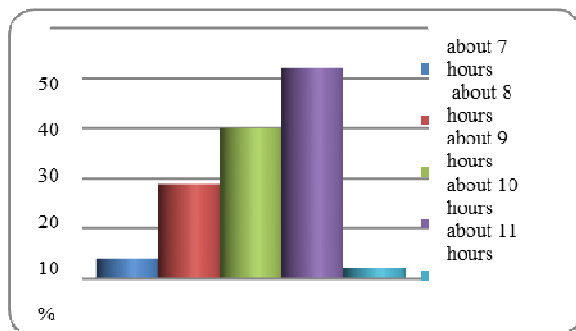


Table 9. Signs of fatigue in children

ANSWERS	Never	Tricks	Often
f	8	116	76
%	4	58	38

When asked whether their children have some body damage, answered positively and 56% cited at least one physical disability (and more):

Table 10. Physical damage in children

Answers	curvature of the spine	Visual impairment	Anemia	Heart disease
f	104	66	12	18
%	52	33	6	9

Asked whether he had once talked with a professor of classroom instruction, ie.the teacher / refer your child about the problem of burdening your child's homework, 82% responded negatively and only 18% positive that's not good.This means that teachers and parents do not cooperate enough.

Suggestions decreasing

Parents are most often cited the following suggestions decreasing:

- reduce the volume of material and
- more learning in school.

X CONSLUSION

Based on the results, it can be concluded parents of students in largely separated overloading of teaching content as a factor of time overloading pupils homework, so we can say that the hypothesis is correct.

The load of homework students must be studied as part of a wider social responsibility with the involvement of all stakeholders.

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E-LEARNING INTEGRATION- CORRELATION SYSTEM IN TEACHING SERBIAN LANGUAGE AND LITERATURE

UDC: 37.018.43:004.738.5:[811.163.41
Original Research

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Abstract – Among other, information technology (r)evolution, as well as correlation and integration of sciences influenced on literature teaching. In this paper possibilities of correlation-integration system application that may be realized through e-learning are stressed. It was created teaching material with the sunflower as a motive, which has correlate status that connects two arts: literature and painting. In synergy with information technologies, the teaching model, that may become more available to the pupils and enable the learning that is not conditioned by the place or time, was proposed. At the same time the model with this structure may be used for similar artistic contents, and on the other hand it may be stimulus for independent research work of pupils.

Key words: e-learning, teaching material for Serbian language and literature, interdisciplinary sciences

I. INTRODUCTION

Among other, literature teaching involves questions that determine literature as creative activity, as art. It is usual that literature definitions appoint at its means of expression that differ literature from other arts. In those terms, the literature is defined as an art whose basic mean of expression is word. In teaching, this problem may be seen concerning modern correlation-integration system that enables observing literature work in wider artistic paradigm. Having this in mind, it may be said that teaching procedure of connecting different arts is challenging and productive, firstly by separation of convenient theme and motive, which are different in their means of expression.

Functional permeating of teaching areas in the subject Serbian language and literature, as well as this subject and other arts, represents program requirement and at the same time it is a requirement of modern methodic. The goal of correlation-integration system is perception of phenomena explored from perspective of different teaching areas, subjects and pedagogical-educational areas. In that way it is gathered by complex and versatile manner. Interconnection between teaching contents may be accomplished at different levels, and, e.g. different types of correlation may be noted. [1] By using this system in teaching, the need for interdisciplinarity, by connecting different sciences and getting out of traditional tightness of a particular teaching subject is fulfilled. In that way the need for integration of different subjects and knowledge areas necessary to the pupil to perceive the world holistically is imposed. [2]

Correlation-integration system has research character and like that it may be realized on the classic way (by working in the classroom or seminar library), but also by modern ways of e-learning. This way of learning is consequence of booming development of information technologies and its application in education. By using this way of learning we may leave the traditional teaching frame and make learning independent from time and space. Today, this way of learning is connected with different ways of education by using internet. Most schools in the world have organized e-learning study programs, and in our country this way of learning is realized as additional service as support to pupils' and students' learning process, by uploading textual materials mostly on the internet.

For this way of gaining knowledge it is necessary to have structured learning, training, etc. material that is distributed by internet, as educational software on CD-s, or similar. This way of learning is in accordance with modern methodic approach in teaching because it enables better individualization of teaching and better availability of teaching materials, as well as the possibility of interactivity. In this case, technology appears as intermediary in relations between teacher and pupil. The concept of e-learning and the system of programmed learning have many common characteristics, which may be considered as certain advantage to the classical way of learning:

- Pupils learn independently at the place and time as they want;
- Pupils learn at they own pace, and they can go through the study material as many time as they want;
- It is possible to chose own learning model (active or passive) and level of interaction: as classical written material by making own notes, interactive simulation, discussion with other pupils (e-mail, teleconferencing), more multimedia – graphics, animation, sound, etc;
- Practical work with different technologies – information about the teaching subject is not the only one available, but the additional knowledge and skills about using different technologies;
- Independent learning and interaction – teacher can also learn from pupils who independently seek for information sources. [3]

However, application of information technology in teaching should not be the only goal. IT in teaching may have real purpose if it may be used for phenomena specificities stressing that are dealt by pupils and teachers in learning-teaching process.

Information technologies enable teacher to prepare for teaching more precisely. On the other hand, the teacher is in a position to encourage pupils to do research work and to study as well, by valid and well prepared tasks he may guide them to seek and to get particular information, to understand, explain, report, discuss and debate about this information. Especially, it is important that the teacher encourages pupils to do information networking in coherent entity, and then use adopted knowledge creatively in specific workspaces.

By meaningful usage of advantages that IT application in teaching brings, teaching process becomes more dynamic and interesting, without unnecessary verbosity in teaching. Pupils adopt new information more easily and have an active role in knowledge adoption, because this way of teaching develops attention and arouses interest, and enables pupils to remember learned materials longer.

Significantly important segment of IT application in modern teaching makes a wide field of possibilities to connect related subjects' areas. Namely, possibilities of sophisticated methodic work will appoint teachers in related subjects' areas at teaching materials that may be correlated and in that way harmonized, both, during planning and preparing of teaching and during immediate work with pupils. [4]

This paper will show how elements of correlation-integration methodic system, with implementation of information technologies, at the example of two subjects – literature and painting art – may be applied. Moreover, it will be shown how the same motive may be achieved in different arts, by different means of expression, with the aim to discover its symbolic meaning and message. In this case motive of sunflower is chosen.

II. THE MODEL

For clarification of abovementioned problem it is possible to start with a problem situation and asking a question such as: does a photograph with motive of sunflower in a vase or field of sunflowers represent a piece of art (Figure 1.)? Pupils, as participants in conversation, should use the strength of their arguments to confirm their own or reject opposite opinion. Namely, the real purpose of raising problem questions and tasks is in provoking pupils in expressing an opinion about particular part and its elements and confronting opinions, where everybody should stand for its own point of view and experience of piece. The pupil explains its own experience by giving answers to the questions that teacher or other pupil asks. During that discussion a pupil understands which attitudes should correct or instead of them to except other opinion as more convenient and argument. This type of task may be presented in social network which will enable

more participants to include in discussion. It may start by asking a question and afterwards grow under influence of given opinions and comments of network users.



Figure 1. Sunflowers

Acceptable arguments are in the form of following statements, while subjective opinion may not be accepted as full argument, but only as a starting point of view:

- In the first place photographs have documentation role;
- Photographs arise by camera;
- Photography is making a picture by using the light;
- Photographs may be copied and every copy has the same value as the original;
- Photograph may have great influence on people and public opinion;
- Photograph represents individual way of reality interpretation by the photographer.





As synthesis of mentioned attitudes there is one more explanation for complex relation between photography and poetic image: poetic image differs from photography because it is a personal experience and not mechanical copy of life and world, it contains only distinct essentially details as opposed to all particulars, it is alive and dynamic and extracts only the deepest and the most important. Piece of art is condensed picture of life which gathers personal experience of an artist with deep objective meaning of life. In the following symbolic of sunflowers at Van Gogh pictures will be reviled.

In August of 1888 Vincent Van Gogh started to paint series of paintings – *Sunflowers in a vase*. Those paintings symbolize lifecycle that is evoked by different tones of sunflower color – from fullness of life through transience to hint of death its self. “In that case he mostly used variation of blue and yellow colors that partly go into orange. Yellow and blue, broth to the extreme, have the role that blue and gold had in Byzantine art. But, while those colors in Byzantine art have unchanging, abstract value, in Van Gogh paintings they are concrete symbols of Earth, sky and sun, and even more symbols of inner rhythms.” [5]

As an aspect of preparatory research task pupils may be referred to the virtual visit of Van Gogh museum in Amsterdam (Holland) at official museum site (<http://www.vangoghmuseum.nl/en>). In that case they may learn more about life of Vincent Van Gogh and his pictorial work, to see his sunflowers in museum gallery, but also to actively use their knowledge of English.

Further, there is a preview of particular paintings from *Sunflowers* cycle (Table 1.) and their explanation that may be given in shape of information or questions, which will enable to the pupil to, based on color and element of composition, discover its symbolic meaning.

TABLE 1. PAINTINGS FROM *SUNFLOWERS* CYCLE

<p style="text-align: center;"><i>Three sunflowers in a vase</i></p> 	<p>Model 1. Three sunflowers in a vase, shiny green color, with turquoise background at brown basis, associate at earth and harmonically symbolize beauty of life. Only some wither leaves appoint at fragility and necessity of decadence.</p> <p>Model 2. How painter succeeded to have harmonious atmosphere at the painting <i>Three sunflowers in a vase</i>? By whose painting acts he symbolize beauty of life? By which picture elements hint about fragility and necessity of decadence?</p>
<p style="text-align: center;"><i>Twelve sunflowers in a vase</i></p> 	<p>Model 1. Shiny and worm colors of sunflowers represent vital sun power. Shading from pale yellow to cinnabar ocher symbolizes fullness of life. Critics describe this painting as a symphony in yellow.</p> <p>Model 2. How the idea about fullness of life is realized at the <i>Twelve sunflowers in a vase</i> painting? Does number twelve have some symbolic meaning? Why critics describe this painting as symphony in yellow? What kind is the symbolism of yellow color?</p>
<p style="text-align: center;"><i>Fourteenth sunflowers in a vase</i></p> 	<p>Model 1. The painting shows sunflowers in different phases of its decadence. Some flowers are open and live and other are despair as human heads. The painting symbolizes circle of life from birth to death.</p> <p>Model 2. By which shades, shift of moods and emotional coloration of painting <i>Fourteenth sunflowers in a vase</i> comparing to previous paintings of sunflowers is achieved? What revile flowers position in a vase?</p>
<p style="text-align: center;"><i>A vase with fifteen sunflowers</i></p> 	<p>Model 1. There are shades of brown and yellow interlacing in the painting, which at the same time cause association about life and dying.</p> <p>Model 2. What association cause interlacing of shades of brown and yellow at the painting <i>A vase with fifteen sunflowers</i>?</p>

Further, artistic beauty in the poem *Sunflowers* from Jovan Dučić will be reviled, and the beginning will be the basic principle of contrast at which the entire poem structure is based, and the idea and poem message goes from it. Dominant principle of contrasts permeates structure of entire poem and it achieves itself at different plans and by different means.

Pupils may independently revile elements by which this contrast in the poem is achieved. Considering that this principle is at structured and preliminary plan of the poem, this task requires theoretical knowledge. However, the fact that poem interpretation is based on individual experience that may be different from person to person may not be neglected.

In that way pupils confront opinion and gave argument for their problem solution at social network. After discussion, teacher may offer solution to the problem as a feedback. This step may be used as encouragement to further discussion about the subject.

TABLE 2. *SUNFLOWERS* FROM JOVAN DUČIĆ

<p style="text-align: center;"><i>U tužnom oku suncokreta, što nemo prati neba bludnje,</i></p>	<p>Contrast is in the first strophe among basic motives in the poem (sunflower and sky), and then in poetic atmosphere that poetic pictures</p>
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<i>tu su sve žeđi ovog sveta, sva nespokojstva i sve žudnje.</i>	create (<i>sad and silent eye of a sunflower and fiction of a sky</i>), and afterwards in poetic and symbolic content that fulfilling “sunflower eye” (<i>all the thirst, all the discomposure and all the last of this world</i>) directed to the sky content.
<i>Šume u strahu svom od mraka: „Bog je pomalo sve što zari; I svetlosti je jedna zraka Mera i cena sviju stvari!”</i>	Afterwards, the opposition deepens by making relation between darkness and light, feelings and meaning, which brings pictures of darkness and pictures of light; the same principle rules at the plan of making connection between poetic pictures: audio and visual (forests in their own fear from darkness); At symbolic plan of triads the God – lightness – life looks like it compares with Christian triune principle, in poet seeking for meaning and source of life.
<i>„Sve je što živi na dnu tmine S prokletstvom nemim na svet palo – Sve što ne gleda u visine, I nije jednom zasjalo!...”</i>	Although there are contrast interlacing in the poem and based on spacious relations (bottom and height) and light effects (darkness and glow), established relation has unique function: to explain basic thought of the poet: a last for unreachable and the sense and source of life (in some pictures this idea is more explicit).
<i>S istoka kralji, obučeni U teško zlato, stoje plačni; I žreci sunca, naspram seni Prosjrački vape u čas mračni.</i>	The unique picture of sunflower (<i>s istoka kralji, žreci sunca – prosjački vape</i>) in which disturbing lyrics dominate, also lays at contrast painting of <i>kraljeva koji prosjački vape</i> .
<i>Te tužne oči suncokreta U mom su srcu otvorene – Ali su sunca nakraj sveta, I tiho slaze mrak i sene Pomreće noćas širom vrti, Dvoredi sjajnih suncokreta, Ali će biti u toj smrti Sva žarka sunca ovog sveta.</i>	Have the sad eyes of a sunflower found the sanctuary and meaning in a poets’ heart – do they finally find suns in it, which are at the end of the world, it does not matter. Because the principle of the light and the sun over the darkness and shadows wins, as well as the principle of renewal and life will concur the principle of death, without denying its inevitability.

The next step may be defined as a problem question and be a cause for thinking and idea exchange at social network. Namely, the pupil should, at organization plan of the rhyme, discover metric parameters by which the basic idea in Dučić poem Sunflower is confirmed. The feedback should follow independent problem solving.

Feedback information:

By constant length of verses and almost narrative intonation the poet confirms the main idea in the poem. Arraying nine sibilates verses in the six four-verses strophe poem it is disturbed in the third strophe by combining nine sibilates with longer ten sibilates and shorter eight sibilates verse (9/10/9/8).

The final step is based on synthesis that may represent the individual act of a pupil, but it may be guided by teachers’ suggestions, which should encourage the pupil to critical thinking. This activity can be realized at class as discussion which can be initiated by following sentences. The peace of art must have certain symbolic dimension, some message of universal, modern and general character, regardless on the way of expression, or mean of expression. In selected examples from different arts (painting and poetry) it is possible to make analogy that confirms the uniqueness of artistic idea and message, regardless to the mean of idea shaping. In that way the next analogies can be set:

- At formal plan – the series of paintings and cycle of poems;
- At content plan – unique subject and key motives;
- At symbolic plane – the motive symbolic (in the poem Sunflowers that belongs to the *Večernje pesme* cycle the motive of sunflower has the symbolic dimension, which represents seek for inevitable heights and spaces (sky), as well as for ideals and light motive as source of life).

Explanation of pieces of art may be finished with a problem question: why sunflower was chosen for symbolization of these ideas. At this question the answer could be that its title contains the basic connection with the sun – how the sun goes over the sky, and the flowering head of the sunflower follows it, which lit by the sunlight, shines like a gold. When the sun sets, the sunflower looks down to the ground.

The night is the time when the sunflower rests, the lack of light, the lack of life. In that way the key opposition connection: life – death is created on symbolic plan.

Speaking about symbolic dimension in general, there is a question referring relation of a piece of art and objective reality. This problem is contained within term of artistic truth. Moreover, in [6] it is stated that “literature is part of everyday life and like that it speaks about the same thing as every human effort for contemplating reality. The only difference is that literature piece of art about life explains as art and art only, in the manner of the shaping world of arts especially”.

III. CONCLUSION

Methodical approach to teaching material which is based on modern methodical systems such as correlation-integration system with elements of problem teaching, realized by IT elements, demands detailed preparation of a teacher including appropriate subject for this type of methodical modeling. Also, it includes exploring of reliable and well informed e-sources for their research work, as well as special structuring of teaching material in accordance with e-media. Concerning interdisciplinary approach to selected subject, team work is required and it includes teachers with different educational experience. This mostly enables reliability of learning material and creative creating of teaching material.

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