THE ROLE OF LECTURERS IN STUDENTS' PERFORMANCE

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Creating positive attitudes toward statistics has a key role in sustainable statistical knowledge. However, a lot of students have negative attitudes toward and fear of statistics. Lecturers have a key role in identifying these possible problems and taking the necessary steps. An important step in this process is making a course evaluation and analyzing the lecturer's role and effect on students' opinion and performance. This paper introduces the results of a course evaluation focusing on the role of lecturers. Applying PLS (partial least squares) path analysis we came to the conclusion that the evaluation of a lecturer has an effect on the satisfaction with the course, and the latter influences the course performance of the students. According to the results, the higher the evaluation of the lecturer is the higher the evaluation of the subject and the performance of the course prove to be.

THE IMPORTANCE OF COURSE EVALUATION

Sustaining students' positive attitudes towards statistics courses has high importance (Kovacs, 2013). The lecturers have a key role in evolving positive attitudes, but some problems may arise in this process.

First of all, it can be hard to form positive attitudes toward statistics. Students often have a previous negative attitude: they consider statistics as a mathematical subject, and they have a fear of mathematics. According to Budé et al (2007) students who previously think that statistics is a difficult subject, who do not expect to benefit from studying statistics or who think that they have no control over the outcomes of the subject will start to dislike statistics. In this way negative attitudes can prevent students from acquiring statistical thinking skills (Nolan et al, 2012) and acquiring sustainable positive attitudes towards statistics.

The second problem, which can derive from negative attitudes, is that students cannot use their statistical knowledge properly. Interpretation and analyst abilities have key importance in the labor market, but – based on our experiences – in a lot of cases students cannot use their statistical knowledge even in their bachelor or master theses.

There have already been several researches in the field of students' attitudes toward statistics (e.g. Vanhoof et al, 2011; Schau & Emmioglu, 2012), but the first step for identifying and handling the described problems is to have a course evaluation made by the students. In this way we can get feedback from our work and we can measure the satisfaction with the subject. The students' opinions can help us to develop a statistics course which can help to improve or sustain students' positive attitudes toward statistics. The importance of the lecturers manifests itself not only in the mentioned activities (identifying problems and developing the course), but the opinion about the lecturer can influence opinions and attitudes toward statistics and the performance of students as well (Ruggeri et al, 2008).

The purpose of this study is to describe the importance of the role of lecturers and measure its effect on the satisfaction with the statistics course and on the performance of students.

LECTURERS' INFLUENCE ON STUDENTS' PERFORMANCE

There are several factors which can influence the performance of students in statistics courses: expectancies, motivations, student characteristics, previous achievements, related experiences and interests can be mentioned among the influencing factors (Tempelaar et al, 2007; Ramirez et al, 2012; Hood et al, 2010). However one of the most important influencing factors is the lecturer. In Ruggeri et al (2008) it is claimed that the greatest determining factor on attitudes and on the overall experience of the course was the lecturer/professor. The authors (Ruggeri et al, 2008) highlight that negative attitudes can occur due to fear of the lecturer: sometimes students act as if they were working not to look uncomprehending in the lecturer's view. Moreover, attitudes affect the achievements of statistics courses (Emmioglu & Capa-Aydin, 2012), so lecturers can influence performance indirectly too.

Gal and Ginsburg (1994) say that students' beliefs about statistics can be similar to mathematics. They fear of the subject and they have a previous anxiety about the difficulty of the subject. Making the statistics learning less frustrating and less fearful lecturers should focus on beliefs, attitudes and expectations. With the help of an attitude or a course assessment the lecturers can identify the main problems and take the necessary steps to improve the evaluation and the effectiveness of statistics. However, progress is long, significant results can be shown in the long run, but less visible results (e.g., developing statistical literacy) can be reached faster.

METHOD

At our faculty (Faculty of Economics and Business Administration), statistics is a two-semester-long subject. In the first semester mainly introductory statistics is taught, and then students meet with more complex techniques (e.g., hypothesis testing, regression analysis) in the second semester. In both semesters there is a lecture for all of the students, and there are seminars with maximum 28-30 students. Students' performances are measured by (partly computer based) written-exams in the seminars and in the lecture as well, and they get a five-grade evaluation based on their achieved results in both courses (seminars and lecture). We make course evaluations at the end of both of the semesters; students are asked about the difficulty of the subject, about their satisfaction with the lecturer and the teaching materials. We ask students about things, which we can improve and develop, so the questionnaire is based on our teaching experiences and possibilities. There are parts in the questionnaire concerning the lecture and the seminars as well, but in this paper the results of the seminar evaluations will be examined.

This paper is based on the results of our last course evaluation (2013 spring). There were 222 students in eight seminar groups. 55 students filled out the online course evaluation questionnaire and the number of valid answers was 48. Students had to express their satisfaction (dissatisfaction) with the course and evaluate the seminar leader and the teaching materials on a five-grade Likert-scale, where the fifth grade was the best evaluation. It was possible to write any other opinions or suggestions about the course, but the aim of this paper – considering the possibilities our course evaluation system – is to examine:
- the effect of the satisfaction on the course performance
- the effect of the evaluation of the seminar leader on satisfaction and course performance
- and the effect of the evaluation of teaching materials on satisfaction and course performance.

The satisfaction, the evaluation of the seminar leader and the evaluation of the teaching materials and the course performance are treated as latent variables; the validity and the reliability of the constructs were examined by confirmatory factor analysis. (It is noted that the course performance is a single-item latent variable which is not widely recommended in latent variable modeling. However, Ringle et al, 2012, state that if there are not any other options – as the course performance has only one indicator – single-item indicators can be applied.) The effects on latent variables were examined by PLS path analysis due to the small sample size and the non-normal distribution of the indicators (p-value of Kolmogorov-Smirnov statistics in each indicator <0.05). For the data analysis SPSS and SmartPLS (Ringle et al, 2005) programs were applied.

RESULTS

Measurement (Outer) Model

The validity of constructs was measured by Cronbach Alpha which should be higher than 0,7 (Hair et al, 2009). This criterion was fulfilled in each construct (Table 1). We examined standardized factor loadings ($>0,5$), AVE (average extracted variance, $>0,5$) and CR (composite reliability>0.7) for checking convergence validity (Hair et al, 2009). The values in Table 1 exceed the minimum values in brackets, so the existence all of the latent variables is justified.

The evaluation of the seminar leader, the teaching materials and the satisfaction with the course can be considered good; and the mean of the grades (course performance) – with the 1.286 value of standard deviation – is quite acceptable.

Table 1. Latent variables and indicators

Latent variable (Cronbach Alpha. AVE. CR)	Item	Factor loadings	Mean	Standard deviation
Evaluation of seminar leader (α=0.940. AVE=0.893. CR=0.940)	Style	0.957	4.686	0.707
	Way of expression	0.952	4.647	0.770
	Helpfulness	0.925	4.922	0.440
Evaluation of teaching materials (α=0.930. AVE=0.935 CR=0.966)	Quality of teaching materials	0.963	4.569	0.700
	Usefulness of teaching materials	0.970	4.706	0.642
Satisfaction with the course (α=0.773. AVE=0.688. CR=0.868)	Understandability	0.903	4.412	0.779
	Usefulness	0.746	4.510	0.903
	Traceability	0.832	4.451	0.730
Course performance (α=1. AVE=1. CR=1)	Grade-evaluation	1.000	3.490	1.286

Structural (Inner) Model

In PLS path analysis the significance of the path coefficients can be tested by bootstrap algorithm. The number of bootstrap subsamples were 5000, and individual sign changes option was applied (based on the recommendations of Hair et al, 2011). Besides the aim of the paper we examined other possible paths in the model. The final model can be seen on Figure 1, where all of the tested paths are indicated. The evaluation of the seminar leader do not have a direct, significant effect on the course performance (p-value=0.335). The evaluation of teaching materials do not have a direct, significant effect on the satisfaction with the course (p-value=0.125) and on the course performance (p-value=0.437). These paths were left out of the final model (Figure 1, Table 2).

According to the results of the final model (Table 2, Figure 1) there were significant paths between the evaluation of the seminar leader and the satisfaction with the course, and between the evaluation of the course and the course performance. There was an additional significant path: the evaluation of the teaching materials has a significant effect on the evaluation of the seminar leader.
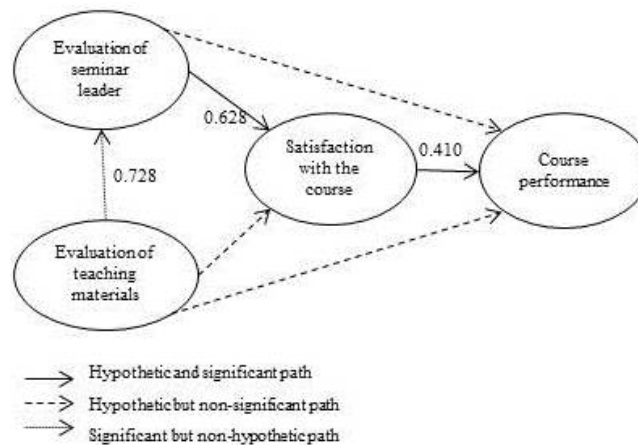

Figure 1. Path diagram

Table 2. Results of bootstrapping (final model)

Path	Original Sample	Sample Mean	Standard Deviation	Standard Error	T Statistics	p-value
Satisfaction with the course-> Course performance	0.410	0.423	0.118	0.118	3.489	0.00049
Evaluation of seminar leader -> Satisfaction with the course	0.628	0.577	0.194	0.194	3.229	0.00125
Evaluation of teaching materials -> Evaluation of seminar leader	0.728	0.678	0.170	0.170	4.281	$1.9*10^{-5}$

In the final model (figure 1) the evaluation of teaching materials has a positive effect on the evaluation of the seminar leader (standardized path coefficient=0.728). The latter has a positive effect on the satisfaction with the course (standardized path coefficient=0.628), which has a positive effect on course performance (standardized path coefficient=0.410).

According to the model, the evaluation of the seminar leader does not have a direct effect but has an indirect effect on course performance; the magnitude of this indirect effect is 0.257 (the indirect effect can be measured by the product of direct effects: 0.257=0.628*0.410, T-Statistics=3.466, p-value=0.00053). Additionally, it is important to apply or work out quality and useful teaching materials as well, because the evaluation of teaching materials influences positively the evaluation of the seminar leader.

In the model the total explained variances were low (Evaluation of seminar leader R^2=0.529, Satisfaction with the course R^2=0.394, Course performance R^2=0.168), but – as it was mentioned earlier – there are a lot of factors which can influence the course performance. The explained variances might be higher with further model extensions.

CONCLUSION

The lecturers have a key role in statistics course evaluation and course performances as well. By making course evaluations lecturers can get an overview on their role and then take actions to improve the evaluation of statistics and attitudes toward statistics. Our course evaluation showed that the evaluation of seminar leaders has an indirect effect on course performance. The lecturers (seminar leaders) should pay attention and be helpful to students; with the help of these efforts the evaluation of statistics and the results of the subject can be improved. These are small steps, but these small improvements can add something to sustainable statistical knowledge.

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