Experience of integrating web 2.0 technologies

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Experience of integrating web 2.0 technologies

Katerina Zdravkova · Mirjana Ivanović · Zoran Putnik

Abstract Web users in the 21st century are no longer only passive consumers. On a contrary, they are active contributors willing to obtain, share and evolve information. In this paper we report our experience regarding the implementation of Web 2.0 concept in several Computer Ethics related courses jointly conducted at two Universities. These courses have been delivered to undergraduate and graduate students. The paper addresses main deficiencies of traditional E-learning noticed in earlier years and offers an alternative approach based on social media and collaborative creation of joint contents. Each Web 2.0 feature directly implemented in our courses is presented in details. Particular attention is paid to workload, student feedback and to observed benefits and disadvantages.

Keywords Social networks · Collaborative content creation · E-learning · Publishing technologies

Introduction

Recent report (Eurostat Report 2010) indicates that "the share of households with broadband Internet access has doubled since 2006" to reach 65% "regular Internet users" in 2010, considering regular those who use the Internet at home at least once per week. Eurostat estimated that even 90% of high educated according to ISCED (2011), indicating first or second stage of tertiary education, as well as young people from 16 to 24 years are such users.

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Much broader study is prepared by Miniwatts Marketing Group, better known as Internet World Stats. Latest research estimates that Internet penetration worldwide will soon approach 30%, predominantly in Northern America (77.4%), Australia (61.3%) and in Europe (58.4%) (World Internet Stats 2010). Statistics once again confirm the slogan "If it (N.B. someone or something) doesn't exist on the Internet, it doesn't exist.", as said in (Goldsmith 2005), or slightly paraphrased "If you are not in Google, you don't exist", as in (Mans 2010).

Controversial for implementing different privacy violating flows, thus sometimes considered as a spyware (Web Page Rank 2010), Alexa daily publishes highly reliable Internet traffic rankings (Alexa 2011). In the last 3 months, the leaders are Google, Facebook and YouTube visited by 48.43, 39.43, and 23.81% of all Internet users, respectively. Wikipedia is also among top 10 with 14.38% attendance. If the time spent during a visit indicates site popularity, then the winner is Facebook with 32 min, followed by Google with 13 min, and Wikipedia with 5 min.

Internet search and information retrieval have been predominant since early 1990s. Undoubtedly, the greatest phenomena of this age are social networking, followed by self-broadcasting and collaborative content creation. Nowadays, it is important to be online, i.e. "If you are not online, you don't exist." as claimed in (Snell 2009). The most obvious reason to switch to new slogan is the social nature of human beings and their need to be socially allied. These two facts have significantly affected traditional WWW (nowadays Web 1.0), giving an opportunity to highly dynamic and interactive application of Web 2.0.

Thanks to new trends ordinary people nowadays constantly participate, mutually communicate and collaborate says O'Reilly (2005). Web 2.0 is no longer a privilege of those who have an access to their own host. Blogging, tagging, and self-broadcasting together with search engine optimisation, and syndication, all associated through so called "social media" as stated in Kaplan and Haenlein (2010) become standard activities of all Web enthusiasts, and they are nowadays a daily routine of hundreds of millions says Owyang (2010). It is very probable that forthcoming Web 3.0, which includes semantic Web and tagging as Lassila and Hendler (2007) noted, will soon become equally popular, particularly for those who use the Web for more serious purposes.

As mentioned in the opening paragraph of this paper, the most frequent Internet users are high educated who tend to extend their education and younger people, who are acquiring higher education. On the other hand, Alexa (2011) reveals that Facebook's "audience tends to be users who browse from school". To be honest, educationalists are aware of this fact. Some of them have probably posed the question: could education benefit from this social media? The answer is affirmative in our opinion.

The unification of E-learning and social networking representing Web 2.0 is E-learning 2.0. In parallel with 1.0 to 3.0 transformation of the Web, E-learning has been strongly affected by "new ways of thinking about E-learning inspired by the emergence of Web 2.0" as said by Downes (2005). As a consequence, many universities nowadays deploy educational social software. It has become obvious that social software, on one hand enhances particular aspects of teaching and learning, while on the other it significantly contributes to the creation of new forms of these activities. It is no longer important to give students an access to their study packs, assignments and assessment, but also to allow them to actively collaborate on a social networking basis says Reynard (2008) and Zdravkova et al. (2009). On one hand, this is a natural evolution of learning, but also, it is a shift from one traditional way of living to another.

To conclude, users in the 21st century are no longer only passive consumers. On the contrary, they are active contributors willing to obtain, share and evolve information. The

era of traditional Web (nowadays denoted as Web 1.0) has finished. Web 2.0 comprises all forms of social, communication, information sharing and corporative tendencies.

The rest of this paper is organized as follows. Section 2 presents recently reported educational projects using Web 2.0 technologies. Section 3 addresses the courses, the activities, and their settings in the E–learning environment at two universities in two countries. Mutual interaction, collaboration and social networking are presented and thoroughly illustrated in Sect. 4. New approach needs an extraordinary effort of both, the students and the teachers. Therefore, particular attention is paid to the quantity of activities to complete them. Although, very demanding, student results, together with their encouraging feedback show that students learn more and more, and at the same time, complain less and less. Concluding part presents the advantages and disadvantages of integrating new technologies in all the courses, together with the intentions of further implementation of additional Web 2.0 components.

Related work

The explanation and interpretation of impact of Web 2.0 in education presented in the introduction of this paper is fairly free versus several other authors. For example, Stepa-nyan et al. (2007), inspired by Web 2.0 "guru" O'Reilly's (2005) article, suggests that Web 2.0 "promotes the growth of service-based applications and greater user-control over content and connection". They notice that people's interest in "social spaces shows that people are willing to collaborate, work and spend time engaging with Web 2.0 technol-ogies" and assert that "educational interests may also benefit from adapting teaching environments to exploit the social process and network benefits provided by Web 2.0".

After examining numerous examples of the implementation of blogs, ePortfolios and educational social software in the academic community, in the recently published paper (Zdravkova et al. 2009), we found out that "recent developments in web-based services and the enhancement of collaborative tools have fuelled the demand for similarly-specified educational software and services."

Many Learning Management Systems (LMS) support different Web 2.0 functionalities. An exhaustive and comprehensive comparative analysis of commercial LMS has recently been published (Learning Management Systems 2011). It covers more than 30 LMS. There are also several open-source LMS, as stated by Sampson (2009). Unfortunately, it seems that there are few reports and analyses to appropriately validate the level of their utilization by tutors and students. But there are some publications bringing more or less optimistic results Ivanović et al. (2009).

Research team from Brunel University, Stepanyan et al. (2007b) examined the inte-gration of social software in undergraduate education. They observed student access and use of educational tools as well as anonymous recording of student experiences of using other social software in a non-educational context. The three-month period of observation of this software usage demonstrates much less activity for social software than for the more conventional VLE.

More complex view of educational activities is given by Itamar et al. (2008). Authors proposed, used and evaluated three-dimensional approach or model representing three E-learning related aspects: teaching methodology, communication and content-delivery. They concluded that increasing the level of interaction between students was a motivating factor for students, and teams' achievements were most likely to be higher than those achieved by individual work. The usage of social tools (instant messaging, forums and

chats), allowed students to share capabilities and knowledge, bringing the synergetic effect to learning and life as well.

Bernsteiner et al. (2008) present the results of an empirical survey in order to highlight the benefits of the Web-based social software tools from the student's point of view, where collaboration of students was, in most cases, required to perform the assigned tasks. Students' experience of using social tools in learning clearly showed that wikis and discussion forums could generously support learning and collaboration (Wee and Abrizah 2011).

One additional note should be made here—while most of the research papers, and experience reports present positive attitudes and opinions about social networks in general, like Franklin and Van Harmelen (2007), and their usage within E-learning (Alexander 2006), there are some negative positions too. For example, in Iadecola and Piave (2008), very negative opinion has been reported about the usage of social networking aspects in the class. Miler (2008) reports the following opinions of students, about usage of social networks within Moodle: "We don't want to use Moodle like a social network, we already have the tools for that and we prefer to do that outside of school hours"; "We don't want to communicate with teachers in these spaces, we don't want them to know too much about us", or "The tools we use (Facebook and MySpace) have features that allow us to choose our audience (friends) and our own privacy levels". Fortunately there were students, who were highly motivated and were creating the content and adding them to the wikis, reports Bendel (2006).

Presented papers and results of appropriate surveys show that the motivation among students depended on different subjective and objective elements and circumstances. As a motivation is on different levels, lecturers should at least try to examine Web 2.0 elements during lessons. Our experience is very encouraging. It guides us to persist in motivating students to use new technological achievements in their learning activities.
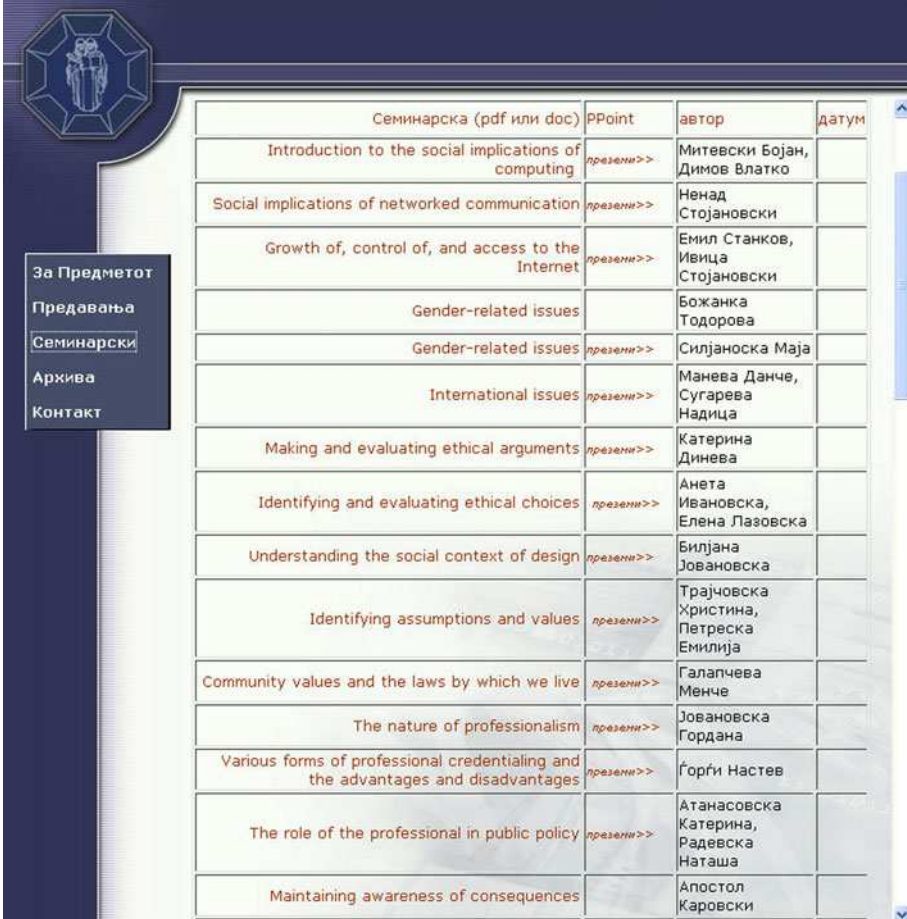
E-learning environments

Since 2002, several Computer Ethics courses have been delivered to undergraduate students from the Institute A and the Department B. Both institutions have created own static Web sites used as repositories for teaching and training resources. At the outset of the course, few students attended the courses, and most student essays were either individual or prepared by two students. Their essays were also manually uploaded at the course site (Fig. 1).

Over the years, the course gained great reputation, and it was elected by many students. Instead of individual essays, collaborative preparation of joint essays was enforced. Classical face-to-face discussions as a valuable social element of learning were intensively used. But although they had been announced in advance student feedback was rather poor. Many students were too shy to participate, while many others were not really prepared for the topic. Discussions were directed by the teacher, usually involving very few participants. Even with only these few elements, the course was dynamic and it involved collaborative elements.

Initially, the final exam was a classical oral examination. In a few years, number of student multiplied. In order to avoid too long oral examinations, the teacher in Institute A prepared an e-Test consisting of 350 questions.

Main problems during earlier delivery of the courses

From the very beginning, individual essays were facing, and we are sorry to say that they are still facing, serious problems. Here are the most important:

Семинарска (pdf или doc)	PPoint	автор	датум
Introduction to the social implications of computing	преземи>>	Митевски Бојан, Димов Влатко	
Social implications of networked communication	преземи>>	Ненад Стојановски	
Growth of, control of, and access to the Internet	преземи>>	Емил Станков, Ивица Стојановски	
Gender-related issues		Божанка Тодорова	
Gender-related issues	преземи>>	Силјаноска Маја	
International issues	преземи>>	Манева Данче, Сугарева Надица	
Making and evaluating ethical arguments	преземи>>	Катерина Динева	
Identifying and evaluating ethical choices	преземи>>	Анета Ивановска, Елена Лазовска	
Understanding the social context of design	преземи>>	Билјана Јовановска	
Identifying assumptions and values	преземи>>	Трајчовска Христина, Петреска Емилија	
Community values and the laws by which we live	преземи>>	Галапчева Менче	
The nature of professionalism	преземи>>	Јовановска Гордана	
Various forms of professional credentialing and the advantages and disadvantages	преземи>>	Ѓорѓи Настев	
The role of the professional in public policy	преземи>>	Атанасовска Катерина, Радевска Наташа	
Maintaining awareness of consequences		Апостол Каровски	

За Предметот
Предавања
Семинарски
Архива
Контакт

Fig. 1 Static course site is still available online in Institute A

1) External plagiarism: In primary and secondary school pupils prepare projects using literally copied or literally translated texts and pictures found on the Internet or in books. With Google translate, the problem becomes even more difficult to detect. Many students don't understand where the problem with the external plagiarism is, and why it is sanctioned. In previous levels of education they learned that external plagiarism was not only tolerated, but even encouraged by their teachers.

2) Internal plagiarism: Students have strong social connections with students who attend the same course, with students from previous generations, and with students from student dormitories willing to prepare their essays for proper compensation. While the discovery of internal plagiarism within the same generation depends on teacher's good memory and observation skills, resemblance of newly submitted essays with essays from previous generation depends on teacher's investigation skills. For the detection of identical writing style due to hired mate who prepares several essays on one or few similar topics, open-source software (Bloomfield 2011) was used to prove the hypothesis, and unfortunately it appeared true.

3) Delivery problems: Initially, students were supposed to e-mail their essays. They were sometimes late, in several occasions they forgot to attach the essay, or in very rare cases the mail didn't reach the goal. This problem was solved individually, almost always in favour of the student, who was afterwards more conscientious for future essays. However, there were few cases when students simply didn't finish their obligations claiming that there were communication problems.

Hopefully, collaborative creation of essays minimized these problems. The only remaining problem was so called "student collegiality". In many occasions the contribution of students close to project leader, even when they were completely idle was overestimated.

Unexpectedly, another great deception was noticed during e–Testing. First group of students, including the best students in the whole generation had moderate results (Fig. 2, left), second was better, while the last group, composed mainly of those students retaking the e–Test demonstrated exceptional skills (Fig. 2, right). The reason has soon been discovered. Students who had already completed the e-Test made a collection of all the questions and correct answers and delivered it to neighboring printing shop.

This student fake proved that it was high time to change everything: the delivery of the course, the methods and means of student assessment and the grading scheme.

Implementation of web 2.0

In 2006, graduate course in "Privacy, ethics and social responsibilities" was created within Tempus project Klašnja-Milićević et al. (2011), Bothe et al. (2009). Since academic 2006/07 up to now, more than 150 graduates attended it in Institute 1 and in Department 2 with a pass rate higher than 90%. In 2007/08 the course was tailored to undergraduates in Institute A and in 4 years 670 students have attended it with a pass rate of nearly 85%.

Teachers' experience from previous delivery of undergraduate courses, together with their familiarity with computer supported learning and E–learning was crucial to direct new courses towards cooperative and collaborative learning promoting usage of social tools to involve all E–learners in building a common knowledge.

New courses were mounted on newly installed LMS platform Moodle, offering enhanced stability, higher scalability, better response time, in a few words, superior performance. Student activities leading towards direct passing of the exam were divided into four types of activities:

a) Individual research projects in a form of very short essays submitted as assignments with fixed deadline.
b) Discussion forums aimed to cover a particular case study connected with one topic from different points of view.
c) Wikis intended to cover a broad topic divided into related articles.
d) Individual news logs in which students individually kept records of all the crucial and emergent news connected with the topics from course syllabus.

In the following sections we concentrate on forums and wikis as individual and collaborative activities within both courses.

Discussion forums

Discussion forums were initially used to apply a well-known technique of role-playing games. Students were given certain roles and were invited to participate in a scenario
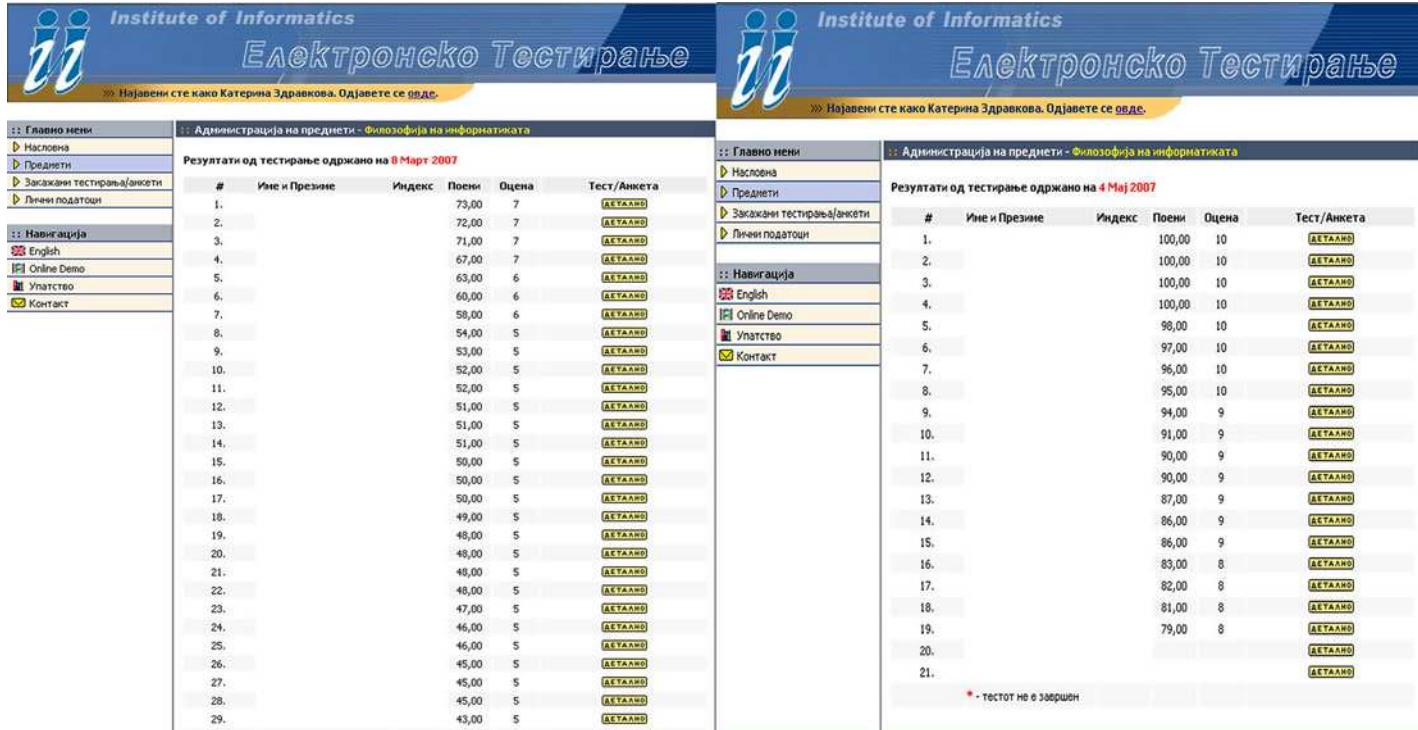
Fig. 2 Results of the same e-Test. Left, e-Test was done by all students; right, e-Test was the correctional one

connected with some ethical and moral issues, discussing and defending opinions represented by their roles. Roles reflected different viewpoints of the same ethical problem.

Students accepted on-line discussion forums with pleasure. The most encouraging argument towards their more frequent implementation was the fact that students who had been recognized as shy and silent persons during lectures, found themselves very involved in discussions, arguments, and even quarrels with other colleagues. This was expected, since the tendency of introvert students is to reveal their opinion within electronic communication, when they are not literally faced with the rest of colleagues. At the same time, intrusive students were moderate compared with their standard behavior.

Forums were soon after extended to research based on-line forums. At first, they were occasional and suggesting one topic only, to become more frequent with time, offering few topics to select. Sometimes, students participated in more than one forum, but it was more an exclusion than a rule. Another point worth mentioning was the fact that created social networks influenced widening of topics in question.

Even though points to be discussed were strictly defined, very often discussions diverged to various directions, touching each matter connected to the original one that is interesting for students. This widening tendency was noticed at both institutions independently on the degree. Undergraduates were still not mature enough, thus teacher had to occasionally direct the discussion toward desired goal, or settle down sporadic online quarrels. Second problem with undergraduates was their number, reaching more than 220 students in 09/10. Although most were strictly obeying the rules, there were still some students who violated them. For example, number of discussion topics per forum was limited to five, but students were opening new and new mutually related topics. In the next forums, all the topics were in advance initiated by the teacher. Interesting topics tackled during discussions were additionally added, again by the teacher only.

From the very beginning, each forum has been graded and it was initially done immediately after its closure. Such grading was very hard and time consuming, and there was a risk to skip some posts. Nowadays, each individual post is separately graded. Final grade of the corresponding forum is a sum of individual grades. This grading scheme is very stimulating. For example, first forum for undergraduates this year produced 613 posts, or in average 7.39 posts per student (Fig. 3, left). At the same time, graduates in Department B produced 245 posts (Fig. 3, right), reaching in average 5.98 posts per student. It's absolutely clear that graduates produce less with much higher quality. Their contribution is based on much more serious research, so quality replaces quantity.

Another advantage of individual grading is student immediate awareness of possible mistake, usually connected with plagiarism, or with wrong citation.

Wikis

Wikipedia is localised in most students' native languages, and many computer science students are Wikipedia registered users who actively contribute to its expansion. Therefore, introduction of wikis was accepted as regular activity for most of the students.

The syntax of embedded wiki module in our LMS is easy and even completely inexperienced users got used to it straightforward, so there were no technical complaints by any student. Whatsoever, more experienced students corrected initial minor mistakes done by absolute beginners who were not familiar with the creation of wikis. The most common problems were misunderstanding of anchor texts meaning, wrong way of quoting references, or incorrect text formatting. For urgent problems students were encouraged to use the news forum to ask for assistance, for different announcement, mainly used to maintain

Fig. 3 Individuals grading of each post stimulates active participation in online forums

smooth development of joint result. All the problems were usually instantly solved. Skilled creators offered an explanation of the reasons that caused the problem and guidelines how to prevent problems from happening again.

We defined two kinds of wikis: independent and discussion based.

Independent wikis were aimed to enable the presentation of a study of one or several different aspects of a particular topic. Since number of students in Institute A was large, they had few days to select their preferred topic. Maximum number of participants per topic was ten. Selection was usually finished in less than 1 day. After the selection was done, students were grouped according to own preferences. Each group member was restricted to actively contribute in the creation of the chosen topic only. However, view of other wikis was not only enabled, but on the contrary, it was encouraged. The opportunity to examine the results of others was intensively used, resulting in frequent improvements of the aesthetics, and occasional improvement of the structure.

Students never explicitly reacted to critical problems, such as: accidental deletion or overwriting of huge amounts of previously prepared material, inability to perform an intended action, and the most delicate problem: deliberate deletion or modification of submitted material by other students. For such sensitive matters they preferred to directly contact the teacher using instant messaging, or e-mail. For technical support teacher usually offered suggestions or redirected the problem towards news forum. In the cases of deliberate removal of other's contribution, usually as a result of mutual intolerance between two or several undergraduate students, teacher personally corrected the problem. As a rule, it has never been repeated again.

There are two crucial differences between independent and discussion based wikis. In discussion based wikis each group is considered to be a compact team. The responsibility for the common wiki belongs to the moderator. Second difference is that discussion based wikis are supported by parallel discussion forums intended to coordinate the preparation of joint wikis. If the use of news forum, and consequently the exchange of information dealing with the final product were sporadic, parallel forums enabled incomparably greater information sharing. For example, for the creation of the wiki on piracy (Fig. 4, left), moderator and students accessed the forum 625 times, or in average 41.67 times per student. Total number of accesses of all the students was 3337, or in average 37.08 per students.

Correlation between final grade of the joint wiki and the quantity of discussion views and posts was 0.73, higher than the correlation between final grade and the quantity of additions and upgrades of the joint wiki, which was 0.61.

Collaborative creation of joint outcomes

From the very beginning of the course, collaborative creation of joint outcomes was stimulated. Joint projects started with essays done and orally presented by a couple of students (visible in the list of authors at Fig. 1), or with group presentations done by groups with no more than ten students. Students were either preparing their assignments together, or they were working individually and meeting occasionally to polish the assignment.

After the installation of an LMS that enabled different ways to exchange information, collaborative preparation became totally online. In recent years, common efforts have been achieved with wikis and joint essays based on previously opened discussion forums.

All collaborative projects were lead by a moderator. Undergraduates usually selected the topic which had already been selected by one or several student they knew well and they were supposed to suggest the moderator themselves. As a rule, this moderator was the

Fig. 4 Wikis done by undergraduates and by graduates within 2 weeks

best student in the team, i.e., the student the teacher would appoint too. In the less homogenous groups, mainly consisting of part-time students, the student enthusiastic to open the supporting forum was considered a moderator. It was not necessary to wait for such student more than one or 2 days. Finally, in the heterogeneous groups, particularly those consisting of graduates, the moderator was appointed by the teacher. Moderators appointed by the teacher accepted the role with pleasure.

Discussion based wikis were presented in the above section, so they will not be elaborated in more details. After the completion of several wikis, we have noticed that their quality predominantly depended on the students who created it. To create an outstanding result, students had to demonstrate a good capability to structure the contents well, to be able to do research, to express their ideas correctly, and last, but not the least, to show a great mastery in technical preparation of their products. Younger students confirmed their superior technical skills (Fig 4, left), while more mature students, predominantly graduates, were exceptional to design the contents, breaking it up into many smaller units (Fig 4, right). Since the content has always been more important than the form, minor technical deficiencies did not affect final evaluation.

Discussion based wikis were intended and prepared by undergraduates. Since majority of graduates are employed, they were usually running out of time, and consequently they did not want to spend too much time on technical details required to prepare an impeccable wiki. Therefore, group projects were carried out using discussion based joint essays. Each student chose a preferred topic. Groups were comparably bigger, counting up to fifteen students.

Teacher initiated the discussion topics. Mutual communication within a group was overt to all the students. They exchanged 387 posts, or in average 129 posts per group, or 9.44 posts per student. In order to stimulate the discussions, posts were sent through e-mail towards all the participants of the corresponding group. If each student received at most 172 e-mails (Fig. 3, right), teacher received all 387 posts, or in average 27.60 posts daily. Hopefully, they were directed towards corresponding folders specialized for this purpose. No student has reacted against these posts.

Initially, each moderator suggested the contents of the essay. The contents was improved and polished by many group members almost until the very end of the project. After 12 days spent in collecting smaller parts of the essays and negotiations how to improve the mutual mosaic, each moderator collected all the discussions and created a preliminary version of the final essay. In the last 2 days, preliminary versions were improved several times bringing them to perfection. The desire to get an ideal essay culminated with a group that initially earned 95 points out of 100. Teacher's crucial remark was the absence of the conclusion. The reaction was immediate, and a satisfactory conclusion was delivered few seconds after the final deadline. The forum has already been closed, so LMS refused to upload it. Students sent it directly to the teacher by an e-mail.

It is interesting that student's individual contributions were usually concentrated to one smaller topic hence the amount of individual contribution in the final outcome was rather balanced ranging from 7.08 to 11.47 posts per student. Quantity of submitted posts did not significantly affect the final grade, yet the group with maximum posts produced the best joint product.

Graduate course is still running, so we can not provide precise statistics concerning student impression of discussion based joint essays. Nevertheless, instant student reaction and the willingness to correct the remaining deficiency is not due only to the ambition for an excellent academic result, but also to the motivation to be actively involved in the preparation of a joint essay, no matter the part of the day. To be more precise, the deadline

was 25 January at 11.55 pm. Students delivered their final result at 7.30 pm. They were informed about their preliminary grade at 9.00 pm. Only few minutes later, they suggested the improvement (see Fig. 3, right), and delivered the corrected version at 00.04 am, 9 min after the final deadline. Our impression is that if they did not like the project and the way it was performed, they would have never reacted so quickly.

Few more web 2.0 features

Our LMS enables several other web 2.0 features, such as web classes, chat, blogs, and glossaries. We have offered these four modules to undergraduate students.

Web classes are predominantly intended for conducting interactive on-line classes for those who are not able to be personally present at traditional classes. Very few part-time students were interested to use them. The main reasons were that the abundance of teaching materials, consisting of almost one thousand lecture slides, supporting texts, and many links towards state-of-the-art news connected with the topic was more than sufficient to be in line with the lecture. Teacher did not insist on web classes as well, having in mind the effort and technical requirements to perform it properly.

Student reaction to chats and blogs was also not favorable. Blogs were intended to exchange and solve technical problems, or to warn the others about unwanted security problems. Student opinion was not only divided, but totally opposed. Some students were exclusively against and suggested news forums instead, while those who were active in blogging in their extracurricular activities insisted to extensively use them. The last insisted than the quantity of notifications they receive from the course was huge, so they did not want more. The best compromise was to exclude internal blogs from the course, but to value external student blogs as bonus activity. Additional value motivated several students to participate in various blogs specialized in computing. They published what they had recently researched within the course. Student enthusiasm after winning and announcing the absolute blog of the week was a great pleasure for a teacher who initiated the topic.

Chats were proposed to enable instant mutual collaboration. The main excuse to avoid chats was that they were not as obvious and transparent as news forums. Moreover, students confirmed they were connected through various social networks, so in critical situation they could depend on them instead.

Creation of a specialized course glossary has been intended in our courses for several years, particularly with graduates (Zdravkova 2010). Unfortunately, these groups have always been very heterogeneous and usually consisting of LMS novice users, so we have never insisted on implementing them. Teacher's personal impression is that they would be very useful for many purposes, including a creation of a multilingual glossary of computer ethics terms. Namely, students in Institute A predominantly use three, while students in Department B use four native languages. All in all, apart from English, the glossary would consist of three Slavic, two Romance, one Finno-Ugric, and one Aromanian language.

Workload and student impressions

Preparation of Web 2.0 contents of good quality, correctly expressed, technically well organized and presented in a good way, required an immense effort of all participants. Total workload of recently finished course is presented at Fig. 5. Left panel presents

student views and posts. They reached their extremes during the discussion forums at the beginning of October and December. Second peak corresponds to individual wiki, when students demonstrated slightly chaotic behavior. Discussion based wiki created by the end of December demanded less activities, but they were planned in advance and carefully monitored by the moderator. Teacher's views and posts are presented at the right panel. Until the beginning of November, student's and teacher's diagram have the same tendencies due to immediate assessment of forums. The same tendency appears during the preparation of the second forum. Teacher's activity was postponed after the final delivery of both wikis. Majority of teacher's discussions were posted at the beginning of the course to instruct students what was expected, and after final grading.

In total, students had 59,418 activities, i.e., 675.20 per student. They viewed the course in average 3,583.47 times per week or in average 40.72 times per student weekly. Altogether, they submitted 4,885 posts, on average 325.67 weekly, and 55.51 per student. Their active participation at this course was the highest at the Institute. For example, students had 19,156 activities during Computer Applications and 29,114 during Intelligent Systems, both with similar number of participants. Teacher had in total 3,210 activities, 1,513 views and 201 posts in total. While students could skip what other colleagues submitted, teacher was supposed to carefully go through any single word sometimes more than once. Such a rhythm was from time to time too exhaustive.

Student's affirmative feedback shows that the effort was worthwhile. No student chose two worst choices: "I didn't like it at all." and "I didn't like it, but I don't mind.", 11.29% declared they liked the course, 14.52% liked it a lot, while a majority of 74.19% were fascinated by the course and appreciated it a lot. Therefore, we found their impression regarding the quantity of gained knowledge from different sources and the impact of different Web 2.0 elements valuable.

It is obvious that students found the lectures the most important for their acquisition of new knowledge (Table 1). The main reason is that they have been used to instructional design during previous education and prefer to get all the information prepared by their teachers. They also liked individual essays. The most obvious cause is that individual assignments needed no interaction, so they were the most efficient. Another asset is a possibility to find someone else to prepare it.

We were also very concerned about their personal feeling about the individual essays and Web 2.0 techniques implemented for assessment (Table 2.). Among three Web 2.0 techniques students preferred the creation of collaborative joint outcomes to independent and individual in the same activities, no matter the quantity of effort done to finish them.

However, student impression was that discussion based wikis contributed to the acquisition of new knowledge more than separate discussion forums and independent wikis (Table 1.). Namely, 33.87 % students had an impression that they learned more due to discussion forums and 35.48 % due to individual wikis, compared with 41.94% who gave an advantage to discussion based wikis. Only one of 62 students who gave their feedback did not like them at all, seven found them very difficult, and thirteen made them because they were supposed, all in all, twenty-one students, or 33.87%. Remaining 66.13% were very pleased with the project. Even 38.71% of the whole group claimed that this joint project was an excellent experience for prospective collaborative tasks. The student who was categorically against them expressed this group task as the only disadvantage during the course in the final remarks, but there was no explanation what was the reason for such an unfavorable impression.
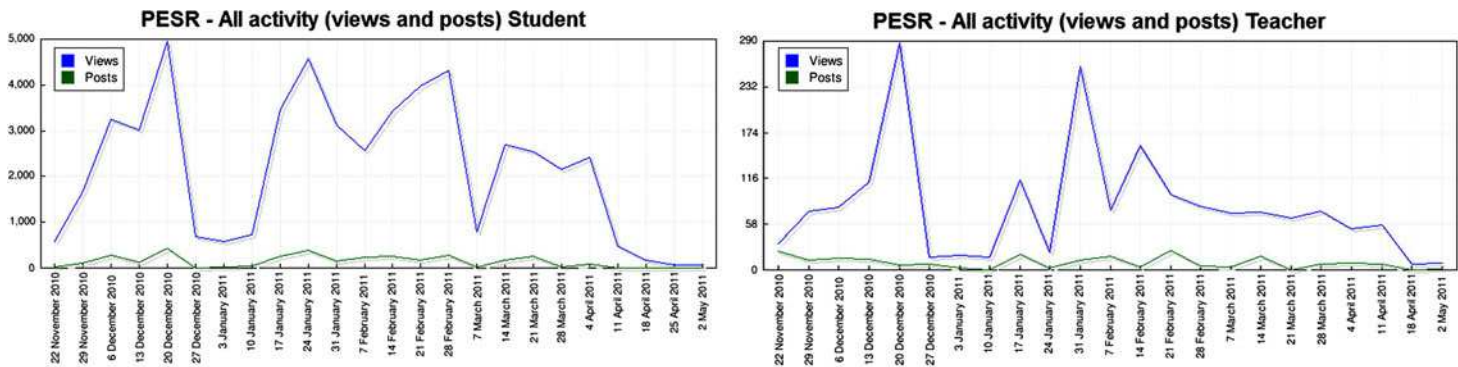
Fig. 5 Students' and Teacher's views and posts

Table 1 Student impression regarding the quantity of gained knowledge and Web 2.0 elements

I learned the most from …		Final impression about Web 2.0	
Lectures	72.58%	Unacceptable	0.00%
Individual essays	40.32%	Expected something else	1.61%
Independent discussion forums	33.87%	Partial approval	20.97%
Independent wikis	35.48%	Approval with minor remarks	37.10%
Collaborative creation of joint outcomes	41.94%	Greatest approval	40.32%

Table 2 Student impression regarding the most important Web 2.0 elements

Individual essays	(%)	Independent discussion forums (%)	
Were a great effort to me	1.61	I was not participating at all	3.23
I made them because I was supposed to	8.06	I read posts and participated sporadically	8.06
I prepared them easily	27.42	I read others' posts and actively participated	16.13
Were an interesting obligation	45.16	Were provocative and inviting to participate	33.87
Were a great experience and pleasure	17.74	Provoked research and critical thinking	38.71
Independent wikis	(%)	Collaborative creation of joint outcomes (%)	
I was not participating at all	0.00	Were total nonsense	1.61
I submitted few things	19.35	Were a great effort to me	11.29
I read others' submissions	3.23	Inevitable obligation	20.97
I read, upgraded and created them	48.39	Obligation I liked a lot	27.42
Provoked research and critical thinking	29.03	Excellent experience for future team projects	38.71%

Our experience regarding the benefits and disadvantages of web 2.0

During almost a decade, we have experienced the continual transformation of learning style in our courses from pure E-learning 1.0 towards E–Learning 2.0. Social networking and collaborative techniques have been progressively introduced replacing traditional seminal works and examinations. There are many obvious benefits of this innovative approach. Undoubtedly, the most important are minimized plagiarism, socialization, mutual collaboration, effective and objective grading, increased awareness, and last, but not the least, satisfaction with the implementation of Web 2.0.

As mentioned in the third section of this paper, we have always suffered of different types of plagiarism. The implementation of transparent and authorized contribution evident to all students minimized it. Student's external plagiarism was significantly reduced after the initial unfavorable grades. Stubborn copyists were warned by the teacher, who was sending a private e-mail. The most persistent were criticized in public by their colleagues. Internal plagiarism was also reduced to a minimum because all the activities were authorized. But, it seems that we will not be able to completely eliminate the problem. Literal copying is easily detected, but good translations of texts written in a foreign language sometimes remain unnoticed.

In On several occasions in the undergraduate course, it seemed that other student or someone else contributed in the name of another. Teacher's suspicion was confirmed by a student who explicitly reacted in the anonymous course feedback telling that: "Forums

were abused by some students. To be more precise, they were sharing their passwords to friends who were posting on their behalf, reducing the possibilities of other students". We can only believe that this totally unethical attitude has not been excessive, because we can not neither prove it, nor prevent from happening again.

We have noticed that the implementation of various discussion forums has motivated, stimulated and sometimes provoked students to reveal their own ideas. It is interesting that students known as introvert demonstrate great extroversion. Students with speech disorders were quite noisy on-line, too.

Student feedback has confirmed that students liked to participate in the creation of joint products, particularly in the discussion based wiki. Their personal impression was that they have learned more from collaborative projects than from individual essays. On-line preparation of joint outcomes has diminished the overestimation of personal contribution of some students or even false addition of totally absent to the final outcome. Student activities and the quality of the contribution were completely clear.

Grading facilities of contemporary LMS enable immediate grading of individual and group activities. Teacher was assessing students' results daily. It was decided to send an e-mail notification after each assessment. These two issues stimulated students, particularly undergraduates to work more and better independently on desired grade, the best one, or the grade to pass only.

In order to be in line with the newest events related to the course and state-of-the-art techniques, all participants (particularly the teacher) permanently followed the latest news. Students usually consulted specialized blogs on-line. They increased their knowledge in several course topics, for example, privacy threats and privacy enhancing technologies, information security and computer reliability. They were aware of their superior competence and they wanted to share it with others, resulting in an increased awareness of all participants in the course, including the teacher as well.

Finally, from the very moment Web 2.0 features were introduces to the course, students have expressed the same fascination and appreciation of the way the course has been delivered and assessed. Their evaluation of the course quality has always been extremely positive, independently of the faculty, the degree they study for, and the age of the student. Many students explicitly stated that the sharing of knowledge and experience with others motivated them to work more.

Disadvantages

According to our experience, benefits are still much bigger than disadvantages. However, new approach was a challenge for students, but even more for the teacher. We have witnessed several infrastructural deficiencies due to numerous concurrent users demanding the same service. Probably the greatest challenge was total transparency, which was a treat to privacy. It sometimes revealed language incompetence of those students who were not used to writing or those who had a native language different from the official language of the faculty. The most sensitive thing was openly publicized personal beliefs different from others.

Impeccable infrastructure has always been the crucial prerequisite for perfect running of the course insisting on frequent activities and strict deadlines. We have never faced the problem with graduates neither in Institute A, nor in Department B. They were fewer and always well organized. But, number of undergraduates exceeded 200 students in the academic 2009/10 and the infrastructure become a real bottleneck. This caused temporary breakdowns of the whole LMS. To overcome the problem, the system was renewed at the

beginning of 2010, enabling 80 concurrent logs per minute. Still, the system fell down few hours before the deadline of final individual assignment.

Social media impose constant presence, because new information is displayed and sometimes prompt reaction is needed. Although the schedule of obligations and the deadlines have always been announced in advance, online collaboration resulted in constant changes and some of them needed prompt reactions. It was exhausting for the students who had to regularly check what was going on. Hopefully, many students could rely on their mobile phones receiving crucial notifications. It was even most exhaustive for the teacher, who had to check all the activities several times a day, and to permanently actively contribute to the course evolution. Students have always appreciated this dedicated approach.

Social software in education is always a great threat to student privacy. In our courses students were making mistakes due to lack of information on the course subject or because of missing experience. They could withdraw the post in the first half hour after being published. It was evident that many students used this opportunity; the amount of such posts was 3.92%. The main reasons were teacher's bad grades or private message due to copying. There were several isolated cases of critical remarks from other colleagues posted publicly, again concerning plagiarism, particularly in collaborative projects. They were accepted as benevolent suggestions. Slightly offensive remark of a student towards a colleague was noticed this year among graduates in Department B. We do hope that it will remain unique.

As mentioned before, many students at both Universities have a native language different from the official one. They were usually silent at the beginning of the course but over time, they became more confident and their contribution became valuable, particularly in collaborative projects. There are many students not experienced to express themselves well. They were not self-critical. While graduates never reacted, there were isolated cases of teasing among undergraduates. Good thing is that they have never been rude.

Cultural diversity, religions differences and the lack of mutual understanding have shown to be extremely sensitive in the past. In order to make the differences less significant and less evident, potentially sensitive topics were left for individual essays. There were few cases of student's personal beliefs different from those of the majority or very opposing thoughts. For example, while some students were eager to attend Institute A lecture of Mitnick's, the famous computer hacker, others argued that it was not worth their attention; or while a student was fascinated with the boy who cracked iPhone, others thought exactly the opposite. Relativism prevailed, and all the conflicting problems were solved with politeness. However, some unusual arguments will never be forgotten.

Conclusion

Although restricted to blogging and collaborative creation of corporate assignments both supported by discussion forums, integration of Web 2.0 in Computer Ethics courses proved to be very effective and very successful.

Obvious benefits to classical e-Learning 1.0 were: socialization, where students were motivated, stimulated and sometimes provoked to reveal their own ideas; small possibility to cheat and to fake personal outcomes; relaxed and efficient group collaboration; student and teacher awareness of all the newest events related to the course; student satisfaction with new learning methodology which was similar to their ordinary activities; grading facilities enabling immediate overview of student current grade.

However, new approach needed a constant availability of the server, impeccable Internet connection, and a permanently high scalability. It was exhausting both for the students and for the teacher. Another serious problem was frequent threat to student privacy, particularly when it was too late to withdraw the post.

In defense of the approach, it is worth citing few of student remarks, such as: "The course was an amazing experience", "I am happy that all the students were engaged to do group assignments, through which they learned many enlightening and instructive things.", and "Team project = fantastic job; a way to learn through social contacts, and additionally, a wealthy experience for future group projects".

There were two completely opposite reactions. One student was absolutely impressed by forums because students were able to "contribute, criticize and support each other". The other reacted that some students exaggerated and "didn't let free space for others".

We still strongly believe that major ethical problems connected with plagiarism and cheating have been reduced to minimum. But, student's remark "They were sharing their passwords to friends who were posting on their behalf, reducing the possibilities of other students." is very serious. The only way to completely avoid is to switch back to exhaustive oral examinations which neither students nor the teacher like.

To conclude, implementation of Web 2.0 was very exhaustive for everyone and sometimes too transparent, but at the same time contemporary, and appreciated by students. In spite of everything, students preferred lectures the most. Their personal feeling was that they increased their awareness of computer ethics 0.73 times more than their second best choice, the discussion based wikis.

There are many Web 2.0 features which have already become part of E–learning (tagging, folksonomies, mashups, RSS) as stated Hulbert (2008). With time, our course will probably switch to some of them. We find that making a mixture of too many techniques is not an advantage, not matter how modern it is. But, new trends are "ante portas" say Waters and Moore (2009). Many younger students are eager to implement everything new. In order to make a good balance between those students who are enthusiastic to immediately switch to new tools, and those who prefer traditional ones, new choices will be in the beginning offered as optional. The best accepted will be afterwards steadily implemented in the courses.

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