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EXPANDING THE ACTIVITY OF STUDENTS FROM PROFESSIONAL FIELD "TRANSPORT, SHIPPING AND AVIATION" THROUGH INNOVATIVE FORMS OF SELF-PREPARATION¹

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Abstract: In the publication is reviewed the education of students from professional field "Transport, Shipping and Aviation" and are presented the applied innovative forms for self-preparation such as course works, course assignments, referrals, project work, participation in clubs, etc.

Keywords: transport, self-preparation for study, innovative forms of education JEL Codes: J21

INTRODUCTION

The training of students in any degree programme is crucial for their preparation as experts in their respective fields. The training combines attendance classes, active forms of training, self-study of students and practical preparation through internships, practice periods and other forms. The proper combination of all these forms is a prerequisite for the successful preparation of excellent specialists in the relevant areas. I will review the training activities for students in professional field 5.5. Transport, shipping and aviation, degree programme Technoology and Management of Transport at the University of Ruse and I will support the review with an example of good practices.

EXPOSITION:

1. Current state of the training in the professional field *Transport, shipping and aviation* in Bulgaria

Professional field *Transport, shipping and aviation* is one of 13 professional fields in the higher education area *Technical sciences*.

The total number of higher schools offering training in this field is seven (Table 1), with a total capacity, determined by the National Evaluation and Accreditation Agency 7405. At the time of the last accreditation, the total number of degree programmes is 38, of which 4 in Educational Qualification Degree (EQD) "Professional", 15 in EQD "Bachelor" and 19 in EQD "Master" [HCC, 2016].

The total number of students enrolled for the last three years (2013-2016) is a relatively constant value, within the range of 5600 to 5900, with the upper value reached in the last two years.

The lowest accreditation grade belongs to the University "Prof. Dr. Asen Zlatarov" - Burgas (7,72), and the highest belongs to the Technical University - Sofia (9,27).

¹ The paper was presented at the plenary session on 27 October 2016 with an original title in Bulgarian: РАЗВИТИЕ НА АКТИВНОСТТА НА СТУДЕНТИТЕ ОТ ПРОФЕСИОНАЛНО НАПРАВЛЕНИЕ "ТРАНС-ПОРТ, КОРАБОПЛАВАНЕ И АВИАЦИЯ" ЧРЕЗ ИНОВАТИВНИ ФОРМИ НА САМОСТОЯТЕЛНА РАБОТА

In Fig. 1 the percentage of professions and positions in the professional realisation of graduates five years after graduation is shown. About 20 % of the graduates are specialists and applied specialists, 7,68% are cpublic servants, and over 70% are in the category "others" [MOH, PCBY].

Higher school	Grade	Valid accreditation	Capacity
	01.000	until	Capacity
Higher Naval School "Nikola Yonkov Vaptsarov"*	9,22	2019	1000
1. Faculty of Navigation;			
2. Engeneering Faculty			
Higher School of Transport "Todor Kableshkov" –	9,19	2019	560
Sofia			
1. Faculty of Transport management			
National Military University"V. Levski" – V.	8,60	2018	300
Tirnovo			
1. Faculty of Aviation – Dolna Mitropolia			
University of Ruse "Angel Kanchev"	9,25	2019	1500
1. Faculty of Transport;			
2. Silistra Branch			
Technical University - Varna**	9,02	2019	1900
1. Faculty of Shipbuilding;			
2. Faculty of Mechanical and Manufacturing			
technology;			
3. Faculty of Marine Science and Ecoogy;			
4. Dobrudja technological College;			
5. College in the structure of the Technical			
University - Varna			
Technical University - Sofia:	9,27	2019	2015
<i>I. Faculty of Transport;</i>			
2. Faculty of Machine-building and Instrumenta-			
tion, Plovdiv Branch;			
3. Faculty of Engineering and pedagogy - Sliven			
University "Prof. Dr. Asen Zlatarov" - Burgas 1.	7,72	2018	130
Technical College			
Total: 7 higher schools			7405

Table 1. Vehicles and transport activity of bus transport



Fig. 1. Percentage of professions and positions in the professional realisation of graduates in professional field 5.5. Transport, shipping and aviation

The large percentage in the category "Other" is due to the state of the transport sector in Bulgaria. Many of the transport companies, as well as companies with auxiliary activities (car services, etc.) are micro companies or sole traders. Many of the company owners fulfil both managerial activities and activities of applied specialists.

2. Individual and independent work with students – a factor for improving the quality of their preparation.

In the course of the students' training, besides attendance classes, the organisation of their independent work, as well as the support of their individual wirk is of essential importance.

We will review the forms of work with students in one of the degree programmes of the professional field 5.5. *Transport, shipping and aviation*, Transport Technology and Management, based on the curriculum and the practice of its study in the University of Ruse.

The total number of work hours per student during one semester is estimated to 800 hours, distributed as follows:

- attendance classes;

- active teaching forms (individual assignment) - course work, assignment and review, diploma thesis self-study, all with predetermined periods for work;

- self-study during the semester;

- self-study in preparation for the exams.

For the total course of study, the attendance classes are 2420, of which 1200 lectures, 1220 tutorials (seminars, lab classes and practice). The hours, estimated for work on the individual assignment, are 710, for 6 planned course works, 17 course assignments, 3 reviews and 1 diploma thesis preparation for defence. The time estimated for self-study during the semester is 1470 hours, and for exam preparation - 1800 hours.



Fig. 2 shows the time distribution of one student per semester

Fig. 2. Distribution of total work time for one student per semester

From the graph in fig. 2 it can be seen that 6 % of the total time is assigned for working on individual assignments. For developing a review, 10 hours are assigned while for course assignments and course works they are 20 and 40 hours, respectively. All these individual taska are assigned to the students at the beginning of the semester. During the semester, consultations are held and at the end, the student needs to defend his/her development. In the first years oftudy, mostly course assignments and reviews are included, while course works are assigned in the junior

and senior year. The fulfilment of the individual assignment is obligatory for the successful passing of the exam, so the 50 hours estimated are obligatory for the students.

A survey was conducted among 60 students from various degree programmes of the degree programme Transport Technoogy and Management, in which the question: How much time do you devote to self-study per semester? Obtained the following answers:

- up to 100 hours - 84% of the students surveyed;

- from 100 to 200 hours $-\,13\%$

- from 200 to 250 hours – 3%.

The results obtained are an indicator of the fact that students do not work sufficiently and they do not cover the standarts for self-study per semester. Therefore, other forms of work should be sought, which would successfully engage the students during the remaining time. One of these forms is work in the student professional clubs.

Work in the professional clubs, directed to knowledge acquisition in the field of the degree programme studied is one of the innovative methods in student training. Currently, ten such clubs are functioning at the University of Ruse, working individually, or in cooperation with each other. Two of these clubs are related to the degree programmes in Transport and are extremely successful: Club "HydRU" and Club " Four Wheels". Over 80 students participate in them actively.

The work in the clubs is mostly directed to:

- promoting the educational and professional development of the students;

- deepening and intensifying the communications and partnership between students and lecturers;

- exchange of ideas and various points of view on topical problems in the fields of competence of the club;

- professional and research development of lecturers;

- active inclusion in educational, research, project and volunteering activities, which contribute to the development of society.

One possible activity in the club is developing and implementing real projects by the club or a group of club members, led by the lecturer.

The main stages of work for the students are as follows:

- getting acquainted with the idea;

- forming a team of students from different degree programmes, needed for the development of the project;

- choosing a platform for communication between the students themselves and with the lecturers;

- developing the product/idea;

- providing supply of materials and parts, including from sponsorship;

- developing the product/idea;

- testing the product/idea;

- defending the development in front of their lecturers, presenting the product at proper occasions and/or participating in competitions with it.

Working on the projects, the students develop a number of crucuial skills:

- acquiring knowledge from various sources individually and willingly;

- learning to use this knowledge for solving ne practical problems;

- acquiring communicative skills, working in varous groups;

- research skills (identifying problems, извеждайки проблеми, collecting information from literature, documents, observation, experiment, analysis, building a hypothesis, summary);

- analytical thinking.

The lecturer performs the following activities in the duration of the work:

- initiates the idea of the project or creates conditions for extracting the idea, helping initial planning;

- monitors the project implementation;

- fulfils control and evaluation functions;

- provides conditions for independent external evaluation of the project.

3. Good practices for project development

The project HydRU, for developing an automobile for urban traffic, powered by fuel cell.

The main characteristics and parameters of the automobile comply with the international competition Shell Eco-Marathon. Numerous conditions and limitations should be fulfilled in relation to:

- The overall dimensions of the vehicle and dimentions for the driver's seat and the cabin;

- the way of joining the individual elements, units and components;

- distance between the vehicle axles, ground clearance, headlights and stop lights;

- technical specifications, realated to: braking system, lights, turning radius, tyre dimensions, weight, driving in bad weather conditions, etc.;

In this respect, a concept for an urban car, powered by a fuel cell was developped. The technical parameters of the vehicle are covered by the use of a fuel cell Horizon FuelCell Technologies - H-1000XP Fuel Cell System.

Over thirty students from the engineering degree faculties of the University worked on the project, led by a team of five lecturers, specialists in various subject areas.

The involvement of students from four faculties and different departments, creating a unified team and solving the objectives of the first project stage, can be evaluated as extremely positive. A concept for the car was built. Based on it, some conceptual views for the design vision of the body, the way of its manufacturing, the type of drive, the braking system, the electrical systems, the control electronics, etc.

Many problems have been solved in the course of the creative work and innovative approaches have been applied. We created our own Facebook page HydRU group. The team members have voted most of the decisions for alternative versions on Facebook.

The result from the relatively short time was two prototypes of the automobile: R1 and R2.

The team of students and lecturers in the degree programmes Transport, Electronics, Telecommunication systems, Industrial design, Material science and metal technology managed to fulfil the main task – creating and producing a prototype of an automobile, powered by a fuel cell, which meets the requirments of the international competition Shell Eco Marathon. This logically led to participation in the qualifications in Istanbul, Turkey, and earning approval for participation in the London race 2018.

The independent external evaluation for the quality of the team's work was earned at the Youth international competition Shell Eco Marathon, taking place in Istanbul in the autumn of 2017. /fig. 3/. Team HydRU of the University of Ruse was approved for participation in the race in London, 2018. The efforts of the team earned recognition with the award for Best Car Design. This Cup is a complex recognition for design and quality.

The Minister of Education and Science received HydRU team and extended a high estimate for their work/fig. 4/.

The results achieved in such a short time and the recognition earned motivate the team to seek new constructive solutions and improve the car systems for achieving a higher result.

CONCLUSIONS

Based on the analysis made, the following conclusions can be brought out:

1. Seven higher schools in Bulgaria teach students in professional field 5.5. Transport, shipping and aviation, with a total capacity, determined by the National Evaluation and Accreditation Agency - 7405 students.

2. At the University of Ruse study students in professional field 5.5. Transport, shipping and aviation, in two degree programmes: Technoology and Management of Transport and Transport Machinery and Technologies.



Fig.3. Participation of HydRU team in the international competiton Shell Eco Marathon, 2017



Fig. 4. Meeting of HydRU team with the Minister of Education and Science

3. Based on analysis of the curriculum of Technoology and Management of Transport degree programme at the University of Ruse, it has been determined that the distribution of attendance classes, active forms of study and self-study meets the requirements approved. However, a survey conducted by the authors discovered that the students do not spend enough time in self-study during the semester. The results from the survey are as follows: up to 100 hours-84% of the students surveyed; from 100 to 200 hours – 13% and from 200 to 250 hours – only 3%.

4. One good practice for expanding the time for self-study is their involvement in professional clubs, where they receive specific tasks. This supports their self-study and develops additionally their communication and research skills, analytical and creative thinking, teamwork skills, etc.

5. Based on the professional clubs set up and the good practice during the work on HydRU project, we claim that establishing new professional clubs and project ideas, involving a large number of students and PhD students is an indisputable condition for expanding the student self-study time.

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