E-LEARNING 2.0 AND ITS IMPLEMENTATION

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Abstract: Evolution is a continuous and unavoidable process of gradual transformation from one state into another. Starting from 1981 when first "computing environment for academic use" was established at Carnegie Mellon, learning progressed from traditional learning towards E-learning. In the 21st century, evolution of communication and collaboration has been even more dramatic. People intensively employ social networking for private and professional purposes. Novel communication trends affected E-learning transforming it into E-learning 2.0. This paper presents an example of this tendency. It starts with an analogy between purchasing goods and acquiring knowledge and skills, and continues with an introduction of two constituents of E-learning 2.0. As an example, an ongoing course that employs several social networking techniques and collaborative learning is presented in details. Particular attention is paid to student's effort to exploit it and teacher's effort to properly maintain it. The paper ends with the benefits and disadvantages of this approach and the intentions of further implementation of E-learning 2.0 in the same course at international level.

Keywords: collaborative learning, computer-based training, course management systems, professional ethics course, social networking, social software, Web-based learning and training

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1. Introduction

Have you ever asked yourself "Where and how do I prefer to purchase?". The first reaction is the return question: "Which merchandise?". Purchasing scripts presented in this paper are mainly related to food, but they could also be applied to other products. However, basic purchasing scripts are highly related to market type. Let's consider these three basic types of markets: open markets, groceries or small markets, and supermarkets.

Here are some criteria to make your decision easier: display, freshness, variety, quality, carrying and transport, working hours, measure, payment, and receipt. The list can be extended, of course, but it will not influence the goal of the survey presented here.
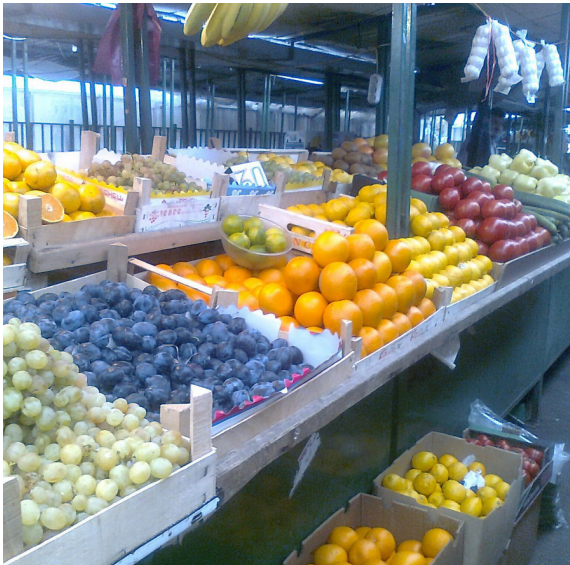

Figure 1. Open market with fruits and vegetables

At open markets (Figure 1) articles are displayed on stands. Same provisions appear all over the market, because many sellers offer the same or similar provisions. Stands are arranged every day, usually very early in the morning, and disarranged in the evening. Sellers can be second dealers, or producers themselves. In small markets articles are grouped according to their type, and arranged by the seller. They are regularly rearranged, cleaned and polished to attract customers. Sellers are all at once arrangers, cleaners, and cashiers. Supermarkets have more space, so arrangements can be better. Occasionally, provisions have already been packed (Figure 2). There are many different kinds of employees, such as: vendors, cashiers, merchandisers, and they usually have formal training and retraining to perfectly do their job.

Figure 2. … and a fruit department in a big market

Articles are usually very fresh everywhere. Owners of smaller markets supply themselves at open markets. In recent time, they started engaging distribution companies, similarly to supermarkets. Spoiled articles are regularly thrown out, particularly in supermarkets. If you discover some rotten articles, or articles with an expired date, even after leaving the market, there is a convincing possibility to return them and get the refund, but only in supermarkets.

Variety of exhibited articles is the smallest in groceries and small markets, and the biggest in supermarkets. Although open markets offer almost everything, when you buy there, you will purchase only those things you intended. Shopping in supermarkets as a rule ends with many unplanned articles and articles that are sometimes never used.

Quality is a very relative category, but for certain articles, particularly for food of animal origin, buying at open markets can be risky. Buying fruits and vegetables at open markets offers the best quality according to your taste, particularly when the seller let's you select alone. If you want to avoid buying counterfeit goods, supermarkets are the only to trust to.

In open markets you tear heavy plastic bags, which cut your fingers and split up when the weight is bigger. In smaller markets you can count on sellers' help, but you will transport all the heavy bags home on your own. Carrying and transport are one of the crucial arguments to prefer supermarkets. You fill the trolley as much as you want and can, "throw" all the provisions in the car, and drive them home.

Open markets work every day from early morning to late afternoon. Working hours can be influenced by weather conditions. Small markets have extended working hours, except on Sundays and holidays. Working hours are not affected by weather conditions unless they become severe. Supermarkets start later and work at least 12 hours a day sometimes including Sundays and holidays.

When you shop at open markets, you hope that the weight is correct. Experienced sellers never forget to add slightly more to please you. But, are old-fashioned scales precise enough to cope with smaller amounts? My personal experience tells me that they are not reliable at all. Other markets have attested digital scales. They are regularly checked in supermarkets.

Price is the lowest at open markets and usually the highest in smaller markets. It is not clearly marked in open markets, where bargaining is highly recommended. Skilled customer first makes tours around the market, locates best products, asks for the price and starts negotiation. Typical conversation looks like this: the seller says "20", the customer replies "15", or "Here is 50 for 3". The result depends on the experience of both involved sides. Payment is in cash only. In smaller markets you don't bargain, you can count on temporary discounts and postponed payment with checks (wherever such payment method still exists). Supermarkets have regular promotions and discounts, price reduction of articles that expire soon, possibility to collect points to get attractive products with "high discount". Finally, customers with supermarket (loyalty) cards have many additional payment benefits.

You will still get no payment receipt at open market (but it is announced). Other markets are obliged to give you a fiscal receipt. If you are a foreigner you can also count on VAT refund with supermarket receipts.

There are many other purchasing factors, such as the time spent, effort, and last, but not the least, satisfaction from shopping. You can extend them according to your taste and inspiration.

1.1. Analogy with learning

According to Answers.com (Answers), Britannica Concise Encyclopedia's definition of learning is: "Process of acquiring modifications in existing knowledge, skills, habits, or tendencies through experience, practice, or exercise.". If we take into account that synonyms of the verb "to acquire" are "purchase" and "make a purchase of", could we consider that learning is purchasing knowledge and skills?

If you agree with this definition, purchasing in open markets could be best associated with traditional learning, purchasing in smaller markets to computer based training (or alternatively, computer-aided instruction or computer supported learning). In such case, purchasing in supermarkets mainly corresponds to technology enhanced learning (TEL). Since contemporary supermarkets, particularly supermarket chains use the affordances of the Internet to: perform the complete accounting, to keep records of the goods on stock, but also for advertising and marketing, it turns out that the learning match of this purchasing scheme is actually E-learning.

In parallel with all these similarities, we could also make an analogy between all the previously enumerated purchasing factors and learning characteristics (Table 1). There are many others, of course, but we will concentrate on these factors only.

Purchasing features	Knowledge and skills acquisition
display of articles	presentation of the lecture
freshness	actuality of information
variety	diversity of knowledge
quality of articles	quality of gained knowledge
carrying and transport	effort to gain knowledge
working hours	Availability
measuring	objectivity of evaluation
payment	Grading
receipt	Certificates

Table 1. Analogy between purchasing factors and knowledge and skills acquisition

Display of articles is analogous to presentation of teaching materials. It becomes more and more attractive as market becomes more contemporary. Freshness and quality of food are comparable to actuality of information and quality of gained knowledge. It depends on human factor only. However, distribution companies and their learning couple, retraining centres, *should* and *can* bring best quality. Assortment of articles corresponds to diversity of knowledge one learning system offers. It can sometimes be too broad. As a result, many unwanted information are gained, and plenty of time is lost. But, with slight supervision, or even a fellow learner, this problem is easily solved.

Although it doesn't look so obvious, carrying and transport are very analogous to efforts made to gain knowledge. Computer based training, technology enhanced learning and particularly E-learning, simultaneously stimulate at least three senses: seeing, hearing, and touching. They also enable discovery, instead of memorising information and facts. All these makes gaining knowledge a very relaxed process.

Working hours correspond to availability of teachers and training. Similarly to open markets, which have restricted working time, traditional education can be gained only at school, when the teacher is near. E-learning materials are always available. At the same time, teachers and colleagues are available without being disturbed.

Subjective and inaccurate evaluation is avoided in computer-aided learning and E-learning, in the same way as subjective factors and measuring errors are avoided with digital scales. Grades in modern learning environments are obtained objectively, with constant engagement throughout all the training. Similarly to payment benefits, diligent students can gain additional grades. Finally, if you want to prove your payment, fiscal receipt is to trust the most, same as certificates obtained in better schools are transferred the best.

It's time to draw the first conclusion. Long, long ago, open markets were the only places to buy everything. As a result of purchasing evolution they are nowadays disappearing, or they are becoming specialised for organic food only. Similarly, traditional learning is slowly but surely evolving towards E-learning.

1.2. Timeline of E-learning

In the beginning of the industrial era, there was a substantial demand for skilled workers and at the same time, there were many experienced workers without a proper education. Therefore, it was necessary to transfer knowledge among employees apart from traditional schools and strictly defined time tables. Probably the first solution to this demand was the creation of correspondence school (ICS), exactly 120 years ago. As stated "ICS was a pioneer in teaching skills by home

study, presenting the opportunity to learn while earning and to relate study to everyday work".

In parallel, technology was advancing very fast, introducing computers in education. The first and the most influential system was PLATO (Plato), the pioneer in computer assisted instruction (CAI). In 1960, when PLATO was constructed, it was a one-terminal system, to be installed and interconnected at several universities in 1976. As stated in the system's history: "For nearly ten years, there were more users on PLATO than there were on ARPANET, the precursor to the Internet."

Another important architect of educational use of technology was Steve Hunka (Hunka) from The University of Alberta. In 1968, he started using IBM 1500 with 8 terminals for educational purposes only. The system has been successfully used by the Faculty of Medicine more than a decade.

In 1980, first computer-based training course was introduced to pilots. The content was installed on the local machine, to be installed on LAN ten years later. In its 30 years existence, aviation industry (AICC) trained successfully over 600000 pilots without any safety risks appearing during on-site training.

The term computer-based training nowadays is an umbrella term which encompasses all the learning activities which are accessible via computers.

Another important step forward in the E-learning timeline was Carnegie Mellon's project in cooperation with IBM (The Andrew project). It started in October 1981 as "a set of computer tools that enables the user to write and edit documents, send and receive mail, read bulletin boards, write programs, and seamlessly access user and project files from any workstation". The project switched towards wireless technology and transformed Carnegie Mellon "campus into the first completely *wireless* campus in the world."

In 1994, on its 25th anniversary, Open University (OU) together with BBC created Knowledge Media Institute (KMi) and organised Virtual Summer School including concept videos. It was intended to enable undertaking of group project by those students who were not been able to be present in person. It seems that this was the first successful technology enhanced attempt to perform collaborative learning.

Although not very well-known worldwide, I personally appreciate Wolverhampton Online Learning Framework (WOLF) developed by former DELTA Institute in Telford campus. This "web based Virtual Learning Environment" was first used in 1995, offering "collaborative tools to facilitate discursive activity among classes and smaller workgroups". Few years afterwards, several learning management systems were launched, including the famous WebCT (WebCT) and Blackboard (Blackboard). WebCT, which at that time offered trial use of their "course tool", is now owned by completely commercial and rather expensive Blackboard.

Starting from 1997, when Jay Cros (Cros, 2004) coined the term E-learning, and Cisco (Cisco) explained that "E-learning is Internet-enabled learning" computer technology and Internet became one of the basic media for teaching and learning content. Soon after Blackboard got the patent for the term and went on trials with potential rivals. In 2008, this patent was declared invalid. Meanwhile, open source learning environments (Claroline, Dokeos, Manhattan, Moodle) became powerful enough, thus E-learning is no longer a privilege.

Mobile and wireless technologies were a big challenge for E-learning in general. They gave rise to mobile E-learning or M-learning. According to Clark Quinn, M-learning is "E-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone".

M-learning stakeholders are mobile companies, such as Ericsson (Ericsson) or Apple Computer (Mobile Learning), and E-learning intensive users, above all Cisco (CML) and on-line universities (Learning Lab). Ericsson started an ambitious project intending to create "a global provision of training on the wireless internet". Apple created the new gadget iPad, which is "a significant milestone towards" making a "computer as easy to use as a toaster". Such a tool will have immense impact on M-learning. Cisco offers several of their conventional courses available free on different Apple applications. University of Wolverhampton established the laboratory concerned with R&D of mobile learning technologies and their implementation in different parts of world including Africa.

Different learning environments and communication models led to the creation of another learning paradigm called blended learning. Wikipedia (WBL) presents a very concise overview of this learning solution, initiated a decade ago by Cisco, the learning academy which has already been mentioned in this paper several times.

Due to all these learning tools, particularly those which are Web-based, traditional face-to-face instruction lost its role. But, the role of the instructor has not disappeared. On a contrary, from a point of view of the author of this paper, who is an instructor, they are necessary even more than previously. Moreover, their obligations and responsibilities dramatically changed. The example presented in the continuation of this paper will try to confirm this assertion.

1.3. New Web generation

One of the greatest phenomena of this age is social networking. First attempt to "socialize" Internet users was the site Classmates.com launched in 1995. This social medium was premature, and it couldn't get high attention. Five years later social networking sites made a real revolution.

No longer existent Nielsen's blog from 2008 reported that top 10 social networking sites had almost 76 million unique visitors in September 2008. Compared with 33 million visitors in September 2007, the average growth was 167%. Nielsen's recent research (Nielsen) reports increase of unique visitors worldwide from almost 211 million in December 2007 through 242 million in December 2008 to more than 307 million in December 2009. The annual increase in 2008 was only 14%, in 2009 further 27%, or biannually more than 45%.

If these data were not convincing enough, here are some more. In July 2010, the most popular social networking site Facebook celebrated its half billionth registered user (NY Times). On that occasion, International Telecommunication Union (ITU News) arrived at a fantastic conclusion: "If Facebook were a country, it would be the third most populous nation in the world after China and India."

Wikipedia (WSN) also offers well documented information concerning the most popular active social networking sites. Many of these sites divide visitors on regional basis, so the estimation is that these sites in total have around one billion unique visitors. Compared with almost two billion Internet users world wide (WIU), it turns up that social networking attracts a colossal, and until recent days completely unexpected interest. Many users are multiple or inactive, others use several services but still millions unique users visit social media daily. According to Alexa's traffic rank on 14 October 2010 (Alexa), Facebook was reached 3658000 times, making it the second visited site after Google. The average time spent during each visit was half an hour.

Apart from social networking, this decade gave birth to open content initiative powered by collaborative efforts of cyber community. The biggest advantages of this initiative are open source (OSI) and free software (FSF), promoting open access, free content and copyleft. Typical repre-

sentatives of free and open software products are several operating systems like GNU, Linux and Ubuntu, various office suites: OpenOffice and Edubuntu, many programming languages, such as Java, content management system like Joomla, many massively multiplayer online games and finally E-learning management systems, including Claroline, and Moodle. Another great success of this initiative is the "openly-editable" encyclopedia, such as Wikipedia.

To conclude, users in the 21st century are no longer only passive consumers. On a contrary, they are active contributors willing to obtain, evolve and share information. The era of traditional Web (nowadays denoted as Web 1.0) has finished. Web 2.0 comprises all the new social, communication, information sharing and corporative tendencies. Exactly five years ago, during first Web 2.0 summit, O'Reilly stated that "the Web is a platform." He gave a fantastic overview of new Web and illustrated the differences between both Web generations. O'Reilly analysed why had some companies directly connected with the Internet disappeared and others spread out. A fantastic proof that his predictions were right and his answers correct is the recent summit (Web2summit). In the joint report O'Reilly and Battelle declare: "we saw that the value was facilitated by the software, but was co-created by and for the community of connected users". Looking back to past five years they deduce that "Since then (author's note, September 2005), thousands of businesses and millions of lives have been changed by the products and services built on that platform." They conclude the report with the brave statement: "The Web is no longer an industry unto itself – the Web is now the world."

Is there any correlation between Web evolution and learning? Let's pay the attention back to the sensation called Facebook. An interesting fact from Web traffic daily report (Alexa) about Facebook is that "this site'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 medium as well? The answer is affirmative. The unification of E-learning and social networking representing web 2.0 is E-learning 2.0.

2. E-learning 2.0

If O'Reilly is the guru of Web 2.0, then Downes is the guru of E-learning 2.0. His fantastic article (E-learning 2.0) was published only a few days before O'Reilly's. The article starts with the initial point when "the dominant learning technology employed today is a type of system that organizes and delivers online courses". He stresses the trend of direct communication between two traditionally opposite sites, causing the revolution in which "Passive has become active. Disinterested has become engaged."

Downes notices that students are accustomed to using wikis and blogs, and that they discuss "a wide range of topics with peers worldwide." With other words, the influence that social networks and collaborative creation of open contents had over the Web was equally important for E-learning.

There are dozens of definitions of Web 2.0, but no formal definitions of E-learning 2.0. For example, Wikipedia redirects the article to Computer-supported collaborative learning (CSCL). The definition is too simplified and stresses the "collaborative (and cooperative) learning using computers and the Internet." However, available tools are numerous, including wikis, blogs, survey systems, file sharing applications and online collaborative work spaces. The list in (E-language) is even more exhaustive. It consists of more than 20 tools, stressing discussion boards, social networking, RSS, instant messaging, multi-user virtual environments, machinima (i.e. videos made in virtual environments), and MMOs: massively multiplayer online games.

3. II and learning management systems

Institute of Informatics (II), the institution the author of this paper is affiliated with, became a National Contact Point in Open and Distance Learning in September 2000. Even before 2000, II used two self-made static Web solutions to present learning materials. First was completely static and offered presentation of learning resources only (FI). Second (KA) offered more functionalities. It enabled slight interaction for teachers and no interaction for students. To facilitate assessment of hundreds of students, a very successful E-testing system was produced (E-test). It was compatible with the second (KA) lecture site.

As part of National Contact Point, WebCT academic version was installed and functioned for two years. The shift from existent solutions to WebCT was a real revolution. Unfortunately, when the license expired, II was not able to renew it, so it returned back to existent self-made solutions, which are not longer used, but they are still visible (Kursevi).

In 2005, when Web 2.0 was established, own solutions were no longer sufficient, and II decided to search for a new learning management systems among open source tools. There were several systems offering more or less similar Web 2.0 functions. The decision was to try with Moodle (IA).

The attempt was a real success and in the autumn 2006, many courses moved to Moodle (OldCourses). During 2,5 years, it had more than 150 courses and more than 8000 registered users from home institution and other institutes and faculties which attended IT courses at II. Due to too many concurrent participants, scalability soon became a bottleneck mainly during examinations. This site is nowadays used as a repository, but student information discussion forum is still active. By October 2010, 1357 users participated in it (Figure 3), some of them recently.
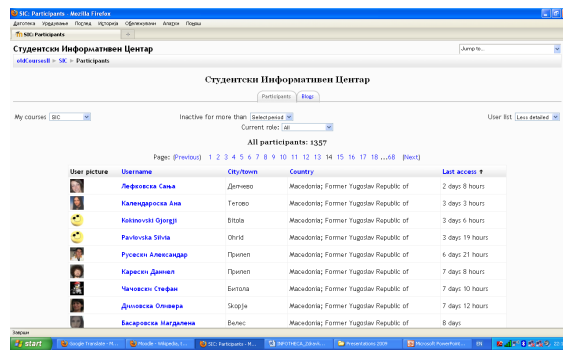

Figure 3. Old system is still active mainly as a result of lively student's information forum

New version of Moodle LMS was registered in spring 2009 (NewCourses). The site is optimised to enable reliable and high scaled performance allowing 80 simultaneous logins per minute.

As stated in the acceptance use policy statements (Moodle Admin eCourses notice from 2 October 2010 at Figure 4), this version is directly connected to II central authentication system and controlled by the enrolment software so all the registered participants at each course are only the eligible ones. Students and teachers are associated to their own courses without an option to select another course or to accidentally enrol wrong course minimising the risk of unauthorised access. These limitations increase student privacy and overall security.
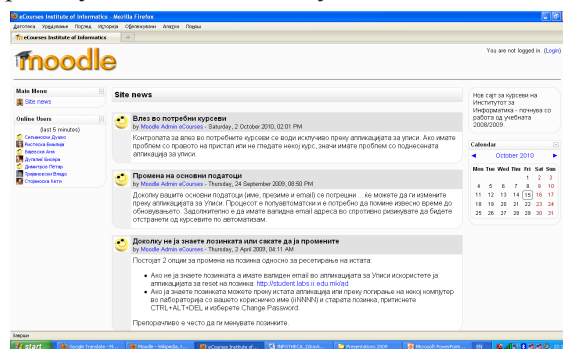

Figure 4. Upgraded version has improved features

New Moodle (Figure 5) is a convenient content management environment which enables the creation of massive resource pools divided into several groups: labels, compositions of text and

web pages, links to documents and web sites, and finally IMS content packages intended to support re-use of materials in different systems (IMS).

Activity list includes different types of assignments, lessons and databases, and supports examining students through quizzes. Important and valuable asset are social learning activities: chat, choice, feedback, forum, glossary, survey and wikis.
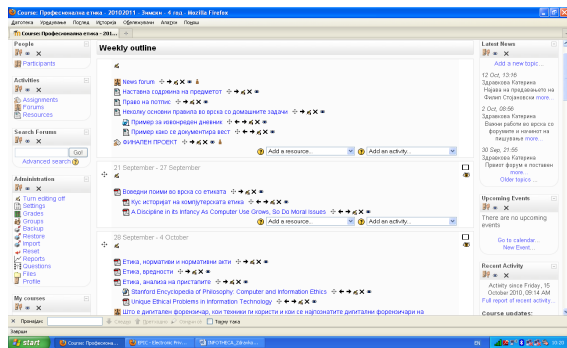

Figure 5. Functionalities, weekly outline and news

Forums, glossaries, and wikis can be individually graded. Therefore students' interest to actively contribute in them is high. Although these social networking activities are limited, they are more than sufficient to enable student active participation, online activities and mutual collaboration.

4. Implementation of social networking at several professional ethics courses

In the recent five years, Institute of Informatics, Faculty of Natural Sciences and Mathematics, University "Ss Cyril and Methodius" in Skopje, Macedonia and Department of Mathematics and Informatics, Faculty of Science, University of Novi Sad, Serbia share postgraduate course Privacy, ethics and social responsibilities (JMSCSE).

Since 2001, similar course has been delivered to undergraduates in the fifth semester in Skopje. In the beginning, it was attended by few students and it was delivered and assessed traditionally.

Grading was based on individual and group essays, and oral examination. After a while, the examination was replaced by e-testing (E-test), but in few months students discovered all the correct answers, so the implementation of this facility lost its worth. It was high time to change something.

The beginning of joint postgraduate course at both institutions corresponded with new curricula for undergraduates in Skopje. Another joint element for both institutions was Moodle. Originally, it was used for uploading teaching materials and student essays.

Implementation of social networking approach started in Novi Sad in the autumn of 2007 with forums, which "were used to apply well-known technique of role-playing games." (Zdravkova, 2009). Students were assigned certain roles and they were invited to discuss and defend the opinions regarding on assigned roles. The assessing style was fully approved by students, and it was transferred to Skopje.

Year by year, more and more E-learning 2.0 elements are exploited. Still, discussion forums are predominantly used, but the goals are different. Frequently, they are used to enable intensive exchange of ideas and research (Figures 6 and 7).
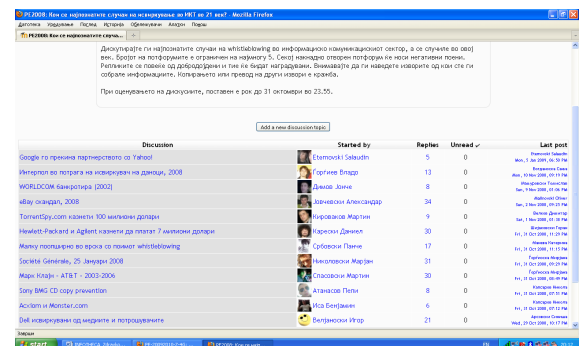

Figure 6. Discussion forum with free topics

At the start, students were free to initiate discussion topics. Unfortunately, they did not appreciate limitations (Figure 6) intended to enable

active contribution in the discussion rather than uploading of own results only, and to prepare students to obey the defined rules. Instead of few (in presented case, the limit was 5), they were opening many (in the same case, 12), so none of these two goals was reached. Therefore, teacher started predefining the topics for all further generations (Figure 6).

Figure 7. Discussion forum with free topics

In recent years, student number ranged from 150 to 250. The maximum was reached last year, so this academic year the course is attended by 91 students making possible the implementation of different E-learning 2.0 models. First activity was the forum on computer ethics and digital forensics. In a fortnight, students exchanged in total 582 posts, or in average 6.40 posts per student (Figure 8). The average frequency was half post per hour. Teacher was an active participant with 26 posts, sometimes directing students towards accurate post writing and citation, otherwise contributing to students' news with own information.

In the first posts, few students pasted news directly from the Web, without proper citation, but after only one teacher's remark, this attitude has never been repeated again. Students showed mastery in the forum, and tried to demonstrate ethical behaviour and tolerance. At the same time, there were several very opposing thoughts (for example, while some students are eager to at-

tend the forthcoming Mitnik's lecture in Skopje, others argue that it is 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.
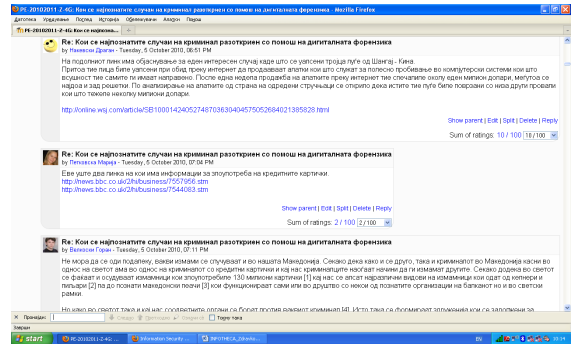

Figure 8. Three posts in 20 minutes

For years, forums were occasionally used to prepare either joint essays or moderator reports. In the first case, team participants applied for a membership using Moodle choice option (Figure 9). Project leader defined the subtopics, distributed them among team participants, collected the outcomes from other members of the same team, and afterwards presented the final joint result for final check. An alternative was to assign a moderator of a topic (Figure 10) who selected several important aspects, and initiated the discussions. At the end, moderator collected all the relevant discoveries and prepared the final report without help of others.
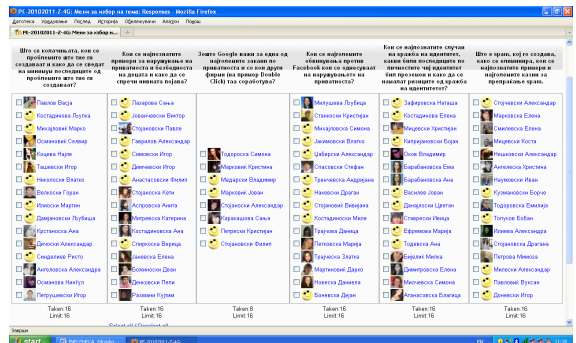

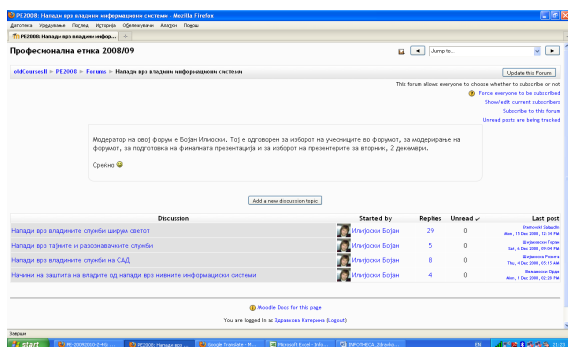**Figure 9.** Choice option to select a project topic

Figure 10. Initial point of a moderator report

A week ago, it was agreed to execute a group project using Moodle's wiki. This option has not been previously used in the course. The experience at other courses proved wiki as a good tool for collaborative creation of contents.

Similarly to former group projects, students chose only one topic instead of contributing to several. Wiki is set to enable visible groups, i.e. all students can see the contribution of other groups, but they can only contribute to the creation of their own wiki. Figure 11 presents the beginning of the wiki defined on 18 October at quarter past 11 pm. On 19 October at 5 pm, it has advanced a lot. Many students have already added plenty of materials (see the scroll bar on the right hand side). Situation has changed during writing this paragraph. More important is that the wiki was presented with proper citation, internal and external links.

Figure 11. The progress of the wiki about cookies in less than one day

Moodle supports blogging, but students' feedback was not favourable. On a contrary, instead of being impressed, some students were against, mentioning "resistance to change". However, there are students with own IT specialised blogs and students who actively participate in such blogs. Whenever the activity coincides with the course syllabus, these students get additional points using grading option of offline activity.

Our version of Moodle has two remaining interoperability features: chat and glossaries. Before activating moderator reports, we intended to use chats for collaborative projects. But, blogs about Moodle chat were not enthusiastic. At the same time, number of students was huge (more than 200, which is 2,5 more than intended for instant concurrent activities), so we were afraid that due to massive chatting, Moodle could collapse, and we gave up from using it.

Glossaries seem to be a fantastic learning element enabling collaboration as well. It is very probable that we will soon exercise them with postgraduate students.

5. Effort needed to maintain the approach

Successfully finished undergraduate course in Skopje brings four ECTS credits. The course consists of three lectures per week, online activities and a final individual assignment which is a news log, containing the breaking news concerning course topics. The amount of online activities to obtain a workload corresponding to four credits is calculated each year after accomplishing the first activity.

In the last several years, first activity has always been a discussion forum. This year, it finished last week, so this was the real moment to calculate the amount of remaining activities. Estimation was done using the average number of posts (6,73), and the number of views. Here is the statistics so far. By 15th September 2010 (when the course become active) until 15th October, the course was viewed 20560 times, 19992 of which were student views.

To approach a certain goal, it usually needs in average four views. First view is the login, the second is the approach to some activity (for example, the forum), the third is the approach to a nested activity (forum subtopic), next is contribution to that topic, and at the end logout. In total, five views for one activity. But, usually between the first two and the last step, a participant goes through the discussion.

So, if the average time to prepare a post is half an hour, and the average time to see all other posts is 15 minutes (data from previous five generations), it appears that so far each student dedicated to this course 665 minutes, or 11.08 hours, which corresponds to half ECTS credits. The attendance at lectures and the preparation of news log worth further 2 credits. Estimation indicates that remaining 1.5 credits have to be distributed to 3 online activities during next 2.5 months.

Table 2 presents published posts distributed per topics. Within a fortnight, students daily published in total 43.71 posts, or in average 0.48 posts daily per student. This proves that student's interest for the course was permanently very high, which is a success.

Discussion topic	Students	Per student	Teacher
famous digital investigators	164	1.80	7
famous digital forensic cases	144	1.58	6
digital forensic methods and tools	121	1.33	9
digital investigator obligations	183	2.01	4
In total	612	6.73	26

Table 2. Number of views distributed to activity

Table 3 presents more detailed statistics of all the activities. Together, students and the teacher viewed the forum 3056 times, almost always on the way towards the discussion, which occurred 7331 times. It is interesting to notice that in average, after entering a forum, each participant viewed inside 1.40 subtopics, which shows that the interest for the outcomes of other colleagues was moderate.

Activity	Views	Participant
forum add	1	teacher only
forum add discussion	4	teacher only
forum add post	638	students and teacher
forum delete post	26	students only
forum update post	248	students and teacher
forum view discussion	7331	students and teacher
forum view forum	3056	students and teacher
total number of views	11123	student only
views per students	123.59	student only
number of views	232	teacher only

Table 3. Number of views distributed to activity

Another proof of the intensive engagement of both, the students and the teacher is the statistics from academic 2009/10. As mentioned before, the same course is held in Skopje and in Novi Sad. Table 4 presents the activity report after completing the course for undergraduates in Skopje and for postgraduates in Novi Sad.

The ratio between number of assignments and forums in Skopje was three times as much than for postgraduates. The inclination towards forums in Novi Sad was demanded by students. Knowing their professional engagements, this fact was very surprising for the teacher. Postgraduate course awards 7.5 ECTS, so the attainment and performance had to be twice as much as of the undergraduates. The report shows that the engagement of more mature students was much higher, particularly their active contributions

to forums. They were also interested to see the resources, something undergraduates sporadically did. On the other hand, teacher views in Novi Sad were lesser, but number of postgraduates was 10 times less, showing that the actual engagement increased.

PE Skopje	Resources	Assignments	Forums
total views	3604	10592	10910
student views	3532	9105	10576
views per student	22.35	57.63	66.94
teacher views	72	1487	334
PESR Novi Sad	Resources	Assignments	Forums
total views	1082	2260	14510
student views	994	1924	13826
views per student	66.27	128.27	921.73
teacher views	88	336	684

Table 4. Activity report from academic 2009/10

Since 2001, data about all the activities and workload concerning the courses presented in this paper and the course which was their predecessor have been collected. Comparative analysis shows that although obligations are equally balanced, next activity curves have a growing trend independently on the target group (degree and university). A curiosity is that the students are constantly present at forums, even if they had obtained the maximum grade. This shows that the model is stimulating.

Students' workload also increases year by year, again on students' own initiative. They are not only passive observers, but rather active contributors even if they had reached the maximum grade and additional points are not counted. They are motivated, and usually start additional

discussions. Moreover, they accept new collaborative activities and find them interesting. This shows that the model is well accepted.

Unfortunately, as a consequence, teacher's workload grows. Hopefully, due to introductory forum, critical mistakes are avoided, and grading is done on a basis of proper outcomes.

6. Conclusion and further implementation of E-learning 2.0

This paper presented a transformation of training and teaching style from E-learning 1.0 towards E-learning 2.0. There are many obvious benefits of this innovative approach. Here are the most important:

Socialization

Students are motivated, stimulated and sometimes provoked to reveal their own ideas. It is interesting that students known as introvert demonstrate great extroversion. Students with speech disorders are quite noisy on-line too.

Relaxed and efficient group collaboration

Students like participating in the creation of joint products, particularly when there is no need of formal meetings. They read with attention what their favourite mates wrote and add the missing parts. They sometimes "polish" the outcomes of colleagues they don't like, but it has never been rude by now.

Impossibility to cheat

LMS take care of timely delivery. They can disable uploading of late assignments and grading of late discussions. After only one missed deadline, students start respecting the closing dates, become punctual and responsible.

Impossibility to fake

It was noticed that student individual essays brought quite a lot serious problems, such as copying other's essays, particularly from previous years, or literal copying of essays found on the Web, or handing in essays found in different languages and then translated (manually, or by Google translate), and last, but the worst: handing in essays done by people who earn preparing

thesis. Online activities demand an individual access, avoiding making assignments on behalf of another. They are completely overt, so plagiarism is avoided.

Increased awareness

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) follow the latest news mainly from specialized blogs online.

Satisfaction with E-learning 2.0

Students spend hours using social media, and their participation in the course is similar to their ordinary activities. They like to share the knowledge and experience with others, so they are motivated to work more.

Grading facilities

LMS enable immediate grading and overview of student current grade. This is very stimulating for all the students independently on desired grade, the best one, or the grade to pass only.

According to our experience, benefits are bigger than disadvantages. However, new approach was a challenge for students, but even more for the teacher. Here are the gravest problems:

Impeccable infrastructure was a bottleneck

If the assessment is done exclusively on a basis of E-learning, it is inevitable to have a constant availability of the server, perfect Internet connection, and a permanently high scalability. In previous years, there were moments when some of these features were not fulfilled.

Participants were not constantly available

Social media impose constant presence, because new information is displayed and sometimes prompt reaction is needed. Online collaboration results in constant changes and some of them also need prompt reaction. It is exhausting for the students who have to regularly check what is going on. It is even most exhaustive for the teacher, who has to check all the activities several times a day, and to permanently actively contribute in the course evolution.

Treat to privacy

Social software in education is always a treat to student privacy. In our courses students are making mistakes due to lack of information in the course subject or because of missing experience. They can withdraw the post in the first half an hour after being published, if not it becomes permanent. It is evident that many students used the opportunity to withdraw the post. The amount of such posts (Table 3) was 26 out of 664, or 3.92%. The main reason was teacher's bad grade or reaction due to copying.

To conclude, implementation of E-learning 2.0 is very exhaustive for everybody and sometimes too transparent, but at the same time contemporary, and appreciated by students. Final student feedback done every year showed that without an exception, student's final opinion about the course was positive (Figure 12). 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". We do hope that this trend will remain, and that this year grades for the overall impressions about the course and the remarks will be at least as good as last year. Student's suggestion from 2008/09 "Keep up the good work" will be the major objective to carry on using E-learning 2.0 technologies for both courses.

LMS technology advances, so does the course. We've already started using forums, wikis, and external blogs. As announced earlier on, it is very probable that postgraduates in Novi Sad will collaboratively start making an internal glossary for the course soon. Their results will be localized and upgraded by postgraduates in Skopje. In another course, colleagues started examining Moodle internal blogs. Their experi-

ence will be essential for implementation of the blogs in the next future.

There are many other Web 2.0 features which became part of E-learning (tagging, folksonomies, mashups, RSS) which either exist or will soon be implemented in Moodle. Our course will probably switch to some of them, but 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" (E-learning 3.0). Time will show when will they become massively used.
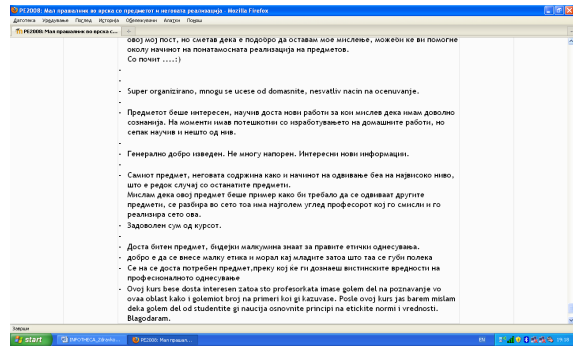

Figure 12. Student's encouraging feedback

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