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Reinforcing social media based learning, knowledge acquisition and learning evaluation

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Abstract

The birth of current students coincides with the rise of the first social media websites, making young people the most competent and the most frequent consumers and creators of social media content. Their savoir-faire in new technologies is a great motivation to intensively use various e-learning 2.0 elements in the process of learning, teaching and knowledge acquisition. This paper presents the experience from a study that stimulates the social media elements existing in the learning environment, and reinforces the use of various techniques intended to enable focused online collaboration and knowledge acquisition. In order to support cutting edge learning, the approach stimulates a pervasive access to scholarly articles, breaking news existing online, and open educational resources.

The study has been performed for almost a decade in computer ethics courses attended by senior undergraduates from the University of Skopje, Macedonia, and junior graduates from the University of Novi Sad, Serbia. The paper exhaustively overviews the simulation of the social media inclusion in the learning process, as well as the activities performed during its execution. The subjective student impression of all implemented techniques is contrasted with the teacher estimated amount of acquired knowledge. The paper also emphasizes the benefits of the implemented approach, suggestions to educationalists intending to employ it themselves, and finally the intentions of the further inclusion of social media in educational technologies.

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1. Introduction

Since the late 1990s, when the first real social media sites like SixDegrees.com were launched (Elison, 2007), the amount of active users raised from several million to more than two billion (Regan, 2015). According to various reports, 61% of the global online population worldwide actively accessed social networks in 2015. For most of them, and predominantly for younger adults, the use of social media is ubiquitous.

However, social media don't provide computer-mediated communication only (Elison, 2007), they also stimulate "the creation and exchange of user-generated content" (Kaplan & Haenlein, 2010). Ever since Wikipedia was created in 2001, it has grown to more than 39 million articles in 290 languages visited by 374 million unique users monthly (Wikipedia, 2016). Even more impressive are the statistics about YouTube, which estimates more than one billion users who viewed or contributed to the creation of hundreds of millions hours of video content (https://www.youtube.com/yt/press/statistics.html). Finally, various independent blogs, and particularly the microblogging services and internal blogs within social media sites rose an enormous popularity in everyday activities, but also in education (Veletsianos, 2012).

Modern students, who were growing along with these new technologies and services are neither scared nor fascinated by pervasive computing. For them, the use of technology is quite a natural phenomenon, and they feel comfortable consuming the social media. Therefore, the reallocation of ubiquitous elements into learning management systems is considered an extension of their everyday activities in education (Jeon & Hong, 2013). Moreover, the research made with the students from three universities proved that social media offer new opportunities for interaction, collaboration, and content creation (Gikas & Grant, 2013).

First promising experience of intensive implementation of e-learning 2.0 techniques at the University of Skopje and the University in Novi Sad was reported by Zdravkova, Ivanović & Putnik in 2009. In the following years, the employment of social media features integrated in the learning management system continued (Zdravkova, Ivanović & Putnik, 2013), resulting in the permanent and concentrated application of role playing (Zdravkova, 2014).

Student favourable feedback and the gained familiarity with the approach were the crucial stimuli to reinforce the social media based knowledge acquisition, and to focus the assessment to social media implementation. Current experience is presented in this paper. The structure of the paper is the following: Section 2 is dedicated to the educational use of social media elements. In the Section 3, the implementation of the most important technology enhanced elements in both courses, which share a similar structure with two target students is presented in details. It is followed by Section 4, which presents student's subjective impression about the amount of acquired knowledge. Then it is compared with their final results. The closing section briefly introduces the major advantages and challenges of this approach, presenting the recommendations on how to successfully implement new educational technologies, which are derived from teacher's observations and student's preferences. The paper concludes with the future plans and intentions to maintain the same manner without risking to exaggerate with the implementation of social media.

2. Transformation of education in the digital age

Reinforced interaction, active collaboration, social networking, self-broadcasting, and massive sharing are the key features of Web 2.0. Bartolomé (2008) suggests that Web 2.0 enables learning at any place, social construction of knowledge, tag production, the concept of studying "any place, any time", learning from peers and use of e-learning 2.0 as commercial promotion. The altered role of teacher and student demand, the incorporation of new e-learning strategies and their optimal and effective absorption, in a conjunction with new infrastructure, support the mechanisms and services, which result in a more competitive education. It ensures full integration of rewarding, effective and technology enhanced learning (Gomes, Fonseca & Serrano, 2014).

Nowadays, learners are accustomed to technology, they have a very strong digital literacy, an intensive access to social media, and to all the resources available online via mobile computing devices or laptops. These typically digital age phenomena provide them with the opportunities for interaction, collaboration, and active engagement in content creation and communication (Gikas & Grant, 2013). Therefore, pedagogy should be reconsidered to fit into the digital era (Beetham & Sharpe, 2013). This also refers to education, which should be remodelled to enable active forms of learning where learners can take control of their own studying and knowledge gathering, generate inputs to digital repositories; participate to crowdsourcing, and benefit from the advantages of social media. Moreover, social media facilitate the creation of personal learning environments, providing learners with the opportunity to be

independent and self-regulated (Dabbagh & Kitsantas, 2013).

Permanent presence of students in the online communities, their interaction and exchange of experiences, brought a new dimension to education. In the virtual social setting, Siemens (2004) announced an alternative learning theory, entitled connectivism. He introduced the seven crucial principles of this theory, including its ability to see connections between fields, ideas, and concepts as a core skill; the intention of connectivist learning activities to strengthen the accuracy and up-to-date knowledge; the right to make the right decision what to learn and how to interpret the meaning of incoming information; and the support to continual learning. In his further discussions (Siemens, 2006), he systematically compared connectivism with the three learning theories: behaviourism, cognitivism and constructivism. He also stressed that with the new models of socialization provided by technology, learning has become a network phenomenon. In a conjunction to this theory, Downes (2006) deduced that new dimensions of technology and their impact to society implemented to education introduced so called connective knowledge. In the e-learning 2.0 connectivist environment, where resources and services are organized to offer learning opportunities, network learning occurs, and as Siemens (2006) claims, it is no longer an internal and individualistic activity. Finally, connectivism is no longer a learning trend only, because it can "actuate knowledge at the point of application" (Siemens, 2006).

In the first Open University studies focused on group problem solving using their platform for distance education, cooperative learning was named a computer-supported collaborative learning (O'Malley & Scanlon, 1990). In both educational approaches, students were divided into smaller groups sharing the same space to communicate in order to resolve a common academic goal (Kaufman, Sutow & Dunn, 1997). The crucial prerequisite for a successful cooperative learning is the precise prior preparation and structuring of the tasks to fulfil the five essential components: positive independence, promotive interaction, individual accountability, interpersonal and small-group skills, and group processing (Johnson et al, 1984). They differentiate it from collaborative learning. In the past, both concepts were performed in the classroom. Nowadays, the technology development, and the high Internet usage among high school students enables moving the communication ground towards virtual environments.

Wikipedia, the largest Wikimedia Foundation project has over 15 million articles published in its ten most represented languages (Wikipedia, 2016). It is a fantastic example of a massive collaborative project. Wikimedia Foundation supports Wikiversity, which is devoted to support learning and research (wikiversity.org) and WikiEducator, among whose goals is to work on building open educational resources (wikieducator.com). Open educational resources (OER, https://www.oercommons.org/) are teaching and learning materials, usually published under Creative Commons or GNU license. They include several high quality university ethics courses, for example the award winning course Ethics and Information Technology from University of Michigan Open.Michigan initiative (Conway, 2015). As part of OER movement, first massive open online courses, better known under their abbreviation MOOCs, as Coursera (https://www.coursera.org/), Udacity (https://www.udacity.com/) or Khan Academy (https://www.khanacademy.org/) emerged. They have changed the way of teaching and learning, creating many new opportunities (Martin, 2012). In the sixth chapter of the book on furthering higher education possibilities (Mesquita, 2015), Coelho (2015) reviews MOOCs in the light of learning theories and emphasizes that they will become "a powerful vehicle to provide disregarded populations with access to higher education". Most of these online lectures, accompanied with online discussion enable the creation of so called flipped, or inverted classroom learning, where typical home and classroom activities are flipped, offering a win-win strategy (Herreid & Schiller, 2013).

Gamification is another interesting trend arising from the pervasive use of Internet, social media and crowdsourcing (Sakamoto & Nakajima, 2014). It encourages game-thinking and playing games in non-game contexts. Combined with social networking implemented in e-learning environments, gamification is implemented to evaluate student assessment. Recent study confirms that with gamification, skill acquisition is better (De-Marcos et al, 2014), while role-playing fosters the comprehension and awareness (Zdravkova, 2014). The details leading toward the second conclusion are presented in the following sessions of this paper.

3. Implementation of new educational concepts in computer ethics courses

The same broad computer ethics course is elective for undergraduates from the University of Skopje and for graduates from Novi Sad. It is delivered in the winter semester. The total workload is 180 hours, which corresponds to 6 ECTS. The undergraduates enrolling to this course must have completed at least 120 ECTS credits from their

prior courses, so the youngest students are in the fifth semester, although the majority of students enrol it in the seventh semester. Graduates are either in the seventh, or in the ninth semester, the eldest usually not older than 25 years. Since this is the first computer ethics course for all students, the syllabi, study packs and assignments are very similar.

Undergraduates have four lectures weekly during 15 weeks, while graduates have three two day sessions delivered by the same teacher, who is a part-time visiting professor in Novi Sad. During bachelor study lectures, four carefully selected guests from industry present their professional experience and answer to students' question. Furthermore, two or three lecture blocks are dedicated to films matching the topics of the course, such as, "Pirates of Silicon Valley", "The Social Network", "Steve Jobs", and to several selected TEDx talks (https://www.ted.com/watch/tedx-talks). Graduate students must watch the same content on their own. These videos are the starting line for further flipped classroom activities.

All the lectures, guest presentations, accompanying links to important sites, as well as the links to open educational resources, massive online open courses, and TEDx talks are given within the closed faculty learning management systems. The guidelines on how to prepare the assignments, instructions for preventing plagiarism, along with the samples of well-prepared essays and journals are presented together with the grading scheme and activities calendar. The student assignments are the following: individual essay (15% of total grade), journal with news from directly connected with the course syllabus (20%), collaborative wiki writing and editing (20%), role-playing project (25%), and cooperative content creation (20%). Individual essays are usually assigned in the second part of the course, when students are already familiarized with the rules of academic honesty, proper referencing and citation of sources. Students are given a list of topics, from which they can choose only one. The group researching one topic should not exceed five students, in order to avoid "collective" preparation and ghost-writing. The essays should be 1000 and 1200 words long and based on at least 10 independent references. The journal is an obligation which lasts from the first until the last day of the course. It should consist of at least 15 relevant breaking news, which are supported by at least three sources and uniformly distributed to cover all syllabus topics. At the end, five selected news should be explained in more details, not exceeding 100 words per news, including the references.

3.1. Collaborative and interactive content creation

The LMS embedded wiki is created over several key articles carefully prepared by the teacher few days before the wiki becomes visible to students. Students extend the existing material, add many new articles, links, and tags. Editing and extension of already prepared articles is encouraged. These obligations end two weeks before the course is over. After finishing with it, students deliver a report with the titles or links to the articles they created, extended or aesthetically improved. This year, 56 undergraduates actively participated in the creation of an encyclopaedia of computer ethics. In their wiki network, they created 239 unique articles, made 6695 edits, 4758 of them being new articles, links or tags, while 1797 were updates. They viewed the wiki 14147 times. In total, their final wiki consisted of impressive 157436 words. Their average grade for this online activity was 77.50 points out of 100. The massive participation, the extremely good results, the amount of produced material and the amount of viewed and exchanged posts in the forum aimed to technically support the creation confirmed student's interest for this collaborative activity.

3.2. Online and in class role-playing

Role-playing starts with an in-class presentation of a film or several TEDx talks, which initiate the roles in the following online game. Roles are carefully selected to cover two or three opposing themes and seven to eight roles that are complementary with them, all consistent to a small exciting story (Zdravkova, 2014). Picked roles are visible to all student prior to their own selection to enable grouping of students who prefer working together. The game is performed via two forums: a broad discussion arena and a private one. In the common forum, all students discuss together, defending the role they selected. They initiate new themes for discussion, extend the existing premises, or oppose their findings to the discoveries of their mates. The teacher is an active participant of the forum and directs the whole discussion towards corresponding team points of convergence. Every single post is graded immediately. It stimulates students to carry on with their research more vigorously. The average result of 67 undergraduates participating in the forum was 62.85 points. Only 57 graduates actively participated in the same forum and obtained fascinating 82.80 points, proving their capability of critical thinking and good articulation of

learned information. The second part of role-playing is the cooperative content creation.

3.3. Cooperative content creation

This activity is done in the private forums, which are visible to team members only. Private forums are personal learning networks used for role-to-role communication, where team mates first select their leader and the presenters of the final report, reveal strategies for a better performance on the broad forum and debate about their final report. This is the place where they deliver the individual reports consisting of approximately 500 words, upon which the team leader creates the final report. After all online activities are finished, teams publicly present their reports. Each presentation takes about 10 minutes, including the time for questions from members of other teams. During the following two lecture hours, public role-playing takes place in the class. This year, 65 undergraduates participated in the role-playing game accompanied by cooperative content creation, with an average result of 64.80 points. The average grade of 79.65 achieved by 62 graduates confirmed their maturity to communicate professionally and their great enthusiasm to participate in the role-playing game.

4. Student perception of implemented learning techniques

The course was enrolled by 77 undergraduates, and 53 of them have successfully finished it by mid-January, with an average grade 8.23 out of 10. The best results were achieved for the creation of the journal of breaking news in the area of computer ethics (84.92 out of 100 points), the internal wiki (77.50 / 100 points), and for the individual essay (73.76 / 100 points). These assignments are completely individual, suggesting that students work more prudently and thoroughly when they complete their obligations alone. But, the interest to complete these tasks was rather low: the journal was kept by 59 students, wiki was created and edited by 56 students, and the individual essay was prepared by 62 students. Cooperative content creation, online and in-class role-playing attracted 67 students. Their results were not as successful, ranging from 62.85 points for the discussion forums supporting the collaborative content creation to 64.80 points obtained for the role-playing. The inferior results were mainly a consequence of the informal attitude towards social media activities.

The graduate course was elected by 66 students. They started it in November, and their final results were available by mid-February 2016. Only six students have not finished the course. The average grade of the successful graduate students was 8.66 out of 10, proving their enthusiasm and experience to complete the assignments promptly and precisely. Unlike undergraduates, graduate students were more responsible, and all the students actively contributed in all the assignments. They exhibited their best performance in the role-playing games, particularly when the game ended with in class discussions. The average grade of role-playing was 87.26 points, which is significantly better than the outcome of their individual essay, which was graded with the modest 71.48 points.

4.1. Student feedback

After the completion of the course, undergraduates from Skopje were invited to answer a questionnaire about the course; the quality of the learning techniques implemented in the course; the estimated own level of awareness obtained about the broad topics from the course syllabus; and the level of acquired knowledge obtained while preparing the five student assignments. At the end, they had to give their personal opinion about the realization of the course as a whole, and to suggest improvements.

The feedback submitted by 46 students is very fruitful and showed that they approved the intensive application of social media in this course. Unfortunately, the internal feedback policy in Novi Sad is not acceptable. The external faculty evaluation will be available at the end of the academic year, but it is very general, thus not valuable to estimate the student's impression about the implementation of learning technologies.

The questionnaire consisted of an introductory part about the necessity of the computer ethics course, and its influence in the understanding, profiling and maintaining ethical values. The majority of 73.91% students found the course crucial for their professional development, and additional 13.04% insisted that the course should be compulsory for all the computer science students. The undoubted positive effect of the course over student's professional and personal ethical behaviour was highlighted by 78.26%, while 19.57% had an impression that it had not changed their professional conduct, but increased the awareness for computer ethics.

Overall impression about the realization of the course was partially approved by 17.39%, 34.78% had minor concerns, and the majority of 47.26% were impressed by the extraordinary way it was performed.

The second part of the questionnaire was concerned with the correlation between the level of acquired knowledge and the implemented learning techniques. It consisted of a question in which students were supposed to give one or more answers about the improvement of their knowledge in the course topics and to judge which activity increased their knowledge. Students estimated that they learned the most about the privacy (78.26%), and the information access (60.87%), topics covered with two role-playing games. The comprehension about reliability of computer technologies was estimated much lower (39.13%) and it was covered by an individual essay. The answers to question: "How much has one activity increased your prior knowledge" are the following: role-playing 54.35%; lectures 52.17%; individual assignment 45.65%; the journal 41.30%; cooperative content creation 34.78% and wiki 29.27%.

Table 1. Frequency of the perception of undertaken activities in the forums related to the expected grade

Activity in the forum	Expected grade	6	7	8	9	10	Total
I haven't read the forum at all		2.17%	2.17%	0.00%	0.00%	0.00%	4.35%
I read the discussions only		0.00%	6.52%	0.00%	4.35%	2.17%	13.04%
I read the titles of the posts and replied from time to time		6.52%	4.35%	2.17%	2.17%	0.00%	15.22%
I read the discussions carefully, examined them and replied		6.52%	2.17%	8.70%	10.87%	4.35%	32.61%
The discussions provoked me to do research and to critically think		0.00%	2.17%	4.35%	4.35%	23.91%	34.78%
Total frequency per grade		15.22%	17.39%	15.22%	21.74%	30.43%	100.00%

They are correlated with questions about each learning activity during the semester, and compared with the estimated final grade, according to student personal impression about own performance during the course. The majority of those students who approved role-playing stressed that they carefully read the posts, examined them, and that the discussions motivated them to do more research (Table 1). The results also reveal that the posts by other mates inspired better students to higher intellectual commitment, research, gathering of relevant information necessary to either support the realistic inferences, or argue against the inaccurate conclusions. The best students were convinced that the discussions within role-playing games inspired them to critically think. This is in fact the teacher's crucial goal for this activity.

Table 2. Frequency of the satisfaction with the complete role-playing related to student expected grade

Student's personal impression	Expected grade	6	7	8	9	10	Total
Demanding task		0.00%	2.17%	0.00%	2.17%	0.00%	4.35%
Obligation that must be finished		8.70%	8.70%	4.35%	4.35%	2.17%	28.26%
Obligation I liked		2.17%	4.35%	4.35%	6.52%	4.35%	21.74%
Great experience for future team projects		4.35%	2.17%	6.52%	8.70%	23.91%	45.65%
Total frequency per grade		15.22%	17.39%	15.22%	21.74%	30.43%	100.00%

The next two tables present the frequency of student satisfaction with the cooperative project realized through role-playing (Table 2) and with the cooperative content creation, which was not supported by forums (Table 3). While the majority of all the students approved the role-playing cooperative content creation supported by discussion forums, stressing that is was a great experience for future team work (45.65%), the agreement with the cooperative content creation was even higher. Namely, 71.74% endorsed it, compared with 67.39% who preferred the collaborative preparation of joint reports supported by the discussion forums.

These two tables also show that the collaborative content creation supported by role-playing was considered more demanding than the group creation based on gathering the individual essays and uniting them into a joint report (23.91% out of 30.43%, or 78.57% of all). While almost half of the students expecting the smallest two grades completed both tasks because they were compulsory, none of the students expecting the best grade expressed any disagreement with them. General approval of the role-playing was emphasised by 45.65% of the students,

particularly the better ones, explicitly showing that more diligent and dedicated students appreciate the permanent, consistent and disciplined presence in the online activities. The agreement with the role-playing was the highest among the students expecting the best grade (23.91% out of 30.43%, or 78.57% of all the students believing their grade would be 10), while the correlation of the answers to both questions obtained by the students with inferior expected grade was 1.

Table 3. Frequency of the satisfaction with the collaborative content creation related to student expected grade

Student's personal impression	Expected grade	6	7	8	9	10	Total
Demanding task		0.00%	2.17%	0.00%	0.00%	0.00%	2.17%
Obligation that must be finished		8.70%	8.70%	2.17%	6.52%	0.00%	26.09%
Obligation I liked		2.17%	4.35%	4.35%	8.70%	19.57%	39.13%
Great experience for future team projects		4.35%	2.17%	8.70%	6.52%	10.87%	32.61%
Total frequency per grade		15.22%	17.39%	15.22%	21.74%	30.43%	100.00%

Half of the students found the journal and the individual assignments very interesting, for 19.57% they were an easy obligation, 15.21% thought that they were an obligation that should be finished, 10.87% liked them a lot, the remaining 4.35% complained they were too complex. Although the fascination by the wiki was small, 36.96% found it exciting, but 21.74% disliked it because they found themselves incompetent.

The final two questions were the impressions about the realization of the course, and the suggestions to future students who intend to enrol it. No matter the final grade and the opinion about various learning activities, most students stressed that the overall realization of the course was extraordinary. They were impressed by the vigorous pace, the unusual way of knowledge evaluation, the unique concept and the personal competence. One comment was particularly interesting: "I learned many new things, I feel more informed now, and in the future, I will be able to argue more competently about the impact of computer science and technology". Very valuable for the future development of the course were the negative statements. One student complained that the workload exceeded the workload of three courses, another insisted that it was too demanding and the deadlines were too strict, third student was not satisfied with the lack of capacity of the mates for team work, and finally, one student argued that many students loaded the forums with trivial information to get the points. Teacher agrees with all these comments.

5. Conclusion and further employment of social media in computer ethics courses

The crucial advantage of the implemented approach at both courses is its intense, overt, interactive, competing, and vigorous completion, during which students discover an immense amount of new information in a very relaxed and informal, but at the same time, very focused, determined and motivating manner. It is definitely tailored to student permanent presence online, facilitates the free expression of thoughts, promotes the development of critical thinking and building of own standpoints inspired by the opinions of others.

Although not highlighted by students, the inclusion of social media based activities is extremely demanding, particularly for the teacher who should permanently have an overview of all activities, and must be ready to react immediately and mediate in the debates, which are sometimes not as refined as in a formal discourse. Another problem is the limited access to crucial information, which is either strictly commercial, or accessible for registered users only.

Educators willing to implement a similar methodology should be aware that this is the hardest way to deliver a course and assess students. They should be careful to keep things under control, and don't let students endanger their privacy. Teams should be small, flexible and compact, with 5 to 10 students. Deadlines should be defined in advance and never extended. Public discussions must be valued more that online discussions.

Bearing all of this in mind, in the following years, the course will proceed using the same learning and evaluation style. The cooperative creation will be extended to role-playing, with an emphasis to public presentations. Individual wiki creation will be transformed into a small group project, to enable less competent students to participate to content creation. More time will be reallocated for in-class activities. Finally, the evaluation of the journal will be graded in two parts, the first one connected with the breaking news, the second with the public discussions about the news that impressed students the most.

In order to reduce the complaints about the enormous workload, flipped classroom activities will be promoted. To eliminate the trivial discussions, and reduce repetitions, broad forums will be divided into smaller and more concentrated ones with topics that never overlap. Teacher will be again very active, particularly in the beginning of the course, to direct students towards critical thinking. With many short and expressive posts, teacher will try to convince students that the quality of produced material is more valuable than long and pointless posts, showing that the effort on something that leads to a little success is a total waste of time. New students will evaluate whether these decisions were right.

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