

The Influence of Stimulating Factors in Continuous Preparation for Overall Results of the Final Examination

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Abstract

The paper presents results obtained from the comparison of two years of students enrolled in the Accounting Theory course in the case of a change in stimulating conditions for obtaining a credit and passing the final exam. The aim of this paper is to statistically verify differences in the achieved results of credit tests between the observed academic years of 2013/14 (438 students) and 2014/15 (429 students) depending on the continuous preparation for the exam during the semester. At the same time the number of final exam dates for the analysed course in the observed years and their results were compared. The benefit of the performed study is to prove the influence of students' stimulation on their better preparation during the semester and subsequently on reducing the number of exam dates.

Key words: Forms of examinations, motivation, stimulation of students, oral examination, evaluation of testing forms in education

Introduction

Education plays an irreplaceable role in the development of any society. It is a principal factor of long-term success and lasting prosperity (Mulač, Vochozka and Opekarová 2009). Motivation must be considered as a very important factor affecting the quality of performance without the reduced importance of other factors, especially abilities, skills or knowledge on which basis performance is realized (Botek 2012). Motivation is the basis of behaviours and activities that people deliver inside the association in relation to the peculiarity of the challenges that follow a category or another of functional relations. (Muscalu and Muntean 2012). Generally speaking, the way students acquire knowledge and skills varies for each of them. This process is called learning (Polanecký and Raušer 2015). Students' motivation for gaining better and deeper knowledge during their studies is universally recognized and proved by years of experience. According to Bain (2004) extrinsic motivators include parental expectations, expectations of other trusted role models, earning potential of a course of study, and grades. Intrinsic motivators

include fascination with the subject, a sense of its relevance to life and the world, a sense of accomplishment in mastering it, and a sense of calling to it (DeLong and Winter 2002). On the one hand, students at universities approach education and knowledge acquirement as investment in their future life; yet, on the other hand, they view the method of knowledge acquirement in accordance with the applicable economic criteria. They devote only the necessary time and energy to their preparation and studying in order to fulfil requirements. One cannot assume that students will voluntarily spend more of their time studying, i.e. time exceeding the required limit for completion of the course. It is therefore necessary to stimulate students to be motivated to achieve good study results. According to Šimánková (2012) stimulation can be defined as usage of external stimuli to influence certain behavior.

To determine students' stimulating factors correctly, it is necessary to correctly understand their priority needs. These factors have been dealt by a number of authors. According to Číhalová and Mayer (1997), the evaluation of knowledge should serve for the students' development and be pedagogically effective. In his survey, Foltýnek (2008) looked into the dependence of day and hour of classes on exam results. The findings have shown that these factors do not significantly influence the overall exam result. The personality of a teacher has only a partial influence. Similar conclusions have been arrived at by Čáp and Mareš (2007). Another discussed issue is the importance of oral or written exam. Wagner (2004) holds the opinion that both oral and written forms of examination are necessary for the proper verification of knowledge.

In individual cases, each form of exam may have its own advantages and disadvantages. In recent years, more and more students have been preferring written tests, oral examination has been considered to be stressful by most students and they have shown worse results in it. Mandová (2006) lists the advantages and disadvantages of exam forms: written tests – the main advantage of written tests is economy of time. The teacher is able to test a larger number of students at the same time. Students answer questions according to their needs, they have more time to think their answers over carefully. The disadvantage of written tests is the fact that they are less objective. The oral examination is definitely more objective, the teacher has the opportunity to examine a wider range of topics, they may specify questions and use additional questions to direct students to right answers. The main disadvantage of oral examination is its time expenditure. Another indicator of worse evaluation is stress, which is very limiting for many students and it also limits the application of their knowledge. Kovářová, Kučera and Navratilová (2012) report that during classes the teacher's influence does not affect the number of attempts to pass the exam. Only student's deliberate individual preparation affects the successful completion of the course. Suitable conditions, a sufficient amount of study materials and appropriate stimulation can therefore help students to better master the knowledge for completing the chosen course. Given the current large capacity of universities, it is necessary to pay attention to the personal approach of teachers in the form of consultations and/or creating high-quality and readily available material for home preparation. Reynolds,

Livingston and Willson (2010) emphasize that when evaluating the students' knowledge teachers must be professionals. They must be able to assess the scope, form and level of the required knowledge, but also to assess the impact of communication on results achieved.

The technological progress of the 21st century enables a comprehensive evaluation of students' knowledge using computer-based testing. Nevertheless, the influence of this form of testing and ensuring of its unauthorized misuse are also important. Brown, Bull and Pendlebury (2005), as well as Astin and Antonio (2012), describe and emphasize the importance of oral communication in classes in schools. The skill to communicate and impart knowledge is necessary for applying acquired knowledge in practice. This skill is to be practised by presentations during classes, which enables getting feedback from other students. The authors infer from the performed surveys that the issue of evaluating knowledge depending on the use of a written or computerized version of tests is very individual. Nonetheless Chrátka (2006) research shows that stimulation of students' interest significantly affects the overall evaluation of the course.

The aim of this paper is to compare the results of credits and final exams in two years of students enrolled in the Accounting Theory course offered for the branch of study called Economics and Management depending on the continuous preparation during the semester. The Introduction chapter defines the theoretical framework of solved issues. The methods used in the evaluation of primary research are defined in the Materials and Methods chapter. The Results chapter presents achieved results, their discussion and comparison with similar results in professional literature.

Materials and Methods

The theoretical bases of addressed issues were developed using the analysis of secondary sources - scientific articles and professional literature. The primary data were obtained from the e-learning system called Moodle.czu.cz, which is used to provide support and additional sources for classes and to test students' knowledge. However, it must be pointed out that the data cannot be obtained from the system in the appropriate categorization and the survey sums were thus obtained by manual categorization and simple data summation.

The aim of the performed survey was to evaluate results of progress credit tests and consequently their influence on the number of exam dates and the overall result of the exam in two years of students enrolled in the Accounting Theory course offered for those studying Economics and Management and taught in the Czech language in the 3rd year of bachelor studies. Two years identical in the number of students in the summer semester of the academic year of 2013/14 and 2014/15 were compared. The first group included 438 students and the second one 429 students. To obtain the credit, the condition of achieving an average of at least 65% of correct answers in four credit tests, which the students take during seminars, was laid down. The subsequent final examination consists of two parts – firstly students pass the written test and in case of

achieving minimum 65% of correct answers they proceed to take the oral exam. In 2013/14, this condition was not adjusted in any way. In the following year of 2014/15, students were stimulated to prepare continuously by laying down the condition that if they achieve outstanding evaluation of the progress credit tests (minimum 85%), they can take the final exam only in writing.

A research question has been formed: Do selected stimulation factors cause improvement of students educational results and reduce the number of exam dates?

Within the evaluation of the achieved averages also the results of men and women were compared on the assumption that both men and women approach the continuous preparation in the same way.

The obtained results were statistically evaluated using the two-sample **t-test** for two independent samples **R₁** and **R₂**, where the null hypothesis was defined as follows: **H₀: R₁ = R₂**.

Three null hypotheses were defined to solve the issues.

1H₀: There is no significant difference between the observed results of progress credit tests in the observed years (R₁ – a sample of results for the academic year of 2013/14, R₂ – a sample of results for the academic year of 2014/15).

2H₀: There is no significant difference in the final credit test results of the academic year without any stimulating factor and of the year with the stimulating factor (R₁ - a sample of results of the fourth credit test in 2013/14, R₂ - a sample of results of the fourth credit test in 2014/15).

3H₀: There is no significant difference in the progress credit test results of men and women (R₁ – a sample of men's results, R₂ - a sample of women's results)

For evaluation purposes, arithmetic means ($\bar{x}$), standard deviations (**s**) and variances (**s²**) were calculated for compared samples R₁ and R₂. Based on the results, the test criterion (t) for the unpaired t-test with different variances was calculated according to the following formula:

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (1)$$

$\bar{x}$ - average of the sample

s² – variance of the sample

n – number of members of the sample

For the subsequent evaluation it is necessary to select significance level **α** (0.05 and 0.01) in the comparison with the table value of the critical value (**p**), where:

If **p > α**, then the statistical difference between **R₁** and **R₂** is **insignificant**.

If $p < \alpha$, then the statistical difference between R_1 and R_2 is **significant at $\alpha = 0.05$ and highly significant at $\alpha = 0.01$.**

The data obtained from the information system called Moodle.czu.cz were evaluated using the Statistica 12 programme.

Furthermore, the number of exam dates in both observed years and also the success rate of students in passing the exam were compared. Results were clearly interpreted in the tables with corresponding comments and discussion bellow. The summarization of the article was formulated in its conclusion.

Results and Discussion

Interpretation of the research results with comments and discussion are given in this chapter.

Table 1 shows the results of the progress credit tests in the observed academic years and it follows that the achieved average of 4 progress credit tests in 2014/15, when the students were stimulated in advance, was in total by almost 10% higher, as well as also the variance of obtained results was lower, and the knowledge was more balanced in the whole year in summary.

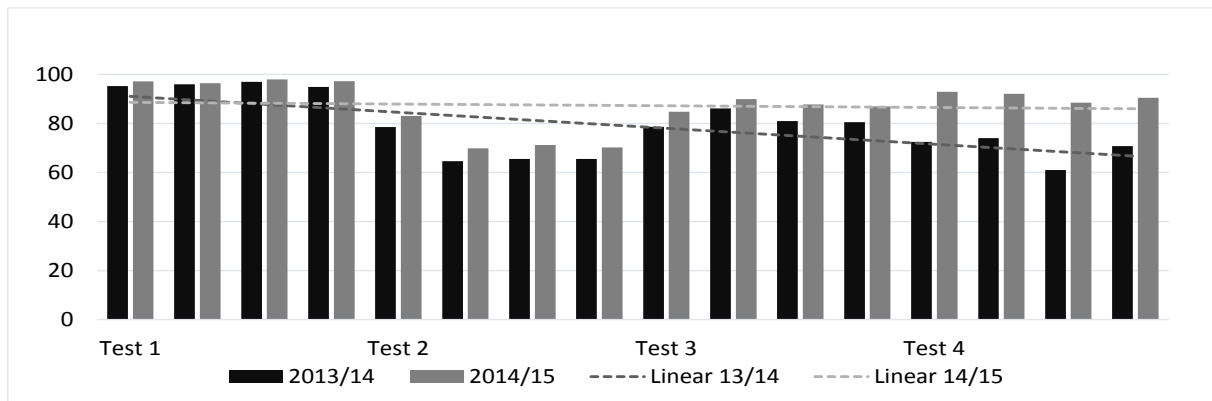
Table 1: Results of progress credit tests in the academic years of 2013/14 and 2014/15

Academic year of 2013/2014				
test 1	test 2	test 3	test 4	Ø test 1-4
95.26	78.49	78.64	72.45	
95.97	65.62	86.13	74.04	
96.97	65.53	80.98	61.02	
94.88	65.53	80.51	70.81	
Ø 95.77	Ø 68.54	Ø 81.57	Ø 69.58	Ø 78.87
Academic year of 2014/2015				
test 1	test 2	test 3	test 4	Ø test 1-4
97.15	83.01	84.75	92.94	
96.46	69.88	89.93	92.11	
97.94	71.24	87.71	88.43	
97.27	70.19	86.95	90.47	
Ø 97.21	Ø 73.58	Ø 87.34	Ø 90.94	Ø 87.27

Source: Authors

73.1% of students reached the stimulating limit in 2014/15. In the preceding year, when students were not stimulated in this way, only 22.76% of the students achieved this limit. The credit test results are compared in Figure 1.

Figure 1: Comparison of credit test results in 2013/14 and 2014/15



Source: Authors

Table 1 and Figure 1 show a significant difference in the final credit test – test 4, when students of 2013/14 without any stimulating factor and being certain that they will achieve a minimum percentage necessary for obtaining the credit did not complete the final test carefully and, in many cases, only tried the test without any prior preparation. According to the findings from Moodle.czu.cz, the students' results of test 4, which was the last one, were worse in 73.78% cases than the average of the three previous tests. Of that 32.77% of students had their average worse by more than 30%. In 2014/15, when students were stimulated for the overall test result, only 28.51% of the students achieved worse results in the last test - test 4. The results show that in most cases when the students were stimulated they improved their results in the last test in order to have a chance to achieve the desired result. Also Wagner (2004) has come to the similar findings.

Descriptive statistics are given in Table 2.

Table 2: Descriptive statistics for evaluating the progress credit tests

Academic year	2013/2014					
	test 1	test 2	test 3	test 4	Ø test 1-3	Ø test 1-4
Average	95.6195	68.537	81.2558	64.9535	81.8062	77.5916
Median	96	75	88	70	84	79.5
Mode	100	75	88	90	95.333	84
Mode frequency	230	91	103	45	14	10
Standard deviation	8.44668	21.66431	15.73254	26.7977	10.56926	11.73957
Var.coefficient	8.83364	31.60966	19.36174	41.25675	12.91988	15.12995
Academic year	2014/2015					
	test 1	test 2	test 3	test 4	Ø test 1-3	Ø test 1-4
Average	97.0184	74.3954	87.5586	90.9011	86.3241	87.4341
Median	100	75	88	95	88	89.1
Mode	100	83	94	100	89.667	multiple
Mode frequency	278	80	107	161	21	9
Standard deviation	6.99075	17.95707	11.61769	11.76682	9.02471	8.17512
Var.coefficient	7.20560	24.13733	13.26847	12.94463	10.45444	9.35004

Source: Authors

The basic descriptive statistical indicators (see Table 2) have proved that the achieved results in 2013/14 were worse and markedly more spread. In the following academic year the motivated students achieved far more balanced and better results, which corresponds to the findings of Kovářová, Kučera and Navrátilová (2012). T-test results are shown in Table 3.

Table 3: T-test results of the compared data from the years of 2013/14 and 2014/15

	Ø 13/14	Ø 14/15	t	p
test 1	95.61945	97.01839	-2.70562	0.006946
test 2	68.537	74.3954	-4.41506	0.000011
test 3	81.25581	87.55862	-6.81886	0
test 4	64.95349	90.90115	-18.6117	0
Ø 1.-3. test	81.8062	86.32413	-6.89782	0
Ø 1.-4. test	77.59161	87.43409	-14.5415	0

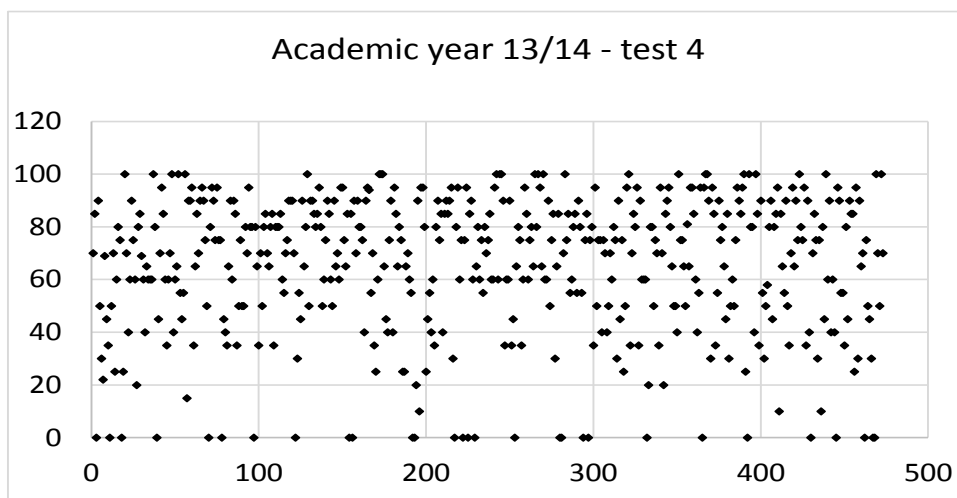
Source: Authors

The statistical evaluation of the t-test for the compared academic years of 2013/14 and 2014/15 (see Table 3) has proved that there is a very significant difference ($p < 0.01$) between the results of individual tests in the observed years.

Null hypothesis 1H₀: "There is no significant difference in the progress test results of the observed years," **has not been confirmed.**

It is evident from Figure 2 that many students' results of the final credit test were very random in 2013/14; in several cases the students did not even fill in the test and their result was zero.

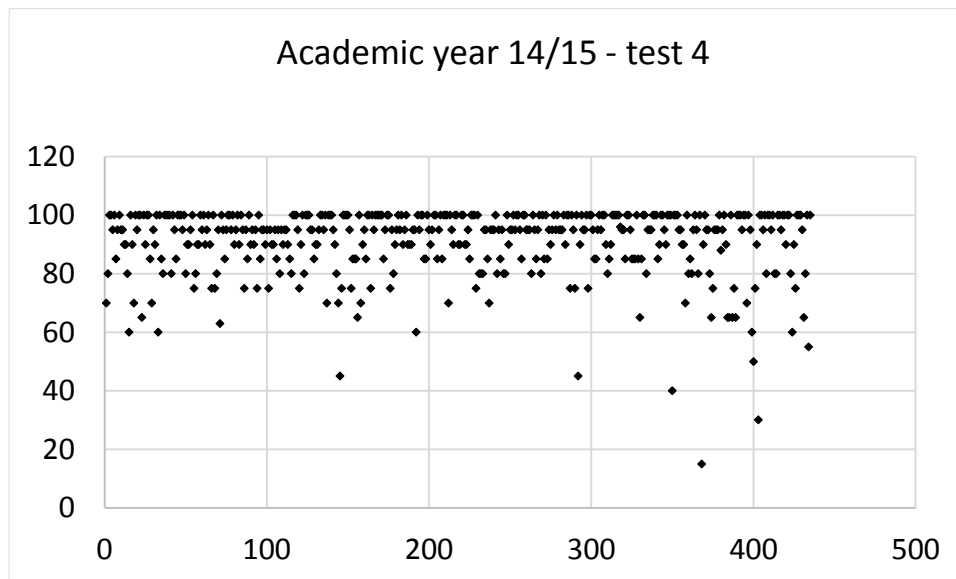
Figure 2: The scope of the final test results of the academic year of 2013/14



Source: Authors

On the contrary, Figure 3 shows that the final test results of the stimulated year of 2014/15 were markedly more balanced and students achieved better results.

Figure 3: The scope of the final test results of the academic year of 2014/15



Source: Authors

The statistical evaluation of the final credit test in comparison with the other progress tests (see Table 4) has proved that the results difference of the fourth credit test is statistically very significant in the academic year of 2013/14. The same applies to the difference between the average of tests 1-3 and that of tests 1- 4.

Table 4: T-test results of the compared data of the fourth progress test with other tests

2013/14	Ø var.1	Ø var.2	t	p
test 4 vs.test 1	64.95349	95.61945	-23.7368	0
test 4 vs.test 2	64.95349	68.537	-2.26167	0.023944
test 4 vs.test 3	64.95349	81.25581	-11.4097	0
test 4 vs.test 1-3	64.95349	81.8062	-12.7235	0
test 4 vs.test 1-4	64.95349	77.59161	-9.39492	0
test 1-3. vs.test 1-4	77.59161	81.8062	-5.80267	0
2014/15	Ø var.1	Ø var. 2	t	p
test 4 vs.test 1	90.90115	97.01839	-9.32177	0
test 4 vs.test 2	90.90115	74.3954	16.03503	0
test 4 vs.test 3	90.90115	87.55862	4.215973	0.000027
test 4 vs.test 1-3	90.90115	86.32413	6.437413	0
test 4 vs.test 1-4	90.90115	87.43409	5.046859	0.000001
test 1-3. vs.test 1-4	87.43409	86.32413	1.901139	0.057615

Source: Own calculations in Statistica 12

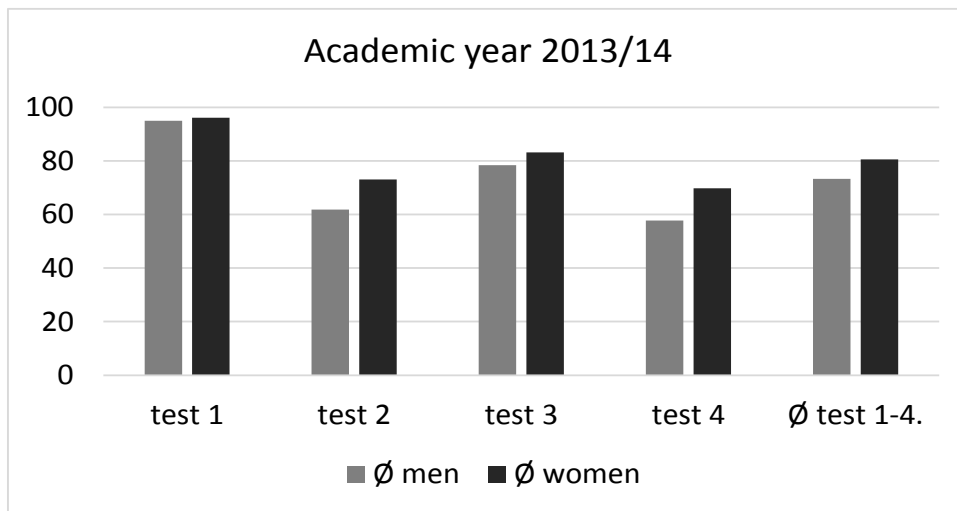
The obtained results confirmed the assumption that the last test in 2013/14 was not completed with a sufficient emphasis on the achieved results. In the stimulated year of

2014/15 the last test results were, on the contrary, better than the results of the previous tests in the same year (see Table 4).

Based on the aforementioned results, it may be stated that **null hypothesis 2H₀**: “There is no significant difference in the final test results of the academic year without any stimulating factor and of the academic year with the stimulating factor,” **has not been confirmed**.

The credit test results of men and women were compared in another evaluation. The evaluation was based on the assumption that the students (both men and women) prepare in the same way throughout the semester. In the academic year of 2013/14 there were 190 men (40.34%) and 281 women (59.66%), see Figure 4.

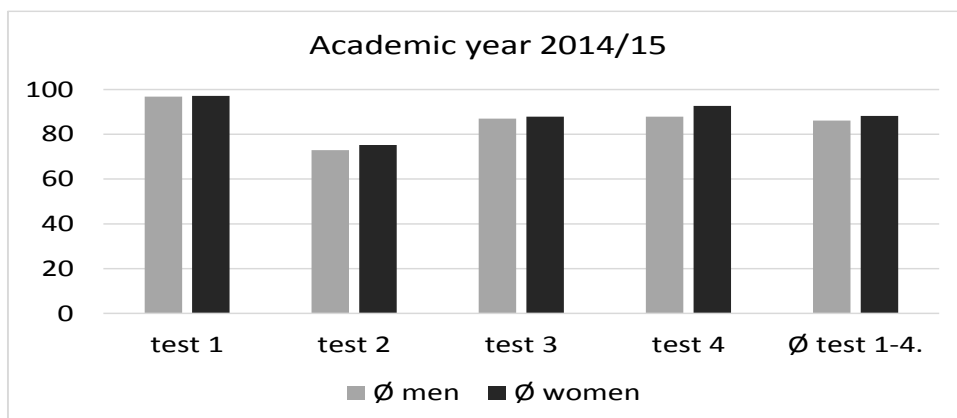
Figure 4: Differences in average results of men and women in individual tests in the year of 2013/14



Source: Own calculations according Moodle.czu.cz data

In the following academic year of 2014/15 there were 163 men (37.56%) and 271 women (62.44%), see Figure 5.

Figure 5: Differences in average results of men and women in individual tests in the year of 2014/15



Source: Own calculations according Moodle.czu.cz data

Table 5: Statistical evaluation of average test results of men and women in the observed academic years

Academic year 2013/14				
	Ø men	Ø women	t	p
test 1	94,9474	96,0707	-0,73562	0,48625
test 2	61,8474	73,0283	-10,89325	0
test 3	78,3947	83,1767	-5,62893	0,00003
test 4	57,7947	69,7597	-12,00693	0
Ø test 1-4	73,2465	80,5088	-7,96928	0
Academic year 2014/15				
	Ø men	Ø women	t	p
test 1	96,7927	97,155	-0,52341	0,600958
test 2	72,9634	75,262	-1,29486	0,196057
test 3	86,9573	87,9225	-0,83948	0,401665
test 4	87,8841	92,7269	-4,24067	0,000027
Ø test 1-4	86,1126	88,2338	-2,64066	0,008573

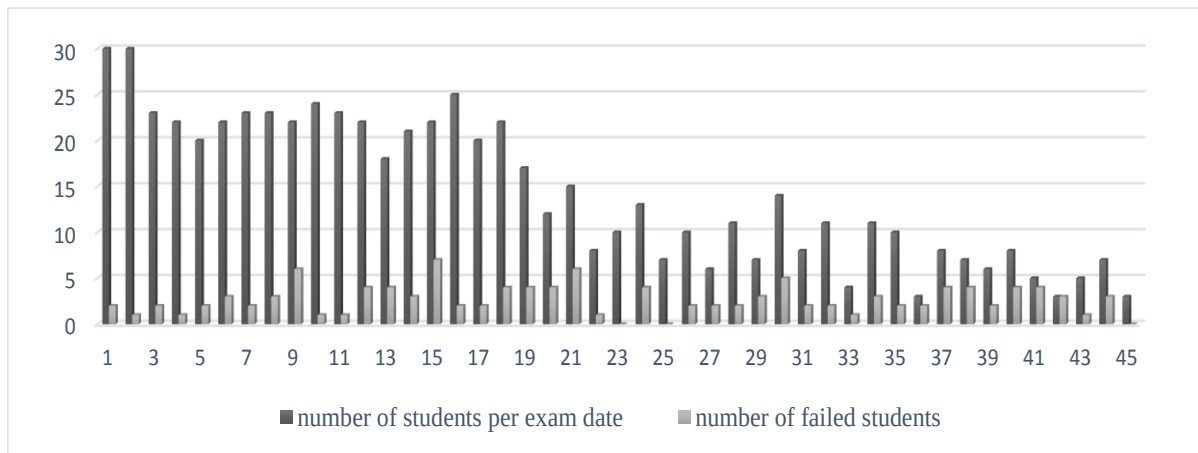
Source: Own calculations in Statistica 12

The statistical evaluation of the progress test results (see Table 5) has confirmed that there is a significant statistical difference in the results of the second to fourth progress credit test in the unstimulated year of 2013/14. As for the following year of 2014/15, the statistical difference was found only in the final, fourth, credit test. It results from the aforementioned evaluation that women achieved statistical better results than men in the non-stimulated year. The same fact occurred in the stimulated year in the fourth credit test, which could still influence the overall average. The statistical evaluation has confirmed that women approach continuous preparation more conscientiously even without any particular stimulation.

Null hypothesis 3H₀: "There is no significant difference in the progress credit test results of men and women," **has not been confirmed.**

The continuous preparation, which was necessary for obtaining the credit in the Accounting Theory course, subsequently had an impact also on the final examination in the respective year. The difference was reflected in the number of exam dates needed to pass the final examination. 25 exam dates were announced in 2013/14. Due to the fail rate in the oral examination and the necessity to repeat it, other exam dates were added up to a total of 45 dates. Those dates were, however, very little used (see Figure 6).

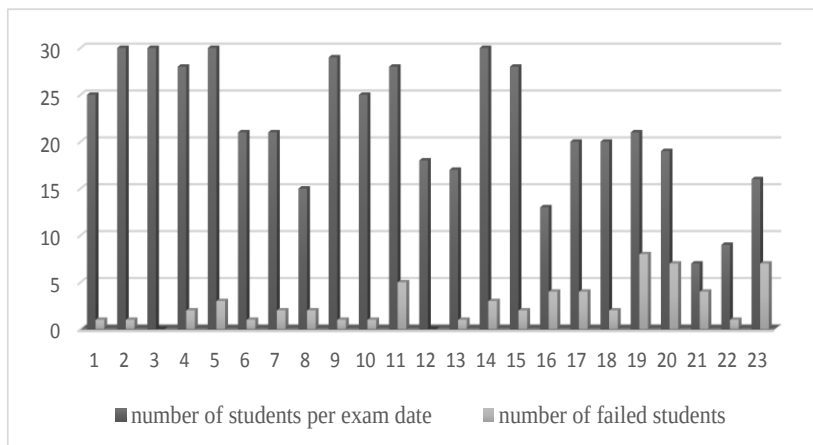
Figure 6: Exam dates and their use by students in 2013/14



Source: Authors

25 exam dates were also announced in 2014/15. Since 73.78% of the students met the condition of excellent results in the progress credit tests and passed the final examination only on the basis of the written test, the repetition rate of exam significantly decreased and the total number of exam dates was not even used (see Figure 7).

Figure 7: Exam dates and their use by students in 2014/15



Source: Own calculations

To objectively compare the students' results in both years, the first 23 exam dates of both years were subsequently evaluated. In 2013/14 those exam dates were attended by 474 tested participants and 64 of them failed on the first attempt. In 2014/15 those dates were attended by 500 testing participants and 62 of them failed on the first attempt. These figures are entirely comparable (see Table 6).

Table 6: Overall results of the final examination in the selected course in 2013/14 and 2014/15

	2013/2014	2014/2015
Students in total	438	429
Excellent	132	112
Very good	153	207
Good	140	98
Fail	13	12
	Ø 2.078	Ø 2.023

Source: Authors

The comparison of written exam results shows that the remaining 22 exam dates in 2013/14 did not affect the overall results of the Accounting Theory course (see Table 6).

Conclusion

The performed evaluation has proved a statistically significant difference between the results of the progress credit tests in the two observed academic years of 2013/14 and 2014/15, and therefore it may be presumed that the stated stimulating factor had a significant influence on the preparation of students during the semester and subsequently on the number of exam dates to meet the conditions of the final examination. In the case of the stated stimulation, the students worked evenly during the semester and the effects of the continuous preparation on the credit test results were statistically conclusive compared to the preceding academic year. The motivated students then used only a half of the number of exam dates for the final examination with comparable results of the final examination to the previous year.

The concurrent statistical evaluation has shown that the obtained results of women in the unstimulated year were better, while both men and women in the stimulated year approached continuous preparation comparably.

The results have proved that the oral examination is very stressful for the majority of students and in case it is removed, they are willing to pay more attention to their continuous preparation. The comparison of students' test results from two different years has shown that the overall results of the final examination from both years are comparable and therefore the marked influence of the oral examination on completing the course has not been proved, which is a helpful finding when the present number of students at universities being so high.

The practical benefit of the performed comparison is a confirmation that the emphasis on quality continuous evaluation of students' knowledge during the semester influences the resulting final evaluation in terms of the necessary pedagogical capacity and at the same time it does not affect the success rate of course completion.

The limiting factor is the fact that the comparison was made for only one selected course. To confirm the obtained results, the comparison will be verified in the broader

context also in the future years, when it will be extended to other branches of study at the Faculty of Economics and Management.

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