

## WITH THE LITTLE HELP FROM ... OUR STUDENTS

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**Abstract:** *In this paper, we will present good experiences we acquired over the years, with the engagement of students of the computer science direction at the Department of Mathematics and Informatics, Faculty of Science, University of Novi Sad, as initial developers of teaching materials for their younger colleagues. At first we started to employ students of the “Professor of Computer Science” as both designers and devisers of eLearning teaching resources for certain courses they have already passed. This was done within their obligatory course “Distance Learning”. Later on, we employed additional interested students within an elective course “eLearning” to participate in the same activity. Lecturers and assistants had to work additionally on these materials to prepare them for use as a part of university courses. Sometimes they even had to make significant and large-scale changes. Still, work done by our students was a significant help, giving us some raw material to work on. In addition, on some occasions, these resources introduced us to different views on problems and thoughts at hand, or teaching methodology and gave us new ideas, concepts, and notions to work with.*

**Keywords:** *course development, teaching resources creation*

### 1. INTRODUCTION

One of the major drawbacks of eLearning employment at the University level is a need to create a huge amount of teaching material. For every faculty and its' every direction, there is certain number of obligatory courses, requiring passive and stable *reading* material, but also some active and multimedia learning resources. There is a need for development of some testing and self-testing resources, finding useful links to additional either pre-requisite, or bonus, extra material, there is a need to keep these links live, actual, readable and useful, as we explained in [1] and [2]. What's more, considering the nature of university level teaching, it is a common practice to improve and change those resources rather often, compared to secondary and particularly elementary level school.

Adding to that, in accordance to Bologna principles, there is a large amount of elective courses, requiring the same eLearning resources we mentioned. For example for the direction of “Computer Science” at the Department of Mathematics and Informatics, it is possible to finish studies and collect necessary 240 ECTS with 31 courses selected – 22 obligatory and 9 elective. On the average, number of courses students select is higher than that, somewhere around 33 or 34 courses. Still, for the curriculum of Department of Mathematics and Informatics, existence of “elective courses” means that in practice we offer and had to develop 52 courses! Some of those courses are actually obligatory courses for some other study directions of course, so we do not have to develop them again. However, in order to give students ability to choose, for each of those approximate 12 courses they *will* choose, we created and offered 3 courses. So, altogether, for obligatory and elective

courses, there was a need to develop teaching resources for around 50 courses.

If we take into account that lecturers have to teach several courses, while assistants have to take care of the exercises for even more of those, and that eLearning is typically self-induced activity, not financially supported, a common practical problem appears – How to create good eLearning material and keep it actual, modern and up-to-date, as discussed in [5] or [6], for example.

Over the time, we worked on several methods to overcome this large burden. Let us enumerate some of them:

- While researching possibilities for conversion of existing, legacy teaching material into the eLearning form, we considered and studied a lot of existing and available conversion tools [11] or [12]. While doing that, we used those tools to transfer, adapt and alter available teaching resources into the form of learning objects, improve them, and exploit them. Namely, at our Department we are using LMS Moodle for around a decade now, which we choose after careful analysis of existing learning management systems and selection based on several papers on the topic, and based on our personal experience ([8], [10] or [16] for example);
- Considering teaching activities, and needed replacement of standard classroom actions with some form of electronic ones, we researched this direction also [7], and employed our findings with satisfactory success both for lecturers and students involved (as shown in [17] and [18]);
- It is also worth mentioning that some of the employed electronic activities even helped us in some unexpected ways. Further about that can be found in other referenced papers, but let us just mention that for example those electronic activities helped us fight

students' cheating [14], assisted us in improvement of fair-grading process [13] or [15], or gave us additional ideas of the proper assessment for students within our courses [3].

Still, our tendency and desire to transfer *all* of our courses to LMS Moodle facility, and to keep them modern and up-to-date, required a great deal of work. We needed some help, and we found it in our students.

In the second section, we will present our original ability for acquiring help from our students. Still, since this ability disappeared after one study direction was canceled, in the third section we show our way out of this problem and model of getting help. In the fourth section we give some numerical data about the course on eLearning, including number of students, grades, and particularly satisfaction results collected within a survey we conducted. The fifth section gives some concluding remarks.

## 2. REGULAR POSSIBILITIES WITHIN THE CURRICULUM

As a part of their curriculum, students of the direction "Professors of Computer Science" at our Department had an obligatory course on "Distance Learning". In the beginning, after the introduction of this direction, number of students showed small, but constantly growth. Three, four, five, eight ... and then none! Since for the next two years we again had no applicants, we decided for the next accreditation to drop this direction. This situation of course asks for further research and explanations, it definitely has something to do with the general situation in our schools and educational system, and general situation in our society. Still, we will not deepen this discussion here. For the purpose of this paper, let us just mention that we lost useful allies in the teaching resources development.

Still, while it lasted, it was very helpful! Students of the direction "Professors of Computer Science" had the course on "Distance Learning" at their final, fourth year. That means that before that they had to pass and have enough knowledge with a lot of other courses for which we needed help. Also, during the first three years of their studies, they had several courses on pedagogy, didactics, and teaching methods, so they were quite prepared to employ their knowledge for creation of teaching resources.

As a consequence – we got 20 lectures prepared, of a high or not so high quality, but we had at least something for a start. Lectures belonged to different courses, chosen by students, and were afterwards further developed and completed by assistants for those courses.

Of course, compared to needed number of lectures, these 20 were just a poor and meager start! Each course itself needed sometimes that many lectures developed, and as we mentioned already, we needed to develop around fifty courses.

## 3. ADDITIONAL POSSIBILITY

Since there were no more students of the "Professor of Computer Science" direction, we had to think of another way to find support from students. Good ahead planning helped us with this. Namely, in order to enable ourselves to stay modern and keep our teaching state-of-the-art, in our curriculum we dedicated four courses to be exchangeable. Two courses for undergraduate and two for graduate level were entitled "Elective Seminar A, B, C, and D", and their contents was not precisely defined within the curriculum. Instead, each year, professors at our Department have the ability to select topics that belong to the area of their current scientific research, and to offer those to students. *If* there are interested students, they can apply and the course is conducted. If there are no students interested ... well, we hoped that for our course we will have enough students applying and didn't ever consider this other option seriously.

The first time we offered the course "Elective Seminar – eLearning" was in the school-year 2004/05. As it is the usual situation with each new course, there were only 7 students who applied for it, among some 50 students that had to choose some of the elective seminars. Still, being the first time we conducted this course, perhaps this was the good thing for us. It enabled us to slowly and carefully develop teaching material for this course and to test it and polish it with this small, but excellent group. Of course, it meant another 7 electronic lectures for some of our courses developed!

In the next couple of years we had a rapid growth of students applying for the course on eLearning. In the second year we had 17 students applied, in the third year 26 students, and in the fourth year surprising 94 students! After that, we decided to make a pause of one year, not offering the course, and after that choose to *control* the number of students allowed to attend the course, and keep it on the reasonable level. As a consequence, for the last three years, number of students attending the elective course on eLearning was between 25 and 30 students.

What we want to mention here are two things – first, the reasons for such large number of students applying for the course and second, results of their work and need to keep the course still existing:

- Students at "Elective Seminar – eLearning" have excellent grades. On the average, grade for our students is above 9.50 (on the scale from 6 to 10). How is that possible? Are we too weak, are we giving the grades away, is the course too easy? We would say *NO*, we think that the reason is something else. Grades are high for those who succeed in passing the exam – and that percentage is *not* too high! As we "promise" our students at the beginning of the course, instead of getting a low grade, they we'll have to go back, rework what is finished and do some additional work, develop some further resources, and refine the existing one, until the final result is satisfactory. As a consequence, the developed material is of much higher quality, some of it almost immediately usable

as an eLearning part of the associated course. Even those other, not “perfect” lectures, are an excellent starting point, where our assistants continue to work on, standardize them, and make them an integral part of belonging courses.

- With such a large number of students, why do we still need to keep this course as one of elective courses? The first and the most important reason is of course our wish to introduce our students to theory and practice of eLearning! So, until we add some such course into our curriculum, we will have eLearning as a very welcomed elective seminar. The second important reason is the constant need for improvement of currently existing eLearning material and need for the development of additional resources on the same topic. The third reason unfortunately also exists, because the number of applicants we presented is not the same with the number of students who successfully passed the exam.

To make the previous claim clearer, we have to admit that there is a large percentage of students who do not finish successfully this course on their first attempt. Consequently, they either never pass the exam, or repeatedly attend it during the next year(s), trying to fulfill required demands.

#### 4. RESULTING LECTURES

##### Numerical results

In continuation of the discussion on number of applicants and the number of successful students, let us look into the table showing the results of the course conduction. Here we also introduce the notion of “successfully developed eLearning resource” which we will identify with the highest grades 10 and 9. These lectures in practice didn’t require too much additional work by our assistants to be usable in practice. Data about participation of students over the years is given in Table 1.

School-year	Number of students who applied	Number of students who passed	Number of successfully developed lectures
2004/05	7	7	6
2005/06	17	15	10
2006/07	26	21	16
2007/08	94	62	44
2008/09	-	-	-
2009/10	15	9	7
2010/11	25	17	14
2011/12	27	16*	7*
2012/13	31	14*	10*
Total	242	161*	114*

\* - some of the students are still working on their exam

**Table 1:** Students participation in the course over the years

Additional explanation considering this table might be that some of the students who haven’t passed the course during one school-year, re-applied for it in the following year. Also, as can be noticed, we gained 114 from very well developed to excellent lectures, plus additional 47 usable lectures for our courses.

##### Contents of the resulting lectures

While in the beginning we had some dilemmas what our students will be able to do and what we should ask them to do, as time went by we were more aware of both our needs, and their abilities.

In the beginning, we supplied our students with the static, written material, covering the topic they selected. We asked them to create an eLesson out of this material, i.e. a sequence of screens explaining the topic, giving links to additional resources and to needed pre-knowledge material, and giving some initial testing questions, just to keep students alert and in touch with the material. After few years of this practice, we noticed that this doesn’t present such a big problem for students, and that they are able and willing to create some more material. In the following years we did some experimenting, and finally settled with the practice that students are required to develop one eLesson, one glossary of the most important terms and notions, one question database with at least thirty questions, and one quiz that randomly selects ten questions from that database for students’ self-testing.

These requirements didn’t present any additional problem to our students – those willing to work are still able to successfully develop all of the required material, and “easily” and with pleasure pass the exam. For those who expected an effortless and undemanding exam, situation haven’t changed, they don’t manage to develop these resources either way.

##### On students’ satisfaction with the exam

On two occasions we decided to conduct a survey asking our students concerning their opinions about the course. A survey is a typical one we use at all our courses, standardized one that is used at all institutions members of a long-lasting educational DAAD project [4]. The survey consists of four parts, helping in analysis of four different aspects of teaching. Those parts are:

- Questions about teaching organization,
- Questions about the lecturer,
- Questions about the assistant, and finally
- Questions about students’ attendance of the course, and needed work.

The first time we carried out a survey was in the beginning of its conduction, during the school-year 2006/07, when we had 26 students attending the course. Second time it was during the next school-year, when we had the largest number of students, 94. The third survey was conducted after the school-year 2011/12, during the eight course conduction, when we had much more experience with the course. This time we had 27 students,

and while not all of them participated in the survey both times, results are more or less comparable.

Namely, the problem with using questionnaires and surveys in this course lies in its organization. First, we conduct several theoretical lectures about the nature and principles of eLearning. After that, some practical lectures follow, teaching our students more application oriented things, needed in order to create eLearning teaching material. In between and in parallel, exercises where all of the mentioned things are tested in practice are conducted. In practice, these lectures and exercises take about two thirds of the course time, during which our students are also obliged to select a topic they will cover, and later to produce a “scheme”, a design, explaining *how* they plan to proceed and develop teaching materials.

After that, students start working on the development of the material, either with, or without help of lecturers. Namely, since we’re talking about eLearning, and development of the material for use on distance, we were somehow obliged to let our students work on those *from home, on the distance*, approaching our LMS Moodle at their convenience considering time and place. (Another survey we conducted revealed the fact that almost all of our students have personal computers, while more than 95% of them have Internet access at home). Time for presenting their material, questions, and consultations, is of course still available, but experience shows that students do not use it too much. Instead, they usually choose e-mail type of consultation and presentation of the material to the assistants when it is mostly finished.

Yet – considering the surveys – it is rather difficult to gather a lot of students again in the classroom to conduct them! With the nature of the course being as it is, of course that we switched to electronic surveys (using the very same LMS Moodle), but response is never too high, shows experience with all of the courses.

In Table 2 we will present the first part of the results, those dealing with the course in general. Also, we’re not showing *all* of the results, just the most interesting. Questions required answers on the scale from 1 (totally disagree/not satisfied) to 5 (totally agree/completely satisfied).

	2006	2007	2011
<b>Part I – Lecture organization</b>			
1. Organization of lectures is good	4,8	4,7	4,4
2. Type and difficulty of the tasks is motivating	4,2	4,0	4,3
3. Quantity and quality of lectures is appropriate	4,2	4,2	4,4
4. Lectures and exercises are well coordinated	4,5	4,6	4,4
5. Course resources are appropriate	3,9	4,0	3,8
6. Overall quality of the course is good	4,6	4,6	4,8
7. The course is useful	4,6	4,5	4,2

**Table 2:** Results of a survey considering the course quality and organization

Some additional clarification of the grades given by students was achieved through later oral communication. Drop of the grade considering “lecture organization” was because of the wish of our students to make lectures *faster*, so that they can start with the work and material creation *sooner*. Slight raise in the grades about motivation and quality of resources we attribute to our increased experience with the course. Questions about lecture/exercise coordination and appropriateness of resources received pretty much similar grades, while it seems that students are not too thrilled with what we offered as learning resources.

This might be justified, since besides several digital resources, representing our lectures, and some links to useful sites, we were able to offer just a small booklet about LMS Moodle we created. Considering the complexity of Moodle itself, and the fact that official book has more than 700 pages, our booklet with only about 60 pages was not enough to satisfy our students’ needs. (The fact that we *didn’t* ask for more knowledge than the booklet contains was obviously of no value, they wanted to have a complete book!). Answers considering the overall quality and usefulness of the course are even better than we expected.

In Table 3 we are presenting results of the survey about the lecturers and assistants. Again, answers were on the scale from 1 (totally disagree) to 5 (totally agree).

	2006	2007	2011
<b>Part II and III – Lecturer and assistant</b>			
1. Lectures were well prepared	4,8	4,8	4,8
2. Explanation style of a lecturer was good	4,4	4,5	4,3
3. Lecturer was willing to answer additional questions	4,7	4,6	4,4
4. Overall grade for the lecturer	4,5	4,6	4,8
5. Exercises were well prepared	4,7	4,7	4,8
6. Explanation style of an assistant was good	4,9	4,8	4,8
7. Assistant was willing to answer additional questions	4,9	4,9	5,0
8. Overall grade for the assistant	4,9	4,8	5,0

**Table 3:** Results of a survey about lecturer and assistant

Grades for questions given in table 3 are so high, that the differences between grades of lecturer and assistant become almost irrelevant. We consider normal that assistant has slightly higher grades, because by the nature of the course, his part was more interesting to students. There were no “boring” theoretical lectures; exercises were concerned more with practical and clickable things, which, as known, students prefer. A question may arise about the need and usefulness of this third part of a questionnaire here. If students created the lectures, why is it important what grades lecturers received?

In our opinion, such a question is wrong. Namely, students were *not* prepared to create lessons. They did *not* have enough technical knowledge to work with LMS Moodle. This is perhaps less important because to some extent, they are usually able to do that part by themselves. What is more important is that they didn't have almost any knowledge in the field of pedagogy and methodology, and no awareness of "best practices" in this field. A large number of typical errors arise year after year, which we carefully include in lectures for future generations, avoiding them onwards, giving us twofold value. On one hand, we got better eLearning material; on the other hand, students were happier because they had useful guidelines of needed work, allowing them to finish their exam with more ease.

The last table is giving results mostly about the technical things, i.e. requirements of the course.

	2006	2007	2011
<b>Part IV – Course requirements</b>			
1. How many lectures you missed?	1,2	1,0	0,7
2. How many exercises you missed?	1,1	1,0	0,5
3. Did you use „consultations“? (answer „yes“ by)	93%	87%	85%
4. How many hours weekly you needed to prepare for following lectures?	2,9h	2,6h	2,5h
5. How many hours weekly you needed to solve the assignments?	2,8h	2,9h	2,6h

**Table 4:** Results of a survey considering the course requirements

In a few words, this last table can be described as: students missed almost no lectures, nor exercises, and used consultations a lot! They spent relatively lot of time to post-process lectures and finish their assignments, but again through oral discussions, we found out the reason for that. Our students liked very much the fact that they can really finish with their exam in a Bologna manner, over the year, and get their grades even before the final exam period, and liked very much practical nature of the course. After passing this course, they were able to concentrate during the exam period on other, more theoretical courses.

One textual note we received within our survey we most gladly accepted as praise: "Interesting, well structured course which provide us with some basic knowledge of teaching 'strategy' and very good experience in online learning."

## 5. CONCLUSIONS

Considering the practical use and application of eLearning at the Department of Mathematics and Informatics, Faculty of Science in Novi Sad, for long time it is not just an improbable dream or unrealistic idea. LMS Moodle is running in full speed for about a decade now [2], and all of the courses in informatics are covered with at least some eLearning resources. Even if that

means just a meager repository of static teaching material, we used it as a start for each course and over the years developed additional resources.

Still, our intentions and wishes were since the beginning to develop active, dynamic, and multimedia resources, which will help our students understand the subjects better.

As we showed in this paper, a great support and help in the development of this eLearning teaching resources we received from our students. This activity fulfilled twofold purpose – both to introduce our students to modern and up-to-date methods of teaching and to help lecturers in achieving some starting material for eLessons, quizzes, glossaries, assignments, links, and other types of teaching resources.

Quality of the material our students produced was of a variable level – from amateurish and weak, to excellent and admirable. Still, each time we checked the material both for quality and for legal/ethical issues, and made sure that everything is correct and usable. Our experience with this type of work is very positive, and we gladly suggest to other institutions to follow it and apply the same methodology.

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