E-learning as an effective educational space in Poland: the benefits and disadvantages of studying using Moodle

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ABSTRACT

Purpose: The purpose of this paper is to present the benefits and disadvantages of e-learning form of teaching in students' opinion at Częstochowa University of Technology and Wrocław University of Technology.

Findings: The main achievement relates to clear indication of main problems with an e-exams in both, students' and staffs' opinions. The biggest disadvantage of e-exams is taken into account only the final results, without taking into account the way of thinking. This article provides a practical way to solve this problem. The achievement is presentation structure of respondents'/students' because of age, gender as well as type of studies. Valuable and original results in both cognitive and application related terms to the determination of education trends have been obtained.

Research limitations/implications: Research and analysis, in spite of their interdisciplinary scope, have been limited in the field of educational processes. Due to the specificity of the issue, it is difficult to estimate the economic impact of the implementation of the proposed solution. Researches were carried out among 698 students from Czestochowa University of Technology and Wroclaw University of Technology located in Poland. Surveyed using a standard questionnaire on students experiences attending an e-learning courses and an e-exams.

Practical implications: Within only a few years, the use of e-learning has increased rapidly in Poland. Although the advantages and disadvantages of e-learning have been discussed in various previous studies; it is a significant issue of better understanding the reasons why some students are dissatisfied with their e-learning practice. The practical application of the proposed solution is related to the increasing demand for e-learning form of study among students but also among teachers. The main aim of researches was to improve studying in the Moodle platform.

Originality/value: Presented in this paper author's opinion in the field of education trend is an original approach of the subject. The main factors' in the field of education trends have been indicated.

Keywords: E-learning; Moodle platform

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EDUCATION AND RESEARCH TRENDS

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1. Introduction

Considering rapid and significant for humanity socio-economic and civilizational changes-called information revolution-of which the consequence is the formation of the network society, information society, knowledge-based economy (in science there are several terms), in many countries intense search for new, more effective educational models can be observed. One notes the fact that young people treat the Internet as the permanent element of reality, including the main source of the educational content, and their interest is attracted mainly by those materials and information which are useful in life [1,2]. Reports and expertise on education and economy suggest that in contemporary reality school should become different-more innovative, creative, cooperating, using new technologies. The requirements of the employers' representatives to make each graduate, regardless of the university and completed specialization, be equipped with the competence useful in the reality of modern economy meet with a large social approval – especially competence associated with using information and communication technologies [3,4]. Moreover Brown and Park demonstrate that learners' knowledge and research self-efficacy improved between pretest and posttest, with no significant difference between online students and traditional face-to-face ones [5].

Research shows that in 2009 more than 45% of Polish public universities had already used the e-learning [6]. Size and versatility of the educational offer include complete programs implemented through e-learning, present in the education systems of the most developed countries. US News and World Report state that in the context of distance learning in the winter semester in 2005 in the United States there operated 383 programs leading to the degrees in the fields such as business, education, engineering, nursing, and public health. According to Flores et al. [7] it can be assumed that both traditional offer supplementation and the process of replacing the traditional schedule with different e-learning forms will continue to take place.

Education consisting in performing tasks using Moodle and other related resources and Internet Tools reveals new unknown areas and opportunities to the students. It makes young people realize what is the educational usefulness of the network and how many abilities associated with the efficient use of the Internet (other than entertainment or social) they still have to possess. It allows one to develop. The article discusses e-learning advantages and disadvantages on the example of surveys conducted at the

Wrocław University of Technology and the Częstochowa University of Technology. At the Częstochowa University of Technology e-learning classes apply to both exercises and projects, as well as the lectures. While at the Wrocław University of Technology the educational portal of Faculty of Chemistry is mainly used to support teaching and conducting stationary classes, as well as to the mass students' examination. For this reason the survey conducted among the students of the Wrocław University of Technology who take some classes at the Faculty of Chemistry focused mainly on the e-tests system and the students' feelings connected to the electronic competence control.

2. The study (e-learning)

E-learning is one of the knowledge transferring methods and it is being increasingly used in Poland in an economic education at the university level. Distance learning can be defined as this form of education in which the interactions between the learner and the teacher do not require the presence of both educational process' participants at the same time in the same place. The development of modern information and communication technologies contributed to the increasingly common support of teaching by using computers and the Internet (e-learning). Enrichment of the teaching offer at the level of academic courses, just by creating learning opportunities through the Internet, is a noticeable trend also in Polish academic practice.

E-learning, until recently known as the future of education, becomes the present before our eyes. It brings a number of new opportunities [8]. Table 1 shows the main e-learning advantages and disadvantages [9-11]. Whereas physical and psychological aspects of e-learning are gathered and comments by Genevieve Johnson [12], his or her own creativity, learning by doing, interactivity, cooperation and discussion, as well as using the knowledge in practice.

Comparison presented in Table 1 allows one to notice that e-learning benefits are mainly associated with an increased knowledge availability, as well as with an improvement and enhancement of the teaching-learning process, while the disadvantages are primarily related to the sphere of human relations. Therefore, e-learning advantages are much more precise for the user, more "tangible" than disadvantages which may seem being less important.

Table 1.
E-learning advantages and disadvantages

Advantages	Disadvantages
Content standardization	Lack of the personal contact with the teacher
Precise control of the learning process and its effects	Lack of the direct contact with other learners – the feeling of isolation
The accessibility to the course's online materials at anytime from anyplace.	A high level of self-discipline or self-direct is required.
Reduced tuition costs (important especially in the case of training large number of people, e.g. for companies)	The difficulty in an appropriate and individualized learners' motivating
Increased availability of educational services (lack of spatial barriers, which is important e.g. for people with disabilities)	The diversity of results depending on learners' computer competence
Making learning process more attractive through the use of multimedia	The need to have hardware with suitable parameters
The possibility to learn at one's own pace and at the chosen time	Greater amount of time from the tutor's side (preparation of the materials, correspondence with students)
Minimizing students' fear and timidity	Vulnerability to technical problems
Learners' implementation to being systematic and self-reliant	No rules concerning diplomas' recognition
Removal of restrictions related to the time and place of study	None or very limited opportunities to acquire and improve practical skills, which is crucial within the fields such as medicine or performing arts
In the case of e-tests: objectivity of the evaluation	In the case of e-tests: key evaluation (the final result is being assessed, not the line of reasoning)
Velocity of the assessment (the grade can be issued immediately after the test)	Problems with the remote verification of the identity of the students taking e-tests

Since it is easier to appreciate attractive ways of content presentation and the freedom which e-learning gives, rather than speculate about negative consequences of human relations marginalization [13]. It must be added that that varied multimedia learning content is a crucial for improving e-learning efficacy, performance, and motivation among students [14].

E-learning is not only connected with studying itself, but also with the competence control [15]. Tools to control knowledge can be available on-line and can be used for self-evaluation of the student's knowledge from the particular material range (e.g. they allow the student to decide to sign up to the language group at the basic level, intermediate, or advanced) or they can be used to examine the students. At the Częstochowa University of Technology in 2013 studied 11,5 thousand of students, including 5,5 women. Currently on the full-time and part-time programs within 28 fields there study approximately 11 thousand of students who have the choice from more than 100 specialties. For the comparison Wrocław University of Technology educates as a whole 34 428 students in twelve

faculties, and in the 2014/2015 academic year it is planned to matriculate 10 261 students. The majority of newly admitted first-year students attends classes "Algebra with Analytical Geometry" (Fig. 1). In addition, in this course participate students who retake this subject, as well as extramural students. Examine such a large number of students was a major logistic challenge. Thus, a special e-course was created, which serves as a supplementation to the traditional classes. Students gained a compendium of knowledge from this subject and from the interactive exercise pages. The different math problems with varying data are generated every time that an exercise or a test is being opened. Moreover, the test problems are of the same type as the problems that can be found on exercise pages. Therefore, students can independently repeat issues raised during the lectures and perform self-evaluation of their own knowledge.

Due to the fact that the random questions are from a larger pool of issues and variables in the tasks are determined randomly, de facto each student receives an individual set of exam questions.
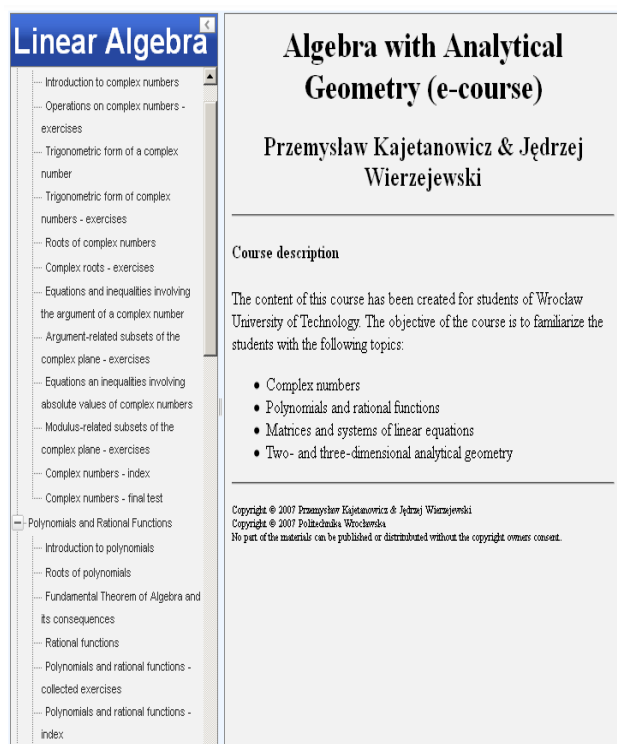
Fig. 1. E-course algebra with analytical geometry

In this way it was possible to replace traditional paper colloquia with e-tests. Every student after logging in to the system received an e-test generated for her/him. At the time of e-tests introduction, students gained an opportunity to obtain objective evaluation almost immediately after the test. It was important for students retaking their exams, as thus they gained more time to learn before the final exam.

Initially, on the didactic server of the Faculty of Chemistry at the Wrocław University of Technology there were placed "static" course materials such as schedule, instructions or excerpts from the lectures, which supplement traditional courses. Using Moodle enables one to introduce the number of interactive elements and activities like chat, lessons, exercises, quizzes, and "flash activities". The platform has become not only the source of information exchange between the lecturer and the students, but also it gave the possibility of self-evaluation of the knowledge and gained functionality of electronic tutor. A typical example of self-assessment tasks is related to the introduction of the chemical compounds' structures. Biotechnology students on their first year have to learn about the structure of the amino acids. They can assess their knowledge in a shared e-test where trough the Java support in the web browser they can draw the compound structure. JME editor is used to a structure interactively and

answers are converted to SMILES chemical markup language. It allows the students not only to verify their knowledge, but also to familiarize with the way of introducing chemical structures to the computer, which is important also e.g. in searching scientific information in e-library. Electronic tutor was another convenience for the students. At the Wrocław University of Technology students have an access to their lecturers during certain consultation hours. However, a large number of students admit that they learn in the evenings when there is no possibility of a direct contact. In this case useful is an electronic tutor which contains analysis of the problems which students most often report during traditional classes. Additionally in the case of computational tasks, the diagram of solving the particular problem is shown, and the student may interactively participate by typing intermediate results which are the solutions to different stages of the task. Simultaneously on an educational portal there emerged a block solely dedicated to e-colloquia. It contains a set of examination tasks in subjects such as Chemistry, Physics, Physical Chemistry, Biochemistry, and Biotechnology.

3. Results and their analysis

Students' satisfaction survey on e-learning conducted at the Częstochowa University of Technology began in 2013. It concerns the quarterly period. Survey was conducted among 209 university students. As shown in top of Figure 2, the gender has been included in the survey because female students are more satisfied with tutors' contribution to the education of students than male students [16, 17]. Its aim was to determine the degree of students' satisfaction with the education form which is proposed by Moodle platform, as well as to improve e-learning activities, and to identify which form of activity causes the most problems for the students. According to the results, 41% of questioned students indicated that there should be more e-learning classes, and 32% that the number is just enough (Fig. 2a). At the same time 72% of the students said that they were satisfied with the activities conducted in an e-learning mode (Fig. 2b). But the main reasons given by those who were not satisfied with such classes were related to technical problems. Also students indicated that during 'face-to-face' classes all ambiguities can be resolved directly with the teacher, while generally in the case of e-learning classes solutions to similar problems are not immediate and students in online courses feel more disconnected from professors [18 - 20]. Students indicated

that mostly they were satisfied with the lectures conducted in the form of e-learning classes (41%). According to students' argumentation, on-line lectures allowed the students to study at a convenient time and pace [20]. Also in the case of e-learning classes there wasn't any problem with taking notes during the lecture or with repeating its parts. While in the case of a project students expected some hints and direct consultation with the teacher, which explains the negligible percentage of people interested in project classes conducted in e-learning mode. Quiz was the most common module used during the classes, also it was the most difficult form of completing lesson units (for 51% of the respondents). The main reason for this difficulty was the fact that the time to answer was strictly defined and that the students had only one chance to solve the quiz. A significant e-learning model disadvantage, which occurs in students comments, was the tasks using open-ended questions. Problems emerged from the difficulties in formulating responses in a manner re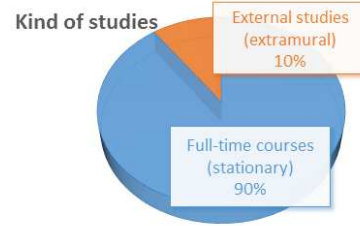quired and programmed by the teacher. For example the tutor defining the task in the course expected the response Customer Relationship Management, but the student answered customer relationship management. Such a response is treated as the wrong one, because at the beginning of words there are lowercase letters.

Among the most important advantages of distance learning students choose flexibility of work. E-learning platforms allow to acquire the knowledge and to realize the tasks in hours adapted to the rhythm of the student's day. The student has to comply only with the starting dates of particular modules and the deadlines of solving following tasks or projects. Without the compulsion to attend traditional classes with the teacher, students possess more opportunities to work or participate in other courses [21]. Quiz was the most common module used during the classes, also it was the most difficult form of completing lesson units (for 51% of the respondents). Quiz was the most common module used during the classes, also it was the most difficult form of completing lesson units (for 51% of the respondents). The main reason for this difficulty was the fact that the time to answer was strictly defined and that the students had only one chance to solve the quiz. A significant e-learning model disadvantage, which occurs in students comments, was the tasks using open-ended questions. Problems emerged from the difficulties in formulating responses in a manner required and programmed by the teacher.
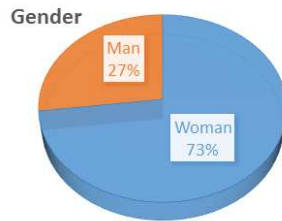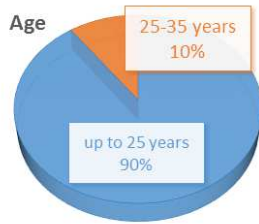
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Currently on the Faculty of Chemistry at the Wrocław University of Technology e-colloquia are taken by more than four thousand students. In the 2013/2014 winter semester only for e-colloquia on General Chemistry – exercises were registered 1098 students. With such a large number of students taking e-colloquia there emerges the question about feelings of people passing the subject in this form [22]. The answers were provided by the anonymous survey conducted among 489 students carried out in 2012-2014. Immediately after the completion of e-colloquia in one of four subjects (General Chemistry, Physical Chemistry, Physics, and Biochemistry) students were asked to identify the main disadvantages and advantages of the e-tests system. In order to not to suggest the answers the survey included open-ended questions and the students could enter any number of answers. Due to the fact that there existed a presumption that the answers given in the questionnaire may depend on the evaluation obtained by the student, the survey contained an additional checkbox allowing to indicate whether the particular student passed an e-test. At the end of the survey students might also enter their own comments regarding the system of e-colloquia. It should be underlined that the survey differed from the one conducted among students of the Faculty of Management at the Częstochowa University of Technology, because at this University e-learning classes are related to the exercises, projects, and lectures. On the other hand, at the Wrocław University of Technology educational portal of the Faculty of Chemistry is mainly used to support didactics and for mass examination of the students. For this reason the survey conducted among the Wrocław University of Technology students, who take some classes at the Faculty of Chemistry, focused mainly on the system of e-tests and the students' feelings connected to the electronic competence control.
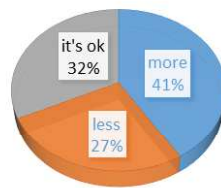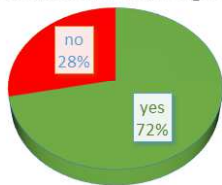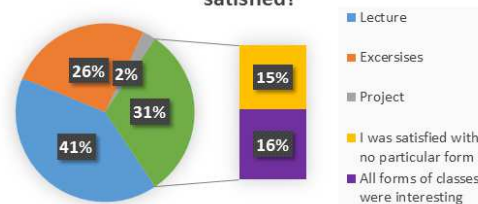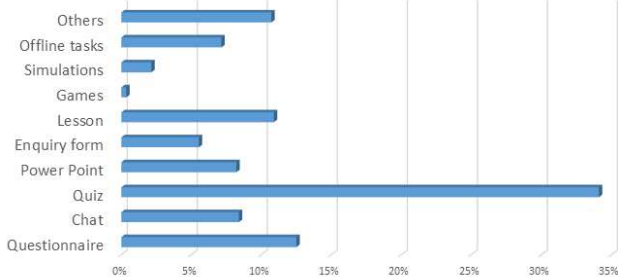
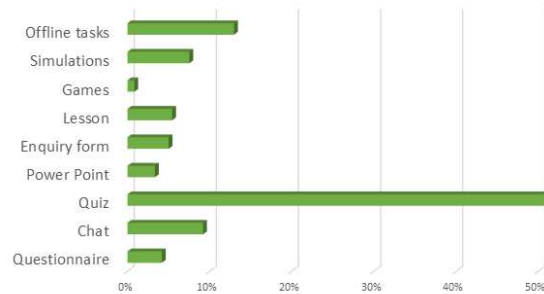Fig. 2. Respondents profile, influence of items regarding course satisfaction and differences regarding the satisfaction of the items related to teaching tools

4. Conclusions

In the results of the conducted survey the surprising was the fact that the students recognized the objectivity of obtained marks as both the advantage and disadvantage of e-colloquium. By definition computer systems guarantee to obtain an objective evaluation on the basis of a specific scheme of an e-test assessment. However, some respondents identified it as a disadvantage of a system, because they stated that in the case of "manual" tasks evaluation they can count on extra points associated with the attendance or being active during the classes. At the same time students who have passed the e-colloquium with the highest marks noticed that they couldn't demonstrate their additional knowledge, but only to choose the proper answer or to provide correct solution to the problem. Indeed-system adopted during the e-colloquia evaluates only the given answers, but it is worth noting that despite those comments Moodle also enables the "manual assessment" and assignment of extra points by the person who conducts classes.

A large number of the respondents recognized as the main disadvantage of e-colloquia, containing computational tasks, taking into account only the final

result, ignoring the line of student's reasoning. Mainly the problem with evaluating the line of student's reasoning occurs in the case of incorrect answer given by the student or raised objections related to the particular task. Practical solution to this problem was proposed on the Faculty of Chemistry at the Wrocław University of Technology. During the e-colloquia held in the computer rooms students under the supervision solve tasks generated by the computer. They can try to answer any task three times, which additionally allows the evaluators to check whether they can find a mistake in their reasoning or in their calculations. In the case of any ambiguity students may apply to the person supervising the test directly after the e-colloquium with the paper notebook containing the solution of the task. Depending on the complexity of a problem, the complaint can be considered directly during the test, during consultation, or discussed in class. In the justified cases the teacher has the ability to "manually" change the student's mark, taking into account not only the final result, but also the line of reasoning contained in the student's notebook.

The second aspect of the colloquia, which was perceived by the students as both advantage and disadvantage of the electronic system of examination, was timing the e-colloquia. On the one hand the timer allows the students to plan solving the test accordingly and guarantees that each student will be able to write the test for a defined period of time. On the other hand, some students were stressed by the timing, and even distracted. Some people who failed the test indicated in the survey that they were finishing solving the problem, but they ran out of few seconds. During the traditional test with less rigorous approach to timing they could finish solving the task. However, it should be acknowledged that electronically measured time of the test is the most fair and objective solution. E-colloquium may be available for students in the particular time period, students may also have appointed time limit to complete the test, comparatively there may

oblige fixed time limit for solving particular tasks (e.g. as it is now during the driving test). Also the teacher has the possibility to extend the time of solving an e-test, even during its continuation, for instance when there are problems with connecting to the server. It is possible to make an evaluation dependent on the time of solving the task, and for example to reward people who would send the correct solution to the problem in the shortest time period. Also the useful option is to specify the time between possible subsequent retaking of a test by the students. Hypothetical time arrangement between following retakes presented in the Figure 3 enables the students to write the e-colloquia in a convenient time, and simultaneously it makes the students unable to take the same quiz twice a day.

In the questionnaires students variously commented on the possibility of multiple answer correction in some tests. On the Faculty of Chemistry at the Wrocław University of Technology, in relation to e-colloquia on General Chemistry, Physical Chemistry, and Physics, the principle that students can re-enter the answer in the computational tasks has been adopted, but after each attempt they receive accordingly fewer points. In this way, rewarded are those people who faultlessly solve the task and correctly inscribed the result at the first attempt, and at the same time those who made a mistake in their calculation may correct their results. The possibility of correcting the answers repeatedly was considered as an advantage of an e-test by 59% of the surveyed students who passed it and only by 22% of those who didn't pass e-tests correctly. It is worth noting here that an information about mistakenly entered result and the possibility of re-entering answers to the particular question allows the person who takes an e-test to verify the result. For students who did not pass an e-test it is difficult to argue that they made a mistake in the calculation if they could re-enter the answers, and at the same time they were not able to give the correct result.

Fig. 3. Quiz timing control panel in Moodle

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As the greatest advantage of an e-test nearly 71% of the respondents indicated the publication rate of received mark-usually the final grade was available immediately after the approval of all answers by the person taking the test. Students who additionally commented on their indications admitted that in the case of passing the test soon after the e-colloquium they disposed of stress related to passing the subject and they can focused on next exams. Knowing the results, students who didn't pass the course could much more easily contact with each other, it was easy to notice that such persons exchange their phone number soon after leaving the exam room. In addition, due to the fact that the students received their results immediately, they had more time to study for the retake exam.

The majority of students (63%) positively assessed the introduction of an electronic system of signing up for e-colloquia. Thank to this fact from the available pool of dates the student can choose one which suits him or her best. In the opinion of teachers this system works perfectly in the case of organizing retake exams: students can remotely declare whether they wish to proceed with the retake and sign up for specific dates, and in the event of running out of available seats, the lecturer has the possibility to start the enrollment for the following dates.

Most people within the group which didn't pass the test, as the biggest weak point of an e-test considered the possibility of drawing "difficult" sets of tasks. Indeed some tasks may be recognized as more complicated, although in the systems such as Moodle, the teacher is able to prepare an e-test in such a way that one task is drawn from "more difficult" basket (with highly scored questions) and other tasks from the "easier" basket. It is also worth noting that in the case of traditional colloquia the division into groups is also often used, between which there may appear disparities in the difficulty level of the exam commands.

Remarkably, for the students the system of electronic tests itself was not a surprise. This is probably due to the revised methodology of evaluating the pupils, according to which already in elementary and secondary school written

exams are replaced by tests and exams assessed accordingly to the so-called key [23 - 25]. Moreover, by creating an account on the social network or creating an e-mail account, submitting an annual tax return via the Internet, passing the driving test, we are also taking specific e-quiz in which we have to enter relevant data. Some students admitted in the survey that the e-colloquia system itself is less stressful for them than traditional tests, because in the case of computational tasks in the quizzes part they could enter the answer several times. At the same time some students admitted that the most stressful, but also the most motivating way to control the competence is an oral exam, because the examiners often apart from giving the correct answer itself, also acquire its justification. However, with the current load of teachers, it is difficult to imagine the completion of each subject with an oral exam. On the other hand, electronic exams are by definition fast and objective way to control the competence.

An interesting experiment was carried out in 2012/2013 winter semester by the team conducting classes in Physics I on the Faculty of Chemistry at the Wrocław University of Technology. The condition of obtaining a positive mark was to pass two colloquia. First of them in an electronic form, which was provided for 952 students, was held in the middle of semester in designated computer rooms. For solving an e-quiz consisting of five computational questions students had 55 minutes. Each question was drawn from the separate pool, so that the whole e-colloquium included the cross-section of the material discussed in the first half of the semester. At the same time some parameters in the tasks were generated in a random manner so as to ensure the uniqueness of each test. For every question one could answer 3 times, but each incorrect answer entailed a punishment equal to 1/3 of the points available to obtain for this particular question. In addition, students could familiarize with all types of tasks a week before an e-test, solving specially available quiz test. Students were deprived of this possibility, in the end of the semester while taking the second test which took place in the traditional way (examinees had to solve set of tasks on the prepared sheets). Due to the different way of organizing colloquia and different difficulty level of the material obligatory for students in both cases, it is difficult to directly combine the results, although it is easy to notice the general tendency that the persons who obtained the highest scores from an e-test had no problems with passing the traditional colloquium. In contrast, the students who have not obtained the required number of points to pass an e-colloquium, also had the problem with passing the second test. It suggests that the mere form of controlling

the competence had no significant impact on the marks obtained by the students.

It is worth noting that in parallel to the survey conducted among the students, the employees involved in an e-learning were asked to identify the advantages and disadvantages of the electronic competence control. Like the students, the employees stated that the biggest advantage of e-colloquia is the objectivity of getting marks and the possibility to obtain an immediate assessment (eliminated was the time which was dedicated to check the paper tests). On the contrary, the biggest problem associated with conducting e-colloquia is related to the control whether an e-test is being solved by the right person and whether this person is not using any forbidden sources of information. Therefore, to prevent cheating and taking exams by unauthorized persons, the majority of e-colloquia at the Faculty of Chemistry takes place under the supervision in departmental computer rooms. All students have university e-mail addresses based on the unique student ID numbers. These accounts are necessary not only for corresponding with teachers, but also they are linked to MOODLE accounts with an LDAP server. Moreover, participants are classified-only students recorded on lecture have the possibility of solving the quiz. We also restrict IP address-only students logged in at definite computer laboratory are able to access the quiz. Despite those restrictions, the e-colloquium for students being on a foreign exchange was possible to conduct several times. Those students sat an exam at the same time and on the same principles as their classmates who stayed in their homeland. To the pool of authenticated IP addresses have been added the addresses of the relevant computers from abroad, and the students staying abroad sat an exam supervised by their foreign tutors. With such a solution, without major problems, students staying abroad could pass the final exam in parallel with their classmates staying in the country.

As a plus teachers also considered the fact that they don't have to store students' paper colloquia, and in the case of any complaint it is easy to get to the sheet of a particular person. With over 2000 exams in General Chemistry (two colloquia per semester+retake exams), there emerges the question who should keep student's papers: course coordinator or particular lecturers. In the case of an e-colloquium, students' e-tests are archived on the server, and the lecturers can have a quick insight into the student's works from the particular subject. It should be added that e-quizzes also reduce cost of educational assessment [26, 27]. Assessment can focus on the individual learner, but before e-exams real problem was the storage of the hardcopy of student's test, which was over several thousand per year. Now supervisor, just at the moment, can find all students' history with data of all examination, grades, questions and student's answers. Summative and formative assessments are very important not only in measuring a student's current knowledge and regularity of learning, but also should identify a suitable program of education. It should be added that we have also exams for student from other department. The Chemistry Physics prepare electronic quizzes also for students from Faculty of Fundamental Problems of Technology. Nowadays, using electronic forms, we have no problem with diversifying e-exams and with quick transfer grades and other student activities between different departments.

As a result of using the described tools and online resources the authors have observed a regular increase in informative and media competence among students. Students gained the ability to connect new information as a whole and to use the obtained knowledge to realize various tasks. The analysis of performed work showed that in the two-year period there occurred the minimalisation of such negative effects, known as "immersions in the network," like: "googlism", "wikipediaism", the belief that everything in the Internet is valuable, that it is possible to copy other people's works with impunity, the inability to distinguish the valuable resources from "junk," getting lost in an information noise, inattentive reading, or rather reviewing on-line texts, the tendency to operate with the data in the shallow manner, as well as relativizing the values and the importance of scientific knowledge, and submitting to the effect of social proof of rightness. Also one evaluated positively the e-colloquia system allowing to obtain an objective assessment in a relatively short time.

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