

Teaching Quality Management of the Subject Elasticity I

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Received: July 30, 2021. Revised: September 3, 2021. Accepted: September 6, 2021.
Published: September 9, 2021.

Abstract—This paper deals with quality teaching management of the subject Elasticity I. It contains seven chapters, including an introduction and conclusion and a list of bibliographic references. The second chapter, entitled the Study program of Structural and Transport Engineering, displays the profile of the graduate of this study field. Chapter III, Information of the study of the Elasticity I teaching program, gives extensive information on the subject. It contains conditions for successful completion of the subject, learning outcomes, a brief outline of the subject, and recommended literature for the study. Chapter IV, Evaluation of the subject learning program, gives essential information about the questionnaire and responders. Chapter V, Evaluation of the teaching quality of the subject by students, deals with analyzing the quality of this subject's teaching process through the presentation of the questionnaire and its graphical and verbal evaluation. Chapter VI, Discussion, contains the review of all questions of the questionnaire. This paper summarizes an interpretive study designed to understand and represent the learning experiences of the students and ourselves.

Keywords—Teaching, Quality, Management, Elasticity.

I. INTRODUCTION

THE evaluation of the quality of education has recently become an essential part of the management of educational institutions. The reasons that led to the gradual introduction of the quality of education can be summarized as follows:

Increasing the number of university students persists, with the developed world economies planning a further increase in

the number of students, which characterizes the entry into the information society.

Education has become a fundament of the social and economic development of developed society. Countries are investing more in education, eventually reflecting society's potential.

From the perspective of society and an individual, the objectively demonstrable quality of educational institutions is significant. That becomes important specifically with individual decision-making while selecting the study field and thus a particular school. This process provides free choice of study, fairness in education (equal opportunities), and creates a competitive environment in the education field.

Internationalization of education led to the development of mobility of students and pedagogical staff.

All this proves that the intricacy of measuring and evaluating the quality of education is a very complex issue and requires a complexity of scientific approach. The current trends in European education impose new requirements on the pedagogical staff of higher education institutions. The main innovation areas closely linked to each other are teacher professionalism and quality management at school, especially teaching.

In the quality assessment of the teaching process, it is insufficient to learn the outcomes and compare them with the desired objectives. It is also necessary to determine why the desired/undesired results were reached, what the constraints were, and what to alter in the teaching process in the future. Therefore, it is also essential to discover the quality of the preparation and progress of the teaching process, i.e., the satisfaction of students with teaching; methods, forms, materials, and technical provisions; evaluation of students; the social climate in the study group; characteristics of teachers; teaching objectives; topic selection; conditions in which the teaching process takes place, etc. [1-8].

The thoughtful planning combined with teacher training in

E-Learning and research activities can contribute to high quality of educational processes [9].

II. THE STUDY PROGRAM OF STRUCTURAL AND TRANSPORT ENGINEERING

A. General Characteristics

Theoretical and practical knowledge, including recent developments in planning, designing, and realization of engineering and transportation infrastructure, will be acquired. The bachelor graduates will be qualified to continue studying for the engineering degree (within this or a similar field) or implement their knowledge in practice. With the acquired theoretical and practical skills, the graduates will be able to design, construct and operate the civil and transportation engineering works, but also bearing structures including bridges, overpass bridges, towers, pylons, tanks, silos, roads, highways, airports, railways, tunnels, buildings of diverse utilization.

The graduates can analyze problems in the planning, designing, and realization of various types of constructions, design simple structures, analyze and manage a fundamental economic agenda.

B. Knowledge

Graduates of the study program

- obtain the necessary theoretical foundations from science disciplines,
- acquire basic knowledge of the calculation methods, principles, and procedures of safety, reliable and economical design of civil engineering and transport structures
- acquire basic knowledge of the socio-economic nature.

C. Skills

Graduates of the study program

- acquire and understand the essential facts, concepts, and principles applicable to both structural and civil engineering and can use them in practical activities in a way that demonstrates an understanding of the context and consequences of alternative solutions and decisions,
- understand the basic principles and procedures of construction of various types of civil and transport engineering structures; can comprehensively handle related organizational and technological tasks,
- manage and control construction-technological processes.

D. Competence

Graduates of the study program

- acquire the ability to use and adequately develop basic theoretical knowledge in the design and construction of less demanding civil and transport engineering structures,
- acquire or expand basic communication skills in at least one world language,
- can further expand the knowledge and abilities gained by studying,
- manage to organize own education and further professional development,

- can apply legislation in construction business practice per generally accepted moral and ethical principles,
- acquire the urge for constant professional education.

E. Graduates' Practical Application

Graduates of the study program will find application in various areas of civil, structural, and transport engineering. As designers, they can design simpler civil and transport engineering structures.

In the position of master, assistant construction manager, and, after necessary practice, as construction manager, they can be engaged in constructing various civil and transport engineering structures. Graduates of the study program will also find employment in state administration, environmental offices, and organizations carrying out the administration of civil engineering and transport structures. They can also be self-employed in the realization and design of simple buildings.

III. INFORMATION OF THE SUBJECT

A. Learning outcomes

Objective of the Elasticity I is to analyze simple state of stress (Simple tension (compression), Simple shear, Simple torsion, Simple bending), Buckling of centric loaded columns and combined state of stress (Shear under bending, General bending, Bending with tension (compression)) [10-13].

Brief outline of the subject:

1. Introduction. Simple state of stress
2. Simple tension (compression)
3. Simple shear
4. Simple torsion
5. Flexural properties of beams
6. Beam displacements
7. Moment-area method
8. Shear under bending
9. General bending
10. Bending with tension (compression)
11. Cross-sectional core
12. Buckling analysis of centric loaded columns
13. Stress distribution in an elastic-plastic stress state

A language which is required to complete the subject: Slovak, English

B. Recommended literature for the study

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 [10]Internet address: <https://moodle2.tuke.sk/moodle/course>

IV. EVALUATION OF THE SUBJECT LEARNING PROGRAM

The course is taught in the winter semester in the 1st year of bachelor study in all study programs and fields in the range of 2 hours per week in the form of joint lectures and exercises for each study group separately. For its successful mastery, the completion of theoretical courses such as Theoretical Mechanics, Mathematics and Physics is required. The mandatory prerequisite is Theoretical Mechanics. Teaching is focused not only on theoretical knowledge, but above all on their application examples.

In the last week of the semester, students were asked to complete a questionnaire. The Questionnaire for the evaluation of the quality of subject teaching was anonymous and focused on the individual evaluation of the subject topics, social climate during teaching, teaching method, and overall satisfaction with the subject. 41 respondents from 7 study groups were approached. The questionnaire contained 17 questions formulated under the auspices of the Higher Education Quality Management course of the Technical University of Kosice. The full text of the questionnaire with its subsequent evaluation is set out in the following chapter.

V. EVALUATION OF THE TEACHING QUALITY OF THE SUBJECT BY STUDENTS

The full text of the questionnaire for the evaluation of the quality of subject teaching:

1. Teaching took place in a suitable classroom, with appropriate equipment and didactic technique.
2. The teaching of the subject was provided by appropriate, available educational resources and professional literature.
3. At the beginning of the semester, the teacher explicitly explained the requirements and criteria for the successful subject's completion.
4. The subject had a logical, rational, and coherent concept.
5. The complexity of the subject was appropriate to the given stage (year) of study.
6. The lectures were interesting, engaging in content, understandable, applicable to practice, and beneficial.
7. The seminars were helpful and practical.
8. The lecturer performed as an expert interested in the field, which motivated me to learn the subject.
9. The teacher managed to teach well; his/her speech was clear and understandable, with valuable information; he/she answered students' questions.

10. The teacher led the students to discussions, cooperative and independent work, critical and creative thinking.
11. The teacher optimally used didactic technology, teaching tools, computer, the internet, etc., in teaching.
12. The teacher had a pleasant speech, had an open, accepting, empathetic relationship with the students, had a sense of humor.
13. The teacher was able to respect the limits of students' social communication and behavior.
14. When necessary, he/she dedicated time to students outside of lessons, provided appropriate consultations.
15. The teacher's assessment of the homework was reasonably demanding, objective, and fair, following clearly defined rules.
16. The evaluation of control tests was reasonably demanding, objective, and fair, following clearly defined rules.
17. Passing the subject was a benefit to me; it was interesting, I learned a lot.

The students can choose from the options

- 4 – Agree
- 3 – Rather agree
- 2 – Neither agree nor disagree
- 1 – Rather disagree
- 0 – Disagree

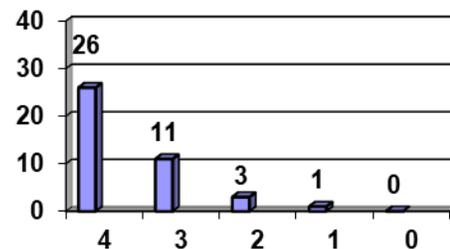


Fig. 1 Teaching took place in a suitable classroom, with appropriate equipment and didactic technique

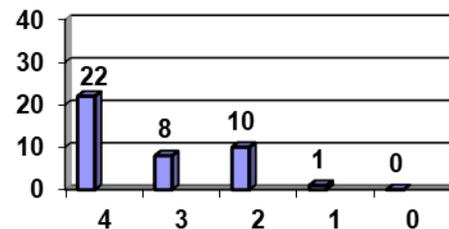


Fig. 2 The teaching of the subject was provided by appropriate, available educational resources and professional literature

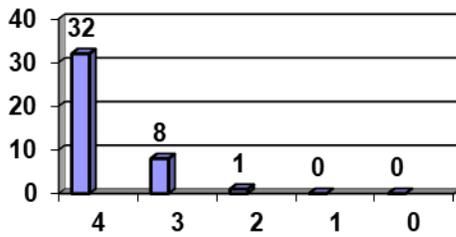


Fig. 3 At The Beginning of the semester, the requirements and criteria for the successful subject's completion were explicitly explained

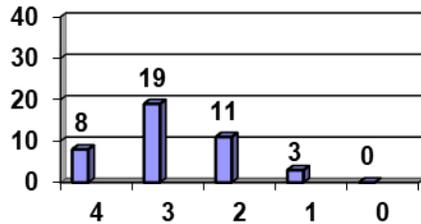


Fig. 4 The subject had a logical, rational, and coherent concept

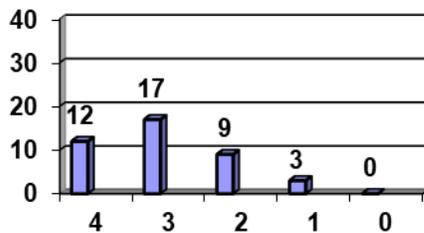


Fig. 5 The complexity of the subject was appropriate to the given stage (year) of study

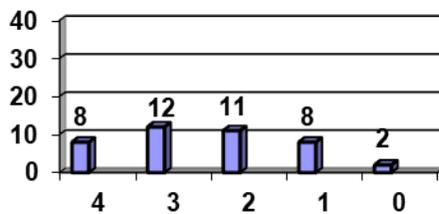


Fig. 6 The lectures were interesting, engaging in content, understandable, applicable to practice, and beneficial

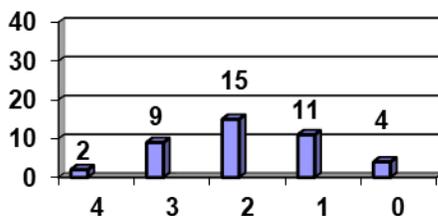


Fig. 7 The seminars were helpful and practical

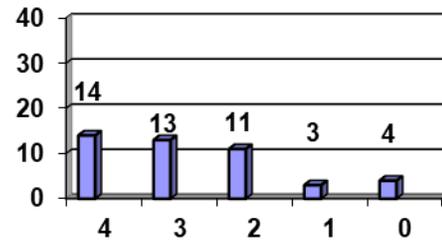


Fig. 8 The lecturer performed as an expert interested in the field, which motivated me to learn the subject

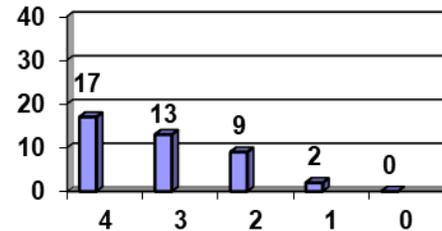


Fig. 9 The teacher managed to teach well, his/her speech was clear and understandable, with valuable information; he/she answered students' questions

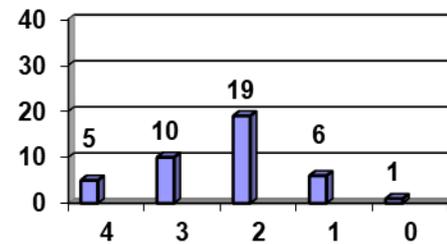


Fig. 10 The teacher led the students to discussions, cooperative and independent work, critical and creative thinking

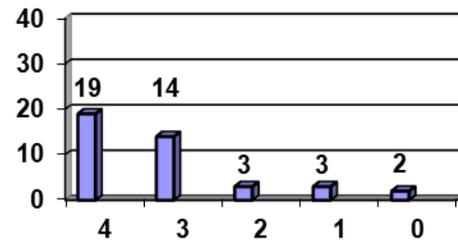


Fig. 11 The teacher optimally used didactic technology, teaching tools, computer, the internet, etc., in teaching

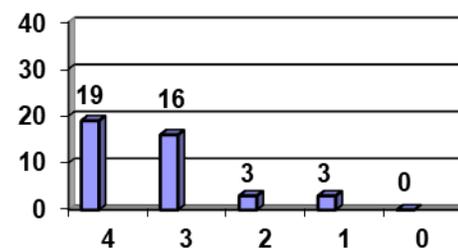


Fig. 12 The teacher had a pleasant speech, had an open, accepting, empathetic relationship with the students, had a sense of humor

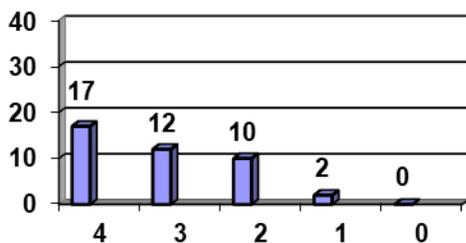


Fig. 13 The teacher was able to respect the limits of students' social communication and behavior

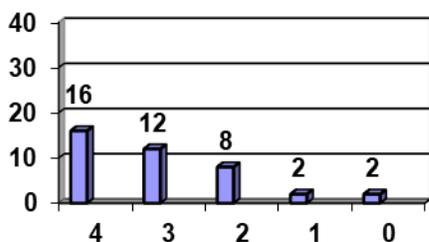


Fig. 14 When necessary, he/she dedicated time to students outside of lessons, provided appropriate consultations

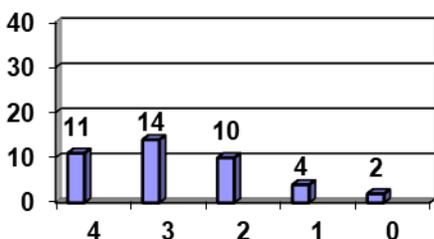


Fig. 15 The teacher's assessment of the homework was reasonably demanding, objective, and fair, following clearly defined rules

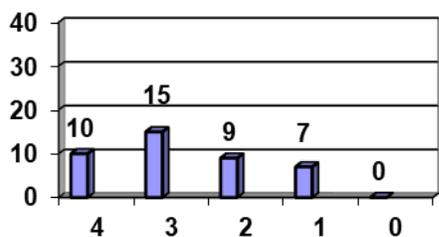


Fig. 16 The evaluation of control tests was reasonably demanding, objective, and fair, following clearly defined rules

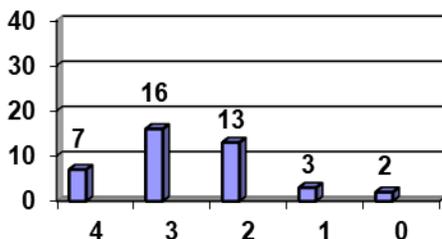


Fig. 17 Passing the subject was a benefit to me; it was interesting. I learned a lot

VI. DISCUSSION

With the "above average", the students evaluated the 1st, 2nd, 3rd, and the 12th question. This mainly concerned the technical equipment of the subject, which is currently one of the main objectives at TUKE. Furthermore, the teacher's knowledge and pleasant speech dominated this evaluation.

The worst-rated, i.e., below average, was the 6th, 7th, and then the 10th question. Elasticity I is a demanding theoretical subject that forms the basis for the design of building structures. Practical applications can only be presented in the form of pictures and photos at this stage of the study. Students are led to independent and creative work in the practices. As the subject is taught by several teachers (due to many study groups), the subjectivity and personality of each teacher are considered in the evaluation of the questionnaire.

The remaining ten questions were rated with an average.

The evaluation of the questionnaire led us to think about strengths, weaknesses, threats and opportunities of the course. Knowing these we can improve the quality of education to a high level.

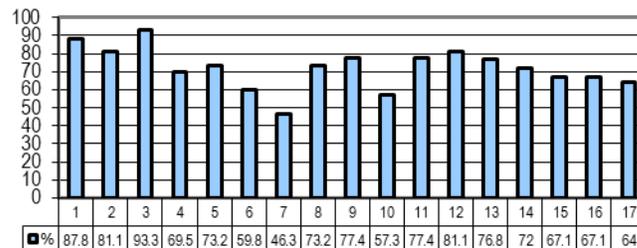


Fig. 18 Evaluation of all questions of the questionnaire

VII. CONCLUSION

The work focused on the evaluation of the quality of education in the subject Elasticity I. A questionnaire was given to students of the 2nd year of the bachelor's degree at the Faculty of Civil Engineering, Technical University of Kosice. Through the questionnaire's evaluation and deriving from the pedagogical practice to date, we obtained the basis for further elaboration of the strengths and weaknesses of the subject. We assessed the threats and opportunities that can occur in the teaching of this subject. The overall ranking of the questionnaire is 68.6%. It resembles the students' perception of the lessons (lectures and exercises in general). This result does speak of good quality, although it is still not approaching our objectives. It is a hurdle for all teachers of this subject to further invest in the quality of lessons.

Quality management in university teaching is the most recent innovation of professionalism of a university teacher and his/her teacher's competences. Creating appropriate conditions for the work of teachers and developing their professionalism can improve the quality of teaching (especially lectures, exercises and seminars) as the most important processes at university and in the main area of the quality of the university. As a result, the principle of indivisibility of

teaching and research at universities can be ensured in a more effective way [14-21].

Our intention is not only to improve the quality of this course, but also to improve the ability of Moodle as a tool to create online courses that embody and further develop our social constructionist pedagogical framework in pandemic situation.

ACKNOWLEDGMENT

Funding: This work was supported by the Scientific Grant Agency of the Ministry of Education of Slovak Republic and the Slovak Academy of Sciences under Project VEGA 1/0374/19.

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Author Contributions:

E. Kormanikova carried out the conceptualization, method, writing-original draft preparation, funding acquisition.

K. Kotrasova has organized writing-review and editing, project administration.

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