INTERDISCIPLINARY USE OF SIMULATION OF PASSENGER VEHICLE FOR TEACHING AT THE ACADEMIC LEVEL

Potential and current students of universities more and more often pay attention to the quality and level of classes as part of their studies. It is an important issues for the faculties, institutes and other units which make up the educational path of the educational profile. Use of above all an unusual approach to activities and utilization of the modern equipment like a passenger vehicle simulator ASI200–6 company AutoSim, to correlate and analysis by students of various data collected and the results. It is an important element of activating students by inteesting them of topic.

The article presents a description of the positions, primary and secondary goals which are to achieve the students after successful completion of laboratory exercises, the methodology and the concept of teaching for undergraduate students in the field of simulation studies the impact of driving style on emissions vehicle (ecodriving) and the main problems associated with the proper functioning classes.

Keywords: eco–driving, simulator, simulation, teaching

1. INTRODUCTION

The present work is a description of a method of teaching in the field of laboratory simulation studies the impact of driving style on emissions vehicle (ecodriving), carried out at the Institute of Combustion Engines and Transport at Poznan University of Technology in framework of the subject protection of environment in transport, for transport course of study of 4 semester. The paper presents the goals and how to achieve them through interdisciplinary topics classes. Main topics is related also to ecology, modern transport, simulation research and

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interdisciplinary studies. The resulting data from simulator can be interesting for researchers, ordinary users of road vehicles and most of all technical students.

2. MAIN AND ADDITIONAL GOALS OF CLASSES

The first step was to clarify what will be lessons about and what can be used to implement the main goals. With the imposition of the subject of the course by defining the thematic scope of the task was made easier. The main goals were to achieve:

- Simulation studies in terms of ecodriving,
- The use of passenger vehicle simulator AS1200–6,
- Learning to write formal essays & theses.

In contrast, additional assumptions were as follows:

- Teaching actions in the research group,
- Interdisciplinary discussed topics,
- Presentation of research work based on simulation scenarios,
- The processing and presentation of data from a large database,
- Interest and inspire their own work related to the topic of simulation,
- Study the correlation of measurement results collected from registration,
- To encourage look for reliable information and correct describe by a bibliography.

All the above goals underwent delicate changes resulting from the need to reduce the amount of time or materials [1 – 4, 6].

3. DESCRIPTION THE WORKPLACE

The next step was to consider a situation and the ability to conduct laboratory exercises. So that it became possible to optimal and efficient use of in a safe way classroom and simulation room. This represented a problem due to the lack of adequate number of seats in the laboratory simulator passenger vehicle and the involvement of other persons other activities in the course of another subgroup of their research laboratory registration.

The most important place at the beginning and end of the course is laboratory room, which can accommodate one group of laboratory. Thanks to the use of such teaching aids which are overhead projector, blackboard or the possibility of connecting additional research equipment it is a good place to explain to students the purpose of the exercise carried out and guidelines associated with them.

The main element of the laboratory simulation is the mechanical device AS 1200–6 from the company AUTOSIM, which consists of a real vehicle cab (Fig. 1). Placed on a mobile basis across the center of the panoramic screen
Interdisciplinary use of simulation of passenger vehicle …

(Fig. 2.). Relative to the position of the driver of the vehicle and the position of instructor. Realistic simulations allow the creation of repeatable and customized routes of journeys in terms of traffic, signaling components, information or unexpected pedestrian entrance to the road. This allows to objectively checking drivers' skills from the scope of eco–driving – checking how the drivers usually drive vehicles, and the introduction of adjustments to their driving style and test re–examined the drivers of the newly acquired knowledge. An important advantage of this kit is the ability to register the relevant virtual parameters of the car, which are directly related to the actual parameters of the passenger vehicle. Students had the difficult task due to the need for processing data received from registration. Collected information make it easy and transparent way to present the most important aspects of driving skills in the context of eco–driving.

Fig. 1. Interior of the cabin simulator AS1200–6

Fig. 2. Position of the visible simulator cabin AS1200–6 and a panoramic screen
The danger arising from the room the movable base of simulator was divided into two zones: green – safety zone and red – dangerous zone. The cycle exercise of laboratory exercises only driver in the closed cabin of the vehicle can be in the red zone, while the rest of the sub–groups and members of the public in the green zone in at the instructor zone [3, 5].

4. METHODS OF ACHIEVING THE GOALS AND THE COURSE OF CLASSES

The main assumptions for the implementation of classes were issues: time limit to 1.5 hours of the classes, a variable number of subgroups in the range of 7 – 16 people, and unconventional form of teaching laboratory tests, through a combination of different forms of activation of students such as: lectures, presentations, registration exercises, questionnaires, the use of different measuring equipment managed to get rich and dynamic storyline. The best representation of the form of the course is the following chronological plan:

– Start of course,
– Introduction in the form of a lecture on OSH and organization of the laboratory,
– Introducing of aims and goals of classes,
– The division into sub–groups and assign roles personal,
– Identification of theoretical issues to develop and analyze the data types to be on the basis of data from registration,
– Study the response time to Aparat Piórkowskiego,
– Simulation of passenger vehicle ride,
– Assembly of the measurement results and surveys,
– Discussion on the role and impact in terms of simulation,
– Students questions,
– Completion of course.

Due to the limited number of persons who may carry out studies on the simulator, the decision of the previously mentioned broken down into smaller subgroups. Thanks that achieved the effect rotary position subgroup at simulation and research bench AS1200–6 (Fig. 3), and during the work of one of the subgroups of the rest of the simulator carries out its research preparation is performed discussion and presentation of the subject matter presented simulation.
Thanks the use of various forms of data recording simulation, bio–medic or suggestive assessment of the students encountered the problem of interdisciplinary connections collected results and observations. The most important element was the familiarity of students with the basic editing tools that will be used to write probably future diploma theses engineering or degree. An important issue was to learn the processing of the data received from the simulator in terms of quantity and quality, and adequate presentation of the correct variables correlated waveform parameters such as vehicle speed (Fig. 4) with overall fuel consumption, or the route of the journey [1, 3, 5].
5. MAIN PROBLEMS OF IMPLEMENTATION

The most serious problem of the students during the implementation of the course was the issue of the debate on the role of simulation in terms of engineering. The probable cause was the rare form of contact with that work with students and lack of boldness to the teacher.

However, in the case of a written report which was, the main problem recorded in students was the lack of application of the guidelines given by the teacher and the lack of knowledge in the field of writing formal work [7]. Frequent mistakes in students report were:

– Confusion of students through open form of some key elements,
– Lack of administration of information sources and non use bibliography,
– Bad formatting work,
– Incorrect writing summary,
– Wrong or not clear graphical presentation of data,
– Lack of correct correlation data, consequently an correct analysis and conclusions,
– Omitting important elements component parts of the report,
– Problems associated with combining work by many authors,
– The need to allocate a large amount of time to write and verification (evaluation) report.

Despite these problems, students appreciate the classes because of the manner of conducting laboratory and the possibility of practical training in the skills required by future employers in the processing of a range of data, presentation and extracting reasonable conclusions as relevant.

6. SUMMARY

Laboratory classes are one of the most important aspects of education. Thanks to them students acquire new skills and abilities. That is why it is very important to use different forms of work while developing laboratory exercise. By varying the dynamics and the aspects of stimulation you can get at least a satisfactory final result. A serious problem of this method is the need to maintain strict control of the pace and timeframe for the phase of the classes and spending a lot of time on the analysis of written work. On the other hand the teacher has a possibility through such writing to obtain additional resources and information, and means of the processing presentation of data on the subjects of their course, and students gain new experiences interdisciplinary in the fields of: transport, engineering, psychology, biology, mechatronics, automation and informatics.


INTERDYSCYPLINARNE WYKORZYSTANIE SYMULACJI 
POJAZDU OSOBOWEGO DO ZAJĘĆ DYDAKTYCZNYCH 
NA POZIOMIE AKADEMICKIM

Streszczenie

W artykule przedstawiono opis stanowisk, podano cele główne i dodatkowe jakie mają osiągnąć studenci po poprawnym wykonaniu ćwiczenia laboratoryjnego, metodykę oraz koncepcję prowadzenia zajęć dla studentów pierwszego stopnia z zakresu badań symulacyjnych wpływu stylu jazdy na poziom emisji pojazdu (eco-driving), a także scharakteryzowano główne problemy związane z właściwym prowadzeniem zajęć. Określono cele do osiągnięcia przez grupę studentów podczas zajęć i na tej podstawie opracowano program zajęć. Przedstawiono podział Sali laboratoryjnej ze względu na funkcjonalność i bezpieczeństwo. Wykazano możliwość wykorzystania stanowiska symulacyjnego do interdyscyplinarnych prac badawczo-naukowych.