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Survey of Collective Intelligence as Interdisciplinary Phenomenon

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Abstract

While people have been talking about collective intelligence for decades, new communication technologies, particularly Web 2.0, allow now for huge numbers of people to work together in new ways. The great success of systems like Google and Wikipedia suggest that it is now the right time for their further development. The aim of this study was to determine which form of collective Web intelligence was used by young people through Web 2.0 applications. The sample (N=103) in this study comprised young people aged 20 to 30. The Evaluation scale of use of Web 2.0 applications was applied in this research. The results showed that young people use collective intelligence based on collaboration through Web 2.0 applications. Presenting the analysis of applications that are most frequently used, the paper suggests possible ways to use Web 2.0 in social learning in order to obtain the best effect in different types of environment.

Key words: *social learning; Web 2.0; youth.*

Introduction

Collective intelligence can be defined as the ability of groups to find a solution to a problem, in a better and faster way than a single member (Singh, 2011). It is a form of intelligence that emerges as a result of cooperation among more individuals. This phenomenon has recently attracted attention of scientific community, but the concept is neither new nor associated solely with the human species (Woolley et al., 2010). Nowadays this concept is undergoing dramatic changes and is acquiring quite new forms as an attempt to try to understand collective intelligence at a level where it becomes an interdisciplinary phenomenon which may be the object of interest of psychology, economics and computer science.

There are numerous terms which overlap with the term *collective intelligence* or which are closely associated with its meaning and the framework - *the wisdom of*

the crowd as the broadest term, *computer-supported collaboration, social networks, collaborative software* and *Web 2.0* as the concept that is most closely associated with the term *collective intelligence* (Singh, 2011).

Collective intelligence can be viewed as a group problem-solving and decision-making process as well. Both interpretations imply certain limitations of the term *collective intelligence* (Heylighen, 1999). When we talk about using collective intelligence to solve problems, it certainly meets the restrictions of verbal and nonverbal communication. Communication is often unclear (misinterpretation of the original message), sometimes too loud and always dependent on the context and issues. Even when the participants in the communication process understand each other well, there are always suggested solutions that are never put into practice. Another problem in the successful usage of collective intelligence in solving problems arises from the natural human need for power games. In fact, everyone wants to be in the position of the smartest and most important person in the group, and any different opinions given by others are rejected. So, any power game and any competition can lead to a situation where only one person is heard and listened to. Other, less important group members remain unnoticed no matter how good their proposals may be. The solution to such dominance of one member in the group may be a division of the group into several smaller groups. In this way, simultaneous communication (parallel discussions with the same goal) replaces the existing sequential communication in the group. However, a new problem that arises from this kind of usage of collective intelligence is coordination (Masumi & Tovey, 2008). In the process of solving the problem, small groups must be in direct contact, because it is important that everyone knows who does what in order to use all the solutions obtained in discussions. The result is a large amount of information the reception, processing and transmission of which are affected by the constraints of communication channels and individual cognitive systems. One of the efficient solutions of transmission, storage and processing of information lies in communication technologies – first of all, the web provides unlimited space for storage of information intended for and available to millions of people and, secondly, any information found on the web is virtually instantly available to others (Heylighen, 1999).

People's basic life goal is to survive and create better conditions for life which presupposes constant decision-making, which is easiest to achieve within the group. Our physiological (brain) and psychological organization, unfortunately, is not in accordance with the modern age consisting of constant bustle and mutual competition (Bonabeau, 2009). In this modern age we are looking for short and accurate answers, exploring potential opportunities. Owing to new technology, organizations have more information about consumers, employees and competition, which facilitates their understanding of the environment. However, an individual cannot make any decisions in this situation - a lot of information is processed, all the options are identified and checked, then a decision is made and an individual acts on it. To

solve this problem, organizations form small groups of people who are engaged in the process of solving individual problems – for example, a team of people deals with the needs of consumers, while some other team deals with the needs of employees. With the help of Web 2.0 applications, organizations can now, better than ever before, understand their collective, and the concepts such as *problem solving*, *research opportunities* and *understanding* have a different meaning (Bonabeau, 2009). In organizations, the decision-making process consists of two parts: a solution which includes definition of the problem and listing of a number of assumptions as possible solutions, and then evaluation of assumptions that emerged in the first step of the process. Collective intelligence can moderate potential negative effects of this process. Whether the goal is finding solutions or evaluating options, each organization uses three possible ways of achieving the goal, where different Web 2.0 applications have an important role - the expansion, additional gathering of information and team self-organization (Bonabeau, 2009). Expansion, as a way of achieving the goal, means involving people outside the team into the decision-making process. Additional gathering of information means the gathering of information provided by people within and outside the team and then evaluation of the "opinion of the majority" which can significantly help in decision-making process. The third way of achieving the goal of the organization, self-organization, includes the possibility of interaction among team members and extra value arising from working together. When we talk about using the collective intelligence in decision-making in an organization, we face certain limits (McAfee, 2010) - (a) a lack of control, which can lead to making bad collective decisions, to unpredictability arising from decisions that organizations are not ready, to undistributed responsibility when no one knows who is responsible for the decision that has been made; (b) diversity versus expertise - every organization has to balance the diversity and expertise in making collective decisions, and emphasis placed on one or the other will not help if the participants themselves are not interested in making the right decisions; (c) the motivation of people (inside or outside the organization) to participate in the decision-making process in the organization - the organization must provide a constant arrival of new participants in the full vigor and enthusiasm for the job, and (d) the adoption of common rules of behavior in the group, which is very important for the improvement of team work.

Over the last few years the web has experienced a transformation known as Web 2.0, which is one of the fundamental principles of promoting collective intelligence and providing rich experience to users (Malone, Laubacher & Dellarocas, 2010). Some of the web 2.0 examples (applications) are Wikipedia, YouTube, blogs, RSS, Digg, Facebook, Flicker, Forum and so on. Wikis are the sites which allow users to make their own contributions by editing their content. The best known wiki is Wikipedia, an online encyclopedia which now has over 3.5 million articles in English only (Wikipedia: About). YouTube is a collection of videos uploaded by users and that makes it priceless. An additional value is the opportunity for improvement of

an individual or a series of recordings from the same user on the basis of comments and advice from other users. The blog is a kind of free electronic magazine. Blogs are usually written in a personal, dialog style, which allows users to comment on them and join the discussion. Using RSS technology, users can subscribe to the blog. Digg gives every user the opportunity to vote on the importance, usefulness and other characteristics of the content which is on the web. Flicker is an application for online photo sharing and editing. The primary goals of this application are to help people make photographs available to those who are interested in them and offer new ways to organize them. Flicker can be used free of charge and allows users to begin sharing photographs among themselves immediately. Facebook is a social networking site where people can connect and engage in mutual interactions. People who join the social network must first create a personal profile, and only then can get in touch with friends and other people who are also users of the same network. The forum is an application designed for public written discussion about specific issues. Each note in a discussion remains permanently posted on the Internet. This is a typical example of web sites whose content is fully created by users themselves, and this form of virtual socialization became popular by giving the users opportunity to choose whether they wish to participate in discussions anonymously or using their real name.

The *collective web intelligence* has resulted from the Web 2.0 concept and it has two forms, depending on the source of information it draws upon - based on the content and based on cooperation (Alag, 2009). Collective intelligence based on the content uses information contained in the content of the site. The content can include text, images, videos, blogs, and messages. Collective intelligence based on collaboration uses information obtained in the monitoring and measurement of user interaction and some applications. Sometimes a user profile itself creates a valuable source of information, i.e. the content of a specific topic that is examined by most individuals within specific age groups and the same content can be recommended to other users of the same age.

In order to encourage the usage of collective intelligence on the web, the presence of the following elements is necessary - mutual interaction among users and their interaction with the application, the collection of everything that users give and the usage of the collected information to recommend the relevant content and provide personal customer service (Singh, 2011).

The object of our study is to bring closer the term *collective intelligence* to people engaged in the field of education and business, and shed light on the importance and different ways of usage and understanding of how and why this phenomenon occurs. There is, of course, a limitation because we do not respond to the question of how and to what extent the collective intelligence may be useful. Therefore, our objective is to understand collective intelligence, but not to explain it. Web 2.0 is one of the best ways to use collective intelligence and this survey is an attempt to show its strength in the various possibilities of exploiting the optimum values of collective intelligence.

The paper is aimed to determine which form of collective web intelligence (based on the content or collaboration) is used by young people through Web 2.0 applications.

Method

The aim of this research is to determine which form of collective web intelligence is used by young people through Web 2.0 applications.

The randomized sample (N=103) in this study consisted of students of both sexes, aged 20-33, studying at two universities and two research programs. The study was conducted using the questionnaire as a research method, in which Web 2.0 was examined by the indicators of computer, information and communication aspects. The questionnaire consisted of 23 questions, and was specially created for this research. The survey was conducted from May to July 2011 at the Faculty of Economics and Engineering Management in Novi Sad and the Faculty of Management in Sport in Belgrade. The collected data was analyzed using the SPSS software package.

There are several limitations of this study. First of all, the sample is small and this could reflect upon its representativeness. Secondly, the instrument requires self-assessment and this could reflect upon the respondents' honesty. Furthermore, this all could also reflect upon the generalizability of the results.

Results

Table 1 presents the results of usage of some of the Web 2.0 applications by young people based on personal assessment, on a scale from 1 (always) to 5 (never) relating to the usage of certain applications.

The results show that most young people use various Web 2.0 applications. The most popular one is YouTube (96.1% of users), followed by the social network Facebook with 75.7% users, Wikipedia with 62.1% users, a blog used by 60.2% of young people and, finally, forums where 43.7% of young people are participating in discussions on different topics. Flicker and Digg are the least used applications among the respondents – only about 24% of young people use them.

Among the existing social networks we selected the Forum (Figure 1) and Facebook (Figure 2) and asked the respondents to explain the reasons for taking part in them.

More than 14% of students do not participate in any Forum. 33.3% of the respondents said they participate in the discussion on Forum when they know a lot about the topic in order to help other people. About 26% of them want to learn more about the specific topic in discussions taking place on the Forum. An assumption that people who take part in the real discussion find it easier to express their opinions in virtual discussions was confirmed by 22.2% of the respondents. Another reason (1%) for participation in the Forums is the fact that if anyone disagrees with your opinion, no one would know the real identity of that person. About 3% of the respondents also said that it is easier to join a discussion on the Forum when nobody looks at them in the eyes.

Table 1

The results of the usage of some of the Web 2.0 applications

Web 2.0 application	Scale	Frequency	Percentage
Wikipedia	Yes	64	62.1
	No	39	37.9
Wikipedia – designing of content	Yes	25	24.3
	No	78	75.7
Blog	Yes	62	60.2
	No	41	39.8
Facebook	1	48	46.6
	2	16	15.5
	3	14	13.6
	4	2	1.9
	5	23	22.3
Youtube	1	78	75.7
	2	12	11.7
	3	9	8.7
	4	-	-
	5	4	3.9
Flicker and Digg	1	2	1.9
	2	4	3.9
	3	19	18.4
	4	18	17.5
	5	60	58.3
Forum – participation	1	8	7.8
	2	6	5.8
	3	31	30.1
	4	11	10.7
	5	47	45.6
Forum – management	Yes	15	14.6
	No	88	85.4

More than 18% (18.54%) of students do not use Facebook. As far as the reasons for using the Facebook are concerned, an equal number of respondents (12%) specified the possibility of choice who they will communicate with and the desire to meet new

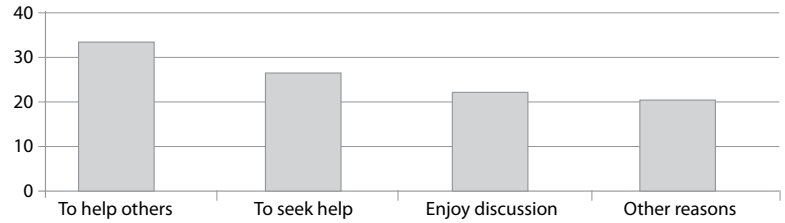

Figure 1. Reasons for participation in discussions on Forum

people. About 10% of the respondents found the following to be very important: the choice when to communicate, an ease of making contacts on Facebook and the fact that things progress faster than in reality.

Almost 6% of the respondents use Facebook to stay in contact with people who live in other towns or countries. About 3% of students use Facebook because they find it easier to communicate without looking the other person in the eyes. A very small number of respondents (1%) said they use Facebook only when they are bored, they use it because it is free, and sometimes they use it instead of mobile phones, as a reminder of other peoples' birthdays.

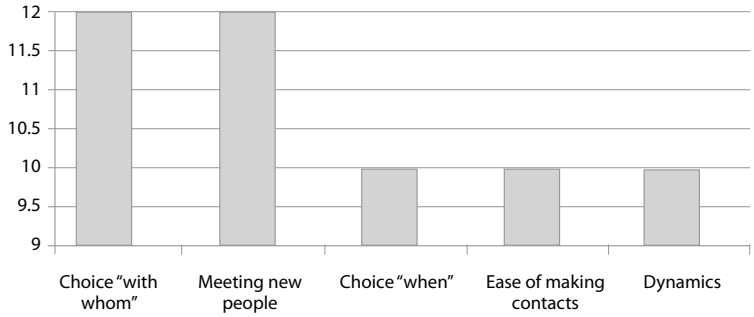

Figure 2. Students' reasons for using Facebook

Discussion and Conclusion

The research was conducted with the aim to determine which form of collective web intelligence is used by young people through Web 2.0 applications.

To encourage the usage of collective intelligence on the web the following elements must be present - mutual interaction among the users and their interaction with the application, the collection of everything that users give, and the usage of the collected information to recommend the relevant content and provide personal customer service (Singh, 2010). Web 2.0 applications include all of these elements.

The results showed that YouTube is the most popular Web 2.0 application with young people aged 20 to 30 - 96.1% of young people use this application. YouTube is a very simple Web 2.0 application for using videos by clicking one button. The main advantage of YouTube compared to other similar applications is the availability of content. The user has the ability to view only one part of the video which he/she wants to see, whether it is at the beginning, the middle or at the very end of the recording. Using YouTube includes the use of collective web intelligence based on collaboration. Moreover, YouTube offers users the ability to put together and share their videos, but also to evaluate the application itself by providing comments on the videos.

Facebook is used by 75.7% of the respondents. Facebook is a social network that brings together a large number of people in one place. Within this social network small groups with the same interests can be created, and in some way groups can convey their interest to people outside the group and thus increase the number of users. Since

the group formed on Facebook is aimed to solve a problem or work on a project, with the possibility of improving the discussion of ideas and suggestions, it could be concluded that Facebook uses collective web intelligence based on collaboration.

The respondents use both Wikipedia (62.1%) and blog (60.2%). Wikipedia is a platform which means that anyone can add and edit information at any time. A blog is usually the work of individuals who add new articles to the blog whenever they want, and it often deals only with one particular topic. An article on the blog is an opinion of the author and may (but not necessary) provide the ability for other users to comment on this article. A Wikipedia article, on the other hand, is the result of cooperation among a number of people who edit certain content, which can also (but not necessary) provide an opportunity for discussion.

Blog usually deals with a subject about which one person writes and others can share their opinions on the subject, while the Forum application allows discussion among a large number of people on various topics that they edit.

Having analyzed the most popular Web 2.0 applications with young people, we can conclude that most young people use collective web intelligence based on collaboration, which can have various implications on collective web intelligence in practice. The success of Web 2.0 applications with young people shows that the productive environment based on autonomous individual activity has a greater potential for participation on a larger scale and for a longer time (Heylighen, 1999). These applications provide individual freedom and a choice to interact with resources and projects without any particular authority to guide individual behavior or attention. Response to individual freedom is the trigger of desire and pleasure to participate in the group (Measuring collective intelligence).

Web 2.0 can be considered a revolutionary new way of creation, collaboration, editing and sharing of varied content online. Web 2.0, as a new form of collective intelligence already has significant economic, social, political and other consequences, and its effects will be more transparent in the future (O'Leary, 2008). Most of the respondents use applications where they can interact with other people, where there is a possibility of cooperation in solving common problems resulting in innovative, creative and useful ideas. Results show that most respondents use Wikipedia (62.1%), but a significantly lower number of them (25%) are involved in editing pages themselves. Also, the respondents are happy to engage in discussions on various topics at the Forum, and only a small number (14.6%) decide to create their own threads and engage in further discussion on the Forum. This shows that two largest and most important functions of Web 2.0 for young people are information and opportunity to participate in the discussion.

When we place collective intelligence and Web 2.0 within these two functions, we come up with the concept of social learning. While the traditional view of learning (acquiring knowledge) as an individual activity is directed towards the content itself (Soleša & Soleša-Grijak, 2011), social learning involves learning as a social event

where knowledge is created by those who learn. The integration of Web 2.0 in the process of social learning makes learning easier and accessible to any educational and business environment. Learning is initiated by one person in the role of the moderator who explains to participants the structure of the expected learning process in terms of its mission and goals. While the participants reveal specific problems and then explore, evaluate, select, collect and rank by priority all materials that could be used for the creation of knowledge for problem solving, they also make their own material in a textual or audio-visual form. All participants in the process of knowledge creation share their own materials with each other and learn from each other by making contribution to the solution of concrete problems (Blees & Rittberger, 2009). When we talk about educational environment, different Web 2.0 applications have different roles - Wikipedia is the major research tool, Facebook and Twitter are used for communication, Google and Wiki are best used for interaction and collaboration of participants in the learning process, and YouTube is the major educational video channel (Diaz, 2009). In a business environment, Wiki is most frequently used to improve collaboration among employees. The most effective marketing tool is a blog, while RSS facilitates communication among participants (Bollier, 2007).

The conclusion of this paper is that YouTube, Facebook, Wikipedia, blogs and forums can seem very simple on the surface, but beyond that superficial simplicity there is a complex internal mechanism which uses collective intelligence. A group can still operate more intelligently than individual members, utilizing full individual intelligence of all participants in the decision-making and problem-solving processes, as well as in the process of knowledge acquisition. Perhaps the best metaphor for the web as the biggest platform of knowledge would be "the global brain", which was defined by Heyligen and Bollen (1996). There are various applications of collective web intelligence, of which only some have been explained in this paper. Further research may be directed towards testing different methods of using collective web intelligence in practice in different social, political and educational spheres as well as in the development of every segment of society.

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Istraživanje kolektivne inteligencije kao interdisciplinarnog fenomena

Sažetak

Dok ljudi već desetljećima govore o kolektivnoj inteligenciji, nove komunikacijske tehnologije, pogotovo Web 2.0 alati, sada već golemom broju korisnika omogućuju suradnički rad na mnoge načine. Velik uspjeh sustava poput Google-a i Wikipedije upućuje na činjenicu da je sada došao pravi trenutak za njihovo daljnje unapređenje. Cilj ovoga istraživanja bio je odrediti koje oblike kolektivne web-inteligencije koriste mladi primjenom Web 2.0 alata. Uzorak (N=103) u ovom istraživanju činili su mladi u dobi od 20 do 30 godina. U istraživanju je primijenjena Skala za procjenu korištenja Web 2.0 alata. Rezultati su pokazali da mladi upotrebljavaju kolektivnu inteligenciju koja se temelji na suradnji putem Web 2.0 aplikacija. Prikazom analize aplikacija koje se najčešće koriste, ovaj rad daje prijedloge mogućih načina upotrebe Web 2.0 alata u društvenom učenju kako bi se ostvario najbolji učinak u različitim vrstama okoline.

Ključne riječi: *društveno učenje; mladi; Web 2.0.*

Uvod

Kolektivnu inteligenciju možemo definirati kao sposobnost skupine da pronađe rješenje nekog problema, na brži i bolji način nego što bi to učinio svaki član pojedinačno (Singh, 2011). Kolektivna inteligencija je oblik inteligencije koji se javlja kao rezultat suradnje između više pojedinaca. Taj fenomen u posljednje vrijeme privlači pažnju znanstvene zajednice, no taj pojam sam po sebi niti je nov niti je vezan isključivo uz ljudsku vrstu (Woolley i sur., 2010). U današnje vrijeme termin *kolektivna inteligencija* prolazi kroz dramatične promjene i poprima potpuno nove oblike kao pokušaj da se kolektivna inteligencija pokuša shvatiti na razini na kojoj ona postaje interdisciplinarni fenomen kojim se bave psihologija, ekonomija i računalna znanost.

Postoje brojni termini koji se isprepleću s terminom *kolektivna inteligencija* ili koji su tijesno povezani s njegovim značenjem i okvirom – *mudrost mnoštva* kao najopćenitiji termin, *suradnja uz pomoć računala*, *društvene mreže*, *suradnički softver* i Web 2.0 kao pojam koji je najuže povezan s pojmom *kolektivna inteligencija* (Singh, 2011).

Kolektivnu inteligenciju možemo promatrati i kao grupno rješavanje problema i kao grupno donošenje odluka. Obje interpretacije impliciraju određena ograničenja termina *kolektivna inteligencija* (Heylighen, 1999). Kada govorimo o korištenju kolektivne inteligencije pri rješavanju problema, tada zasigurno nailazimo na ograničenja verbalne i neverbalne komunikacije. Komunikacija je često nejasna (pogrešno tumačenje originalne poruke), ponekad preglasna, a uvijek ovisi o kontekstu i temama. Čak i kada sudionici u komunikacijskom procesu jedni druge dobro razumiju, uvijek postoje moguća rješenja koja se u praksi nikada ne koriste. Drugi problem uspješne primjene kolektivne inteligencije u rješavanju problema javlja se zbog ljudske potrebe za igrama moći. Naime, svatko želi biti u ulozi najpametnije i najvažnije osobe u grupi, te se odbacuje svako drugačije mišljenje koje iznesu ostali članovi grupe. Stoga svaka igra moći i konkurencija mogu dovesti do situacije u kojoj se sluša i čuje samo jednu osobu. Ostali, manje važni članovi grupe, ostaju neprimijećeni, bez obzira na to koliko su njihovi prijedlozi dobri. Rješenje za takvu dominaciju pojedinca nad cijelom grupom može biti podjela grupe u nekoliko manjih grupa. Na taj način simultana komunikacija (paralelne diskusije s istim ciljem) može zamijeniti postojeću serijsku komunikaciju unutar grupe. Međutim, novi problem koji se javlja zbog takve upotrebe kolektivne inteligencije jest koordinacija (Masumi i Tovey, 2008). Tijekom procesa rješavanja problema male grupe moraju biti u izravnom kontaktu, jer je važno da svatko zna što je čiji zadatak, kako bi se iskoristila sva rješenja proizašla iz diskusija. Rezultat je velika količina informacija na čije primanje, obradu i prijenos utječu ograničenja komunikacijskih kanala i kognitivni sustav pojedinaca. Jedno od učinkovitih rješenja prijenosa, pohrane i obrade informacija može se naći u komunikacijskim tehnologijama – internetska mreža ponajprije pruža neograničen prostor za pohranu informacija namijenjenih i dostupnih milijunima ljudi, a bilo koja informacija koja se pronađe na internetu praktički je odmah dostupna svima (Heylighen, 1999).

Glavni životni cilj svih ljudi je preživjeti i stvoriti bolje životne uvjete, a to podrazumijeva trajno donošenje odluka koje je najlakše postići unutar grupe. Naša fiziološka (mozak) i psihološka organizacija, nažalost, nije u skladu s modernim dobom koje se sastoji od stalne užurbanosti i međusobne konkurencije (Bonabeau, 2009). U ovom modernom dobu tražimo kratke i precizne odgovore, istražujući izgledne mogućnosti. Zahvaljujući novoj tehnologiji, organizacije raspolažu većim brojem informacija o potrošačima, zaposlenicima i konkurenciji, što olakšava njihovo razumijevanje okoline. Međutim, pojedinac ne može donositi odluke u takvoj situaciji – obrađuje se mnogo informacija, mogućnosti se utvrđuju i procjenjuju, a tada se donosi odluka na temelju koje pojedinac djeluje. Da bi se taj problem riješio, organizacije stvaraju manje grupe ljudi koji su zaduženi za proces rješavanja pojedinačnih problema – na primjer, jedan tim ljudi bavi se potrebama potrošača, drugi potrebama zaposlenika. Uz pomoć Web 2.0 aplikacija organizacije sada mogu, bolje nego ikada prije, razumjeti svoj kolektiv, a pojmovi kao što su *rješavanje problema*,

mogućnosti istraživanja i *razumijevanje* imaju drugačije značenje (Bonabeau, 2009). U organizacijama se proces donošenja odluka sastoji od dva dijela: od rješenja, koje uključuje definiciju problema i niz brojnih pretpostavki kao mogućih rješenja, i od procjenjivanja pretpostavki koje su se javila u prvom dijelu procesa. Kolektivna inteligencija može ublažiti moguće negativne učinke tog procesa. Bez obzira na to je li cilj pronaći rješenja ili procijeniti mogućnosti, svaka organizacija koristi tri moguća načina postizanja ciljeva, u kojima različite Web 2.0 aplikacije imaju važnu ulogu – proširenje, dodatno prikupljanje informacija i samoorganizacija tima (Bonabeau, 2009). Proširenje, kao način postizanja cilja, podrazumijeva uključivanje ljudi izvan tima u postupak donošenja odluka. Dodatno prikupljanje informacija znači prikupljanje informacija koje pružaju ljudi unutar i izvan tima, a tada slijedi procjenjivanje „mišljenja većine" koje uvelike može pomoći u postupku donošenja odluka. Treći način na koji organizacija može postići svoj cilj, samoorganizacija, podrazumijeva mogućnost interakcije između pripadnika tima i dodatnu vrijednost koja se javlja zbog suradništva. Kada govorimo o upotrebi kolektivne inteligencije u procesu donošenja odluka u nekoj organizaciji, suočavamo se i s nekim ograničenjima (McAfee, 2010) – (a) nepostojanjem kontrole, što može dovesti do loših kolektivnih odluka, do nepredvidivosti koje se javljaju zbog odluka da su organizacije nespremne, kao i do neraspodijeljene odgovornosti u slučaju kada nitko ne zna tko je odgovoran za odluku koja je donesena; (b) raznolikošću nasuprot stručnosti – svaka organizacija mora podjednako zastupiti i raznolikost i stručnost pri donošenju kolektivnih odluka, a naglasak na jednom ili drugom neće biti od koristi ako sami sudionici nisu zainteresirani za donošenje ispravnih odluka; (c) motivacijom ljudi (unutar ili izvan organizacije) za sudjelovanje u procesu donošenja odluka u organizaciji – organizacija mora omogućiti stalan dotok novih sudionika u punoj snazi i s velikim entuzijazmom za posao; (d) prihvaćanjem nekih općih pravila ponašanja u grupi, što je jako bitno za poboljšanje timskog rada.

Tijekom proteklih nekoliko godina internet je prošao kroz transformaciju koja je poznata kao Web 2.0, što je jedan od temeljnih principa promicanja kolektivne inteligencije i pružanja bogatog iskustva korisnicima (Malone, Laubacher i Dellarocas, 2010). Neki od primjera (aplikacija) Web 2.0 su Wikipedija, YouTube, blogovi, RSS, Digg, Facebook, Flicker, forumi itd. Wiki je internetska stranica koja korisnicima omogućuje davanje vlastitog doprinosa uređivanjem sadržaja stranice. Najbolji primjer Wiki stranice je Wikipedija, internetska enciklopedija, koja sada sadrži više od 3,5 milijuna članaka napisanih samo na engleskom jeziku (Wikipedia:About). YouTube je svojevrsna zbirka videosnimki koje su objavili korisnici, što ga čini neprocjenjivim. Njegova dodatna važnost jest u tome što YouTube pruža mogućnost poboljšanja pojedinačnih ili serijskih snimki istog korisnika na temelju komentara i savjeta koje daju ostali korisnici. Blog je vrsta besplatnog elektroničkog časopisa. Blogovi su obično napisani osobnim stilom u obliku dijaloga, što korisnicima omogućuje da ih komentiraju i uključe se u rasprave. Korisnici se mogu pretplatiti na blog koristeći

se RSS tehnologijom. Digg svakom korisniku pruža mogućnost glasanja o važnosti, korisnosti i drugim karakteristikama sadržaja koji je na internetu. Flicker je aplikacija za dijeljenje i uređivanje fotografija na internetu. Bitni ciljevi te aplikacije su pomoći ljudima kako bi fotografije učinili dostupnima onima kojima su zanimljive, kao i ponuditi nove načine organiziranja tih fotografija. Flicker se može koristiti besplatno, a omogućuje vam trenutno dijeljenje fotografija s korisnicima. Facebook je društvena mreža koja pomaže ljudima da se povežu i sudjeluju u međusobnim interakcijama. Ljudi koji se žele uključiti u društvene mreže najprije moraju izraditi svoj osobni profil, pa tek tada mogu stupiti u kontakt s prijateljima i drugim ljudima koji su također korisnici iste društvene mreže. Forum je aplikacija o određenim temama namijenjena javnim raspravama. Svaka objava u raspravi ostaje trajno zapisana na internetu. To je tipičan primjer internetskih stranica čiji sadržaj u potpunosti kreiraju sami korisnici, a taj je oblik virtualnog druženja postao popularan zbog toga što je korisnicima pružio priliku da odaberu žele li u raspravama sudjelovati anonimno ili koristeći se svojim pravim imenom.

Kolektivna inteligencija na internetu rezultat je Web 2.0 alata, a ima dva oblika, ovisno o izvoru informacija na koji se oslanja, tj. ovisno o tome je li izvor informacija sadržaj ili suradnja (Alag, 2009). Kolektivna inteligencija utemeljena na sadržaju koristi se informacijama koje se nalaze u sadržaju internetske stranice. Sadržaj može uključivati tekst, slike, video snimke, blogove i poruke. Kolektivna inteligencija utemeljena na suradnji koristi se informacijama dobivenim nadziranjem i mjerenjem količine interakcije među korisnicima i nekim aplikacijama. Ponekad i sam profil korisnika pruža dragocjen izvor informacija, tj. sadržaj određene teme koji pretražuje većina pojedinaca unutar određenih dobnih skupina, a isti se sadržaj može preporučiti drugim korisnicima iste dobi.

Da bi se poticala upotreba kolektivne inteligencije na internetu, neophodni su sljedeći elementi: međusobna interakcija među korisnicima i njihova interakcija s aplikacijom, prikupljanje svega što korisnici daju, upotreba prikupljenih informacija da bi se preporučio važan sadržaj i korisnicima pružile osobne usluge (Singh, 2011).

Predmet našeg istraživanja je približiti termin *kolektivna inteligencija* ljudima koji rade u području obrazovanja i biznisa, kao i naglasiti važnost i različite načine upotrebe i shvaćanja o tome kako i zašto se taj fenomen javlja. Naravno, postoje ograničenja jer ne odgovaramo na pitanje kako i u kojoj je mjeri kolektivna inteligencija korisna. Stoga je naš cilj razumjeti kolektivnu inteligenciju, a ne objasniti je. Web 2.0 je jedan od najboljih načina korištenja kolektivne inteligencije, pa je ovo istraživanje pokušaj prikazivanja njezine važnosti u različitim načinima iskorištavanja optimalnih vrijednosti kolektivne inteligencije.

Ovim radom pokušalo se utvrditi kojim se oblikom kolektivne internetske inteligencije (koji se temelji na sadržaju ili na suradnji) koriste mladi ljudi putem Web 2.0 aplikacija.

Metode

Cilj ovog istraživanja je odrediti kojim se oblikom kolektivne inteligencije na internetu koriste mladi ljudi putem Web 2.0 aplikacija.

Nasumičan uzorak (N=103) u ovom istraživanju sastojao se od studenata oba spola u dobi od 20 do 33 godine, koji su studirali na dva sveučilišta i dva istraživačka smjera. Istraživanje je provedeno korištenjem upitnika kao metode istraživanja, u kojem je Web 2.0 ispitan pokazateljima računalnih, informacijskih i komunikacijskih aspekata. Upitnik se sastojao od 23 pitanja i izrađen je posebno za ovo istraživanje. Istraživanje je provođeno od svibnja do srpnja 2011. godine na Fakultetu za ekonomiju i inženjerski menadžment u Novom Sadu i na Fakultetu menadžmenta u sportu u Beogradu. Prikupljeni podaci analizirani su uz pomoć programskog paketa SPSS.

U istraživanju postoji nekoliko ograničenja. Uzorak je malen i to bi se moglo odraziti na njegovu reprezentativnost. Instrument zahtijeva samoprocjenu, a to bi se moglo odraziti na iskrenost ispitanika u odgovorima. Sve navedeno moglo bi se također odraziti i na generalizaciju rezultata.

Rezultati

Tablica 1 prikazuje rezultate upotrebe nekih Web 2.0 aplikacija kod mladih, na temelju osobne procjene o upotrebi određenih aplikacija na skali od 1 (uvijek) do 5 (nikada).

Tablica 1.

Rezultati pokazuju da se većina mladih koristi različitim Web 2.0 aplikacijama. Najpopularnija je aplikacija YouTube (96,1% korisnika), a odmah zatim slijedi društvena mreža Facebook sa 75,7% korisnika, Wikipedija sa 62,1 % korisnika, blog sa 60,2% mladih korisnika, a na kraju forumi na kojima 43,7% mladih sudjeluje u raspravama o različitim temama. Flicker i Digg su aplikacije koje mladi ispitanici najrjeđe upotrebljavaju – njih oko 24%.

Među postojećim društvenim mrežama odabrali smo Forum (Slika 1) i Facebook (Slika 2), te zatražili od ispitanika da objasne razloge njihova korištenja.

Više od 14% studenata ne sudjeluje u raspravama ni na jednom forumu. 33,3% ispitanika reklo je da sudjeluju u raspravama na forumu kada znaju puno toga o nekoj temi, da bi pomogli drugim ljudima. Oko 26% njih želi naučiti više o određenoj temi u raspravama koje se odvijaju na forumu. Pretpostavku da je ljudima koji sudjeluju u stvarnim raspravama lakše izraziti svoje mišljenje u virtualnim raspravama potvrdilo je kao točnu 22,2% ispitanika. Još jedan razlog (1%) za sudjelovanje u forumima je činjenica da ako se netko ne složi s nečijim mišljenjem, nitko neće znati stvarni identitet te osobe. Oko 3% ispitanika je također reklo da im je puno lakše uključiti se u rasprave na forumu kada ih nitko ne gleda u oči.

Slika 1.

Više od 18% (18,54%) studenata ne služi se Facebookom. Jednak broj ispitanika (12%) izdvojio je kao razog služenja mogućnost izbora s kim će komunicirati i želju za upoznavanjem novih ljudi. Oko 10% ispitanika sljedeće razloge smatra bitnima: izbor kada će komunicirati, lakoću uspostavljanja kontakta na Facebooku i činjenicu da se na Facebooku stvari odvijaju brže nego u stvarnosti.

Gotovo 6% ispitanika koristi se Facebookom da bi ostali u kontaktu s ljudima koji žive u drugim gradovima ili državama. Oko 3% studenata koristi se Facebookom jer im je lakše komunicirati bez gledanja druge osobe u oči. Jako malen broj ispitanika (1%) je rekao da se služe Facebookom samo kada im je dosadno, zato što je besplatan, da se ponekad njime služe umjesto mobitelom, kao i da im služi kao podsjetnik na nečiji rođendan.

Slika 2.

Rasprava i zaključak

Istraživanje je provedeno da bi se utvrdilo kojim se oblicima kolektivne inteligencije na internetu mladi ljudi koriste putem Web 2.0 aplikacije.

Da bi se poticala upotreba kolektivne inteligencije na internetu, moraju postojati sljedeći elementi: međusobna interakcija između korisnika i njihova interakcija s aplikacijom, prikupljanje svega što korisnici daju, upotreba kolektivnih informacija da bi se preporučio važan sadržaj i pružile osobne usluge korisnicima (Singh, 2010). Web 2.0 aplikacije uključuju sve te elemente.

Rezultati su pokazali da je među mladima u dobi od 20 do 30 godina YouTube najpopularnija Web 2.0 aplikacija – njome se koristi njih 96,1%. YouTube je vrlo jednostavna Web 2.0 aplikacija za korištenje videosnimaka pritiskom na samo jednu tipku. Glavna prednost YouTube-a, u usporedbi s ostalim sličnim aplikacijama, jest dostupnost sadržaja. Korisnik ima mogućnost gledati samo jedan dio videosnimke, tj. onaj koji želi vidjeti, bez obzira na to je li to početak, sredina ili kraj snimke. Korištenje YouTube-a podrazumijeva korištenje kolektivne inteligencije koja se temelji na suradnji. Štoviše, YouTube korisnicima nudi mogućnost sastavljanja i dijeljenja videosnimki, kao i mogućnost procjene same aplikacije tako što mogu davati svoje komentare o snimkama.

Facebookom se koristi 75% ispitanika. Facebook je društvena mreža koja na jednom mjestu povezuje velik broj ljudi. U sklopu te društvene grupe mogu se stvarati manje grupe ljudi s istim interesima. Grupe na neki način mogu prenijeti svoje interese ljudima izvan svoje grupe i tako povećati broj korisnika. Kako grupa koja je stvorena na Facebooku ima kao cilj riješiti problem ili raditi na nekom projektu, s mogućnošću unapređivanja rasprave o idejama i prijedlozima, moglo bi se zaključiti da se Facebook na internetu koristi kolektivnom inteligencijom koja se temelji na suradnji.

Ispitanici se podjednako koriste i Wikipedijom (62,1%) i blogom (60,2%). Wikipedija je platforma, što znači da bilo tko može dodavati i uređivati informacije u bilo kojem trenutku. Blog je obično rad pojedinaca koji na njega dodaju nove članke kada god

žele, a često se bavi samo jednom određenom temom. Članak na blogu je mišljenje autora i može (ali ne mora) pružati mogućnost drugim korisnicima da ga komentiraju. Međutim, članak na Wikipediji je rezultat suradnje većeg broja ljudi koji uređuju određeni sadržaj, što također može (ali ne mora) otvoriti mogućnost za raspravu.

Blog se obično bavi temom o kojoj jedna osoba piše, a drugi mogu podijeliti svoje mišljenje o toj temi. Forum omogućuje raspravu između velikog broja ljudi, i to o različitim temama koje oni mogu uređivati.

Nakon što smo analizirali najpopularnije Web 2.0 aplikacije među mladima, možemo zaključiti da se većina njih koristi kolektivnom inteligencijom na internetu, koja se temelji na suradnji, što može imati raznolike učinke na kolektivnu inteligenciju u praksi. Uspjeh Web 2.0 aplikacija kod mladih upućuje na to da produktivna okolina koja se temelji na autonomnoj aktivnosti pojedinca ima velik potencijal za sudjelovanje u većim razmjerima i na dulje vrijeme (Heylighen, 1999). Te aplikacije pojedincu omogućuju slobodu i izbor interakcije s resursima i projektima bez nekakvog posebnog autoriteta koji bi upravljao ponašanjem ili pažnjom pojedinca. Odgovor na slobodu pojedinca potiče želju za sudjelovanje u radu grupe i zadovoljstvo (Measuring collective intelligence).

Web 2.0 može se smatrati novim, revolucionarnim načinom stvaranja, suradnje, uređivanja i dijeljenja raznolikog sadržaja na internetu. Web 2.0, kao novi oblik kolektivne inteligencije, već ima znatne ekonomske, društvene, političke i druge posljedice, a njegov utjecaj će u budućnosti biti i transparentniji (O'Leary, 2008). Većina ispitanika koristi se aplikacijama putem kojih mogu biti u interakciji s drugim ljudima, pri čemu postoji mogućnost za suradnju pri rješavanju zajedničkih problema, čime se stvaraju inovativne, kreativne i korisne ideje. Rezultati pokazuju da većina ispitanika koristi Wikipediju (62,1%), no znatno manji broj (25%) sudjeluje u uređivanju stranica. Također, ispitanici se rado uključuju u rasprave o različitim temama na forumima, a samo mali broj njih (14,6%) odlučuje se na otvaranje svojih vlastitih tema i daljnje sudjelovanje u raspravama o njima. To pokazuje da su, što se tiče mladih, dvije najveće i najvažnije funkcije Web 2.0 informacije i mogućnost sudjelovanja u raspravama.

Kada kolektivnu inteligenciju i Web 2.0 smjestimo unutar tih dviju funkcija, dolazimo do pojma *društveno učenje*. Dok je tradicionalno shvaćanje učenja (usvajanje znanja) kao aktivnosti pojedinca usmjereno samom sadržaju (Soleša i Soleša-Grijak, 2011), društveno učenje ima pogled na učenje kao društveni događaj u kojem se znanje stvara od onih koji uče. Uključivanje Web 2.0 aplikacija u proces društvenog učenja olakšava učenje i čini ga dostupnim bilo kojem obrazovnom ili poslovnom okruženju. Učenje inicira jedna osoba koja ima ulogu *moderatora* koji sudionicima objašnjava strukturu očekivanog procesa učenja, tj. njegove misije i ciljeva. Osim što sudionici otkrivaju određene probleme, a tada istražuju, procjenjuju, prikupljaju i slažu po važnosti sve materijale koji bi se mogli iskoristiti za stvaranje znanja o rješavanju problema, oni također izrađuju svoje vlastite materijale u tekstualnom ili

audiovizualnom obliku. Svi sudionici u procesu stvaranja znanja međusobno dijele svoje materijale i uče jedni od drugih dajući svoj doprinos rješavanju konkretnih problema (Blees i Rittberger, 2009). Kada govorimo o obrazovnom okruženju, različite Web 2.0 aplikacije imaju različite uloge – Wikipedija je glavni alat za pretraživanje, Facebook i Twitter se koriste za komunikaciju, Google i Wiki se najbolje koriste za interakciju i suradnju sudionika u procesu učenja, a YouTube je glavni obrazovni videokanal (Diaz, 2009). U poslovnom okruženju najčešće se koristi Wiki da bi se poboljšala suradnja među zaposlenicima. Najučinkovitiji marketinški alat je blog, a RSS olakšava komunikaciju između sudionika (Bollier, 2007).

Zaključak ovog rada je da se YouTube, Facebook, Wikipedija, blogovi i forumi mogu površinski činiti vrlo jednostavnima, no iza te površinske jednostavnosti postoji složeni unutarnji mehanizam koji se koristi kolektivnom inteligencijom. Grupa još uvijek može raditi na inteligentniji način nego što to mogu pojedinačni članovi, koristeći se punom osobnom inteligencijom svih sudionika u procesima donošenja odluka i rješavanja problema, kao i u procesu usvajanja znanja. Možda bi najbolja metafora za internet kao najveću platformu znanja bila *mozak svijeta*, kako su ga definirali Heyligen i Bollen (1996). Postoje različite primjene kolektivne inteligencije na internetu, a u ovom radu su pojašnjene samo neke od njih. Daljnja istraživanja mogla bi se usredotočiti na testiranje različitih metoda korištenja kolektivne inteligencije u praksi u različitim društvenim, političkim i obrazovnim sferama, kao i u razvoju svakog segmenta društva.