

# **e-Classroom in Higher Education**

mag. Viktorija Sulčič

UP Faculty of Management Koper, Slovenia

[viktorija.sulcic@fm-kp.si](mailto:viktorija.sulcic@fm-kp.si)

dr. Dušan Lesjak

UP Faculty of Management Koper, Slovenia

[dusan.lesjak@fm-kp.si](mailto:dusan.lesjak@fm-kp.si)

dr. Nada Trunk Širca

UP Faculty of Management Koper, Slovenia

[nada.trunk@fm-kp.si](mailto:nada.trunk@fm-kp.si)

## **Abstract**

In the paper, some interesting findings related to the introduction and use of e-classroom at the Faculty of Management (FM) is presented. The course was carried out in the e-classroom for full-time and part-time students. The blended learning approach was used as an e-learning model. The teacher's assessments were based on students' weekly activities and achievements. Differences between groups of students and the differences caused by using a different blended learning approach will be presented as well. Beside the differences which were observed, some common findings were found, namely the introduction of innovative learning methods was appreciated by students, as well as the support of the well prepared tutor. Therefore further activities regarding the introduction and use of e-learning should be carried out. Online training courses for teachers and tutors should be organized and further research regarding the impact of e-classroom usage on all stakeholders in e-learning should be done.

## **1. Information and communication technology in education**

The increasing use of information and communication technology (ICT) in education brings numerous important changes for students and teachers, as well as for institutions. On one hand, together with the development of the Internet, it improves the accessibility of education, and on the other hand, it brings about tectonic shifts in the process of teaching/learning as well as changes in administration and management of education. Until recently, ICT in education was mainly used as support for administrative processes [RIS, SITES 2000, 60], which means that - in spite of numerous partial activities on the national as well

as on the local level - key education processes are still relatively seldom supported by ICT in Slovenia. Obviously, the ICT introduction in education institutions is similar to the introduction of ICT in companies, where processes in accounting, finance and human resources are normally supported first [Turban et al. 1999, 48].

With the development of distance education (DE), different teaching methods have developed, which is mainly due to temporal and spatial separation between teachers and students [Saba 1999, Holmberg 1995]. Correspondence education, tele-education, on-line and Internet study give the learner/student a more active role than the role known in traditional education (where education is carried out in a classroom or a lecture room). A more active role of learners/students is also stressed in contemporary pedagogy and didactics, and is in accord with the educational changes as stimulated with the onset and progress of the information society [SITES 2000, 3].

Positive effects of DE, especially with regard to the used teaching methods and forms, necessitate the introduction of these methods in traditional education. Taking into account the fact that education can be carried out over the Internet or intranet on institution premises, it is much better to speak about electronic or e-learning rather than about DE, i.e. about the education, during which study materials are transmitted to learners/students through electronic media (the Internet, intranet, extranet, satellites, audio/video equipment, CD-ROMs [InternetTime Group 2002]. The key characteristic therefore is not the spatial/temporal separation of participants in education (which was the main reason for introducing DE at the beginning) but an elementary change in the method of work, caused by the intensive use of ICT in everyday and in professional life.

E-learning is becoming increasingly interesting for different educational and other public institutions as well as businesses, because the wide-scale introduction of LLL-concepts [Trunk Širca and Sulčič 2003] and the growing importance of knowledge increase the demand for different educational forms [Vasquez Bronfman 2000, 1405]. Private and public educational institutions worldwide cater for the increasing demand by a variety of educational programmes offering new forms of education, increasingly supported by ICT, and especially by the Internet. Thus, for example, the market of e-learning has been one of the fastest growing markets in North America [HKGCC 2002].

## **2. Research results and practical implications**

### **2.1. Introduction of e-classroom at the FM**

We started with the introduction of web technology in our courses in the academic year 2002/2003. The courses for full-time students were supported by web pages. There, students could find all the information needed, materials,

assignments, etc. related to their study related to a certain course, but all the communication between students and teachers was based on e-mails, phone calls or personal communications.

During the academic year 2003/2004 we introduced a virtual learning environment (e-classroom). We have chosen an open source virtual learning environment called Moodle ([www.moodle.org](http://www.moodle.org)) and the blended learning approach - face-to-face meetings were combined with the activities performed through the e-classroom.

In that year, 37 full-time students of a “Digital Economy and e-Business” (DEeB) course were included in the e-classroom. The course was awarded 6 ECTS credits and was taught in traditional classroom 55 hours per semester. Topics of the course were very suitable for the blended learning approach, because e-learning is actually a form of e-business. So students could gain the knowledge of e-business from their own experience.

In the academic year 2004/2005 we continued introducing e-learning with the same course. At this time 105 part-time students were included in the e-classroom. The students were divided into smaller groups of 30 students and for each group one tutor was responsible.

The Moodle virtual environment was used as an e-classroom at FM ([www.eucilnica.si](http://www.eucilnica.si)). The design and structure of virtual learning environment was adapted to our needs and wishes.

The curriculum and study materials were prepared in advance by a teacher and tutors, who organised work in the e-classroom, motivated students, monitored and assessed their work.

The course was divided into weekly activities, comprising of students' weekly obligations. Students worked individually or in groups and had to post their written assignments in a forum within the e-classroom on weekly basis. The communication between students and between students and their tutors was carried out through the e-classroom (discussion groups).

A different blended learning approach was used for full-time and for part-time students. While seven face-to-face meetings were organized in 14 weeks for full-time students, only two face-to-face meetings were organized for part-time students in the period of 8 weeks. Part-time students were invited in a real classroom at the beginning of the course, when the whole learning process was presented to them and at the end of the course, when students presented their projects. In between students performed their study activities in the e-classroom.

For full-time students experts from practice were invited to share with them their practical experience. With the presentation of real problems and their solutions they helped connect the theory gained in the e-classroom with the practice. Full-time students appreciated our aim to involve experts in the learning process.

During the whole period we assessed the impact of e-learning on students and how students accept ICT. In the following parts of the paper some interesting characteristics of different student populations will be presented.

## 2.2. Empirical results

### 2.2.1. Questionnaire and respondents data

Students were polled by means of e-questionnaires when they enrolled in the e-course and by conventional questionnaires at the end of the term.

In the first (entrance) questionnaire we primary wished to inquire about their computer and internet literacy, their personal characteristics and other abilities important for e-learning. Questions about students' equipment and access to the Internet were also included into the entrance questionnaire.

With the final questionnaire at the end of the course, we wished to assess the impact on students characteristics and abilities, the impact on their behaviour, etc.. The questions about students' workload were also included in the final questionnaire. For their weekly activities part-time students had to fill in short e-questionnaires, with the intention to collect data about students' workload, their opinion about materials and about the course itself.

Students rated their answers on a five-degree scale, where 1 represented the lowest grade or their disagreement with the statement, and 5 represented the highest grade or absolute agreement with the statement.

**Table 1.** Characteristics of full-time and part-time students.

Students characteristics	Full-time students	Part-time students
Average age	21.9	30.9
Average grade in secondary school*	2.9	3.8
Average grade at FM**	7.3	7.3
Motivation for study	3.6	3.8

\* 5 being the highest grade

\*\* 10 is the highest grade

Interestingly, part-time students even though they finished their secondary education with a higher average grades than full-time students (5 is the highest grade) they were as successful at their study as their full-time peers (10 is the highest grade). Part-time students need higher motivation, because they need to co-ordinate their personal, business and study activities at the same time.

In both groups, male and female participants were evenly represented (53% full-time male participants and 56% male full-time participants).

If we want to introduce an e-classroom in teaching and learning process all the stakeholders in that process need to be computer and Internet literate. We have been monitoring computer and Internet literacy of our students since 2000.

The abilities of software usage are presented in the Table 2.

**Table 2.** The comparison of students' competences regarding software usage.

<b>Software</b>	<b>Full-time students</b>	<b>Part-time students</b>
Word	4.0	3.7
Excel	3.0	3.2
Access	1.7	1.3
Power Point	3.3	2.4
Browser	4.0	4.1
E-mail	4.2	4.3
<b>Average</b>	<b>3.4</b>	<b>3.2</b>

Both groups of students were weak in using Access. Full-time students were better in word processing and they excelled at using presentation tools such as PowerPoint. On average, part-time students were a bit less computer and Internet literate, but the difference was not significant [Sulčić 2005, 18].

### 2.2.2. Implementing e-classroom in the course

The comparison of both groups of students regarding teacher/tutor/guest is presented in Table 3.

**Table 3.** Students' opinion about tutor/teacher/guest.

<b>Statements</b>	<b>Full-time students</b>	<b>Part-time students</b>
It was much easier to approach the teacher/tutor in the e-classroom than in conventional courses.	4.6	3.9
Tutor can replace the teacher.	4.4	3.2
The inclusion of guests from practice was interesting and valuable.	4.0	
The presence of the tutor in the e-classroom can improve my success in studying for the course.	3.9	3.5
My relationship with the teacher/tutor was better than in conventional lectures.	3.7	3.5

It is rather important that part-time students on the average assessed the statements lower than the full-time students. Maybe they were less satisfied with the realization of the course, because the course was carried out in a very different way – normally, two or three lectures are organized over weekends. After that they had to sit for an exam. Our way of study demanded continuous student participation over the period of eight weeks.

But as we can see from Table 3 the role of tutors were well accepted by both groups of students.

### 2.2.3. E-classroom usage and personal characteristics of students

In addition to computer and Internet literacy of students, other capabilities and personal characteristics were also monitored (study, creativity, organizational, managerial and interpersonal skills) and compared.

**Table 4.** Students' opinion about changes in their ability due to the participation in the e-classroom.

At the completion of studies I...	Full-time students	Part-time students
...was more experienced user of computer and programmes.	3.9	3.5
...was more motivated for studying.	3.7	2.9
...displayed more self-initiative.	3.7	3.2
...became more creative.	3.7	3.4
...developed better organisational skills.	3.7	3.4
...improved my communication skills.	3.5	3.3
...improved my study skills.	3.5	3.2
...improved my team-work skills.	3.4	3.7
...improved my managerial skills.	3.3	3.3
...became more determined.	3.3	3.4
<b>Average</b>	<b>3.6</b>	<b>3.3</b>

As seen from Table 4 part-time students assessed the changes in their skills and abilities lower than full-time students. A higher difference was noticed in the change of motivation. That could be a consequence of students' highest motivation at the beginning of the course, so they could not notice such a high change in their motivation than their full-time peers.

It is obvious that e-classroom had a positive impact on students' skills and abilities. Higher positive impact was noticed in students' computer and Internet literacy. Full-time students became more motivated, they displayed more self-initiative, and became more creative and developed better organizational skills. For part-time students their team-work skills were given highest grades. Some other skills and abilities were also improved. Students became more creative, determined and developed better organizational skills.

### 2.2.4. Student workload

Although for full-time students' face-to-face meetings were organized more frequently than for part-time students, study activities of both groups was based on the obligatory weekly activities and assignments. When we planned weekly activities we took into account the average student workload in accordance with ECTS (25 – 30 working hours per one credit point). Having that in mind, the

learning outcomes and the course credit points (6 ECTS) for the activities were arranged proportionally during the whole semester.

Both groups of students were engaged in the e-classroom, on average, three times a week. The frequency of entry in the e-classroom depended on the features of a certain activity. At the beginning of the week, students had to read weekly guidelines for their study of materials, which were delivered via the e-classroom. Sometimes they only needed to read the materials and then solved an online test, but usually the activities contained more sophisticated student work and more active roles. They had to discuss a topic in groups and then write reports on the basis of their discussions. Weekly activities with assignments were posted in the e-classroom. As we can see from Table 5 students accessed e-classroom more than three times a week during various parts of the day, mainly from their homes.

**Table 5.** Characteristics of students access into e-classroom.

<b>I access e-classroom</b>		<b>Full-time students (%)</b>	<b>Part-time students (%)</b>
From	Only from home	27.4	7.7
	Mainly from home	54.7	42.3
	Mainly from school/work	13.1	30.8
	Only from school/work	2.4	
	From other places	2.4	19.2
x times	Every day	56.0	23.1
	More than 3 times a week	42.8	57.7
	From 1 to 3 times a week	1.2	19.2
	Once a week		
	Occasionally		
When	In the morning	7.1	
	In the afternoon	8.4	15.4
	In the evening	7.1	11.5
	At night	4.8	3.8
	At various parts of the day	72.6	69.2

Based on the final survey, full-time students studied, on average, for 4.2 hours per week. It is interesting that students believed they studied 20% more for this course than for other courses, which were conducted in a traditional way.

We decided to extend our research of student workload while preparing the course for part-time students. Part-time students were asked about their weekly hours spent studying. It is obvious that student workload varied a lot, but the average student workload was calculated. Weekly averages showed that the average student spent more than 100 hour studying. As we see part-time students studied almost twice as much as full-time students.

At the end of the course for part-time students we tested if final grades were related to students' activity in the e-classroom, gender, abilities related to e-classroom usage and student workload. The results are presented in Table 6.

**Table 6.** Stepwise regression (Dependent variable: activity in e-classroom, student workload; Excluded: gender, abilities related to e-classroom usage).

Included variables	B	T	Sig.
Student activity	0.288	2.633	0.010
Student workload	0.220	2.013	0.048
F=7.471 Sig. 0.001 Adj R <sup>2</sup> =0.144			

More active students and students who worked harder obtained higher final grades than less active students who did not work so hard. Gender and abilities related to e-classroom usage were not in statistically significant correlations with the final exam.

### 2.2.5. Students' opinion about e-classroom and study materials

We used open source e-classroom Moodle, which is used in 144 countries around the world. For the time being there are 29 registered sites in Slovenia. [Moodle 2006]

In the academic year 2003/2004 we used the old version of Moodle's (1.1.1), whereas in the academic year 2004/2005 we used version 1.4.3 of the program, which was translated into Slovene (the old version used English user interface). Some other useful features which helped managing the e-learning were added in the new version too.

At the end of both courses students were asked to express their opinion about e-classroom (Table 7).

**Table 7.** Student opinion about e-classroom.

E-classroom was...	Full-time students	Part-time students
...a user-friendly environment.	4.4	4.0
...easy to use.	4.6	4.2
...clearly organized.	3.9	4.1
<b>Average</b>	<b>4.3</b>	<b>4.1</b>

Full-time students assessed e-classroom higher than their part time peers, but all estimations were similar and high, which indicates that our decision for a virtual classroom was correct. Tutors trained in online courses expressed the same opinion [Sulčič 2005].

All study materials were delivered through e-classroom. In Table 8 we show student opinions about the study materials.

**Table 8.** Student opinion about study materials.

Statements	Full-time students	Part-time students
Materials were understandable.	4.2	4.1
Materials were clearly presented	4.3	4.2
I wish more interactive materials.	3.0	2.6

Study materials were well accepted by both groups of students. They both did not have any problems to use and understand them. Interactive materials were not preferred by our students – neither by full-time nor part-time students. We thought age was the main reason for not preferring interactive study materials, because the highest resistance was noticed in part-time students who were older than full-time students. The correlation analysis was made and no statistically significant correlations between age and desire for interactive materials were found (Table 9).

**Table 9.** Statistically significant correlations between the desire for interactive materials and other variables.

Variables	1.	2.	3.
1. I wish more interactive materials			
2. Age			
3. Gender	-0.30**		
4. Printed study materials	0.38**	-0.28*	-0.38**

Legend: \*\*p < 0.01, \*p < 0.05

But we found out that older students printed study materials more often than younger students (-0.28). It is interesting that male students were more likely to prefer interactive materials than female students (-0.30). Males did not print the material very often. The stepwise regression confirmed statistically significant correlation between the frequency of printing materials and their wish for using the interactive study materials (Table 10).

**Table 10.** Stepwise regression (Dependent variable: Printed study materials; Excluded variables: Age, Gender).

I wish the interactive materials	B	T	Sig.
Printing study materials	0.634	3.492	0.001
F=12.193 Sig. 0.001 Adj R <sup>2</sup> =0.128			

Interactive materials are preferred by students who print only a small part of their study materials, which means that they probably did not have any problems reading them on their monitors.

We can conclude that it is economically reasonable not to produce (more) interactive materials, because we found out that most students print study materials. 63.1 % of part-time students printed all materials delivered through e-classroom, and 25.0 % of them the majority of materials. As some topics were presented to full-time students during face-to-face meeting, they probably did not

print them so frequently – 36.0 % of students printed all study materials and 44.0 % of students printed the majority of them. It was found in our previous research on online distance learners (who did not have classical lectures) that 98 % of students printed all study materials [Sulčić and Lesjak 2002].

### 2.2.6. Student opinions about course implementation

At the end of the term, students were asked about their opinion on the implementation of the course (Table 11).

**Table 11.** Student opinion about the course.

Statement	Full-time students	Part-time students
On-line studying is more interesting than conventional studying.	4.6	3.9
On-line studying is easier than conventional studying.	4.2	2.6
More knowledge is gained through on-line than conventional studying.	4.0	3.7
If I had the opportunity I would study this way (again).	4.0	3.0
This kind of studying involves more work than conventional studying.	3.8	4.3
The implementation of the course was in accordance with our expectations.	3.7	3.3
For me, on-line learning is cheaper than conventional learning.	3.7	3.2
The number of F2F lectures could have been smaller.	3.4	2.9
The course forced me to work harder than I normally work for other courses.	3.3	4.5
There was more cooperation between fellow-students than in conventional studying.	3.3	3.9

When we analyzed average estimations of respondents in Table 11 we had to take into account that full-time students had more face-to-face contacts, had more support from tutors and were thus more likely to be satisfied with this kind of teaching/learning.

Even though students expressed complaints regarding the number of activities (too many) and their efforts, the majority of full-time students would be willing to participate in a similarly organized course again - 84.7 % of respondents agreed with the statement (grades 4 and 5). Among part-time students only 33.4 % share the same opinion.

Students obviously like weekly activities, because 73.1 % of respondents expressed their appreciations. Taking into account the success rate of students

(91 %) and their satisfaction with working methods (part-time students: 3.7, full-time students: 4.1), weekly activities should be introduced in other courses as well. Students liked the flexibility of studying and the relaxed atmosphere, but did not like the burden of obligations and temporally limited tests.

### 3. Conclusions

The first attempt to introduce the blended learning approach - e-classroom, combined with face-to-face meetings, is rather encouraging. The workload was more evenly distributed throughout the semester, which successfully incentivizes preparation throughout the study period. E-classroom helped teachers to monitor student's activities and their workload.

During the course students increasingly became more creative showed more self-initiative, and improved their organizational skills, which speaks in favour of bright future of e-learning as one of the means for implementation of life-long learning, through which individuals can constantly improve their employment opportunities.

The research showed that e-learning could be performed without high technology approach, because students involved in our study preferred paper based materials to interactive materials which could be read from the monitor. We focused our efforts on defining student activities through which students developed competences defined in the curriculum. It is obvious that through e-learning learning methods should also gradually change.

The survey results indicate that the selection of tutors is very important. Therefore additional efforts and resources were put into the appropriate selection and good training of tutors. In this academic year, two groups of teachers and assistants completed online courses for teachers and tutors. The course was developed and performed by the Center for e-learning at the Faculty of Management.

Action plan for the introduction of other courses have been presented and as many as five courses on graduate and post-graduate level have been chosen for the blended approach described above in the academic year 2005/2006.

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