

THE PROBLEMS OF SPECIALISTS TRAINING IN THE FIELD OF INTELLIGENT TRANSPORT SYSTEMS IN RUSSIA

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Summary: The present paper estimates experience of creation of conditions for preparation at Rostov State Civil Engineering University of experts for work in the various transport systems having ITS components. In Russia last years there is an essential growth of motorization and development of a transport infrastructure. The state and municipal authorities, transport agencies increase use of technologies ITS for the decision of problems traffic management, transportation, traffic safety. Dynamical development of transport system in many respects depends on per-sonnel potential.

Keywords: intelligent transport systems, education, road traffic

The extension of the application field of intelligent transport systems (ITS) is one of the typical trends of the modern stage of the national economy development. The ITS are treated as one of the key components of the modern concepts of mobility, transport security, environment etc. Due to development of ITS technology, new requirements for the management of knowledge-intensive processes cover all stages of the life cycle of transport systems including fundamental and exploratory research, design, development, operation and management. However, the implementation of all ITS advantages and ITS efficient usage require experienced professionals, and this affects the features of training. Russia's lack of training system for ITS development specialists and ITS operation leads to problem situations, when separate ITS elements are implemented and instead of qualitatively new system arise isolated "islands of technology". To resolve this problem you need training on a new conceptual framework, ensuring the realization of the system planning principles in the process of ITS life cycle.

Analysis of the educational programs of leading universities indicates that practically all directions of transport specialists training have different level of ITS courses. In many countries, educational programs for bachelor's and master's degrees in the field of ITS are realized, as well as retraining programs. In Austria, the Vienna University of Applied Sciences carries out preparation of bachelors and masters in ITS. Linköping University (Sweden), Czech Technical University in Prague also have these educational programs. Taking into account the importance of coordinated approaches to the implementation of educational programs in the field of ITS,

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the European Union has financed a special project ETNITE for the development of transnational educational network. Universities of Germany, England, Sweden, Austria and other countries took part in this project. The aim of this project was to develop a strategy for the transition to the sustainable organizational structure of ITS specialists training with new professional requirements. The main tasks that were solved during this project were the formation of ITS common knowledge base, the formation of training centres, identifying methods and tools for training of such specialists. It should be noted that, from the first steps of this education system development it involved not only students training but also retraining and advanced training of specialists.

In the United States in 1996, the Department of Transport has developed a training program for ITS (ITS Professional Capacity Building Program) with the aim of integrating the activities of the administration of the transport systems, universities, research organizations, and industry to create ITS database and a set of educational programs for different categories of professionals. Such requirements as a general knowledge of ITS, cost and benefits ITS, technology, standards and technical skills were taken into account. These requirements for educational programs were differentiated for four main professional groups: DOT personnel, employees of other Government organizations relating to ITS, specialized staff, ITS users. If the educational programs requirements for professionals are quite natural, then the special programs for ITS users are an important feature. It is very important to inform the public about the possible ITS applications, cost of service, benefits. Minimum level of sufficient knowledge about technological bases of ITS is necessary, but they need more information about the features and impact of the ITS on the daily life of the people.

Some Universities of Japan since 1999 also educate specialists with the training of interdisciplinary courses on technological, economic and social aspects of the ITS functioning. It is very important that the Ministry of Economy and Industry and ITS Association of Japan participated in the development of the educational program.

Integration of educational activity is also carried out in the framework of the International Association of universities "Consortium for ITS Training and Education" (CITE), which since 2000 supported the ITS educational programs and implemented distance learning for both students and working professionals. The Consortium includes more than 70 universities in the world. Distance learning was carried out on 13 main courses dealing with different ITS aspects. Due to the rapidly changing transportation technologies and functions expanding, the continuing education and knowledge exchange are needed more than ever.

At present in Russia we can observe a contradictory situation. On the one hand there is awareness of the need of ITS, because ITS implementation has a strategic character and determines each country's transport system competitiveness. On the other hand, in the educational sphere there is some delay, the limited experience in students training and enhancing the skills of professionals. In the future, the lack of qualified specialists in the field of

ITS will be critical to effective implementation of the development projects of the transport infrastructure, traffic management, transportation, traffic safety.

Based on these factors, Rostov State Civil Engineering University in 2002 began the preparation of educational programs on intelligent transport systems for road traffic. These ITS educational programs were created on the base of the international experience on preparation of specialists of this profile and the cooperation with universities of Germany, Switzerland and Spain. For using advanced educational sources in the field of ITS in 2002 Rostov State University of Civil Engineering joined the International Education Association in the field of ITS.

In the process of creating the educational and methodical support, we followed the definition of knowledge base and key competencies of ITS specialists. ITS knowledge base can be represented at three main levels. The fundamental information includes overview of Intelligent Transport Systems, main functional ITS application, benefits for ITS users, etc. Classic ITS course describes general principles of ITS functioning, the theoretical basis for the realization of ITS functions, ITS architecture, standards, funding of ITS. The advanced information includes new approaches for design ITS projects, using high technology, risk analysis and methods of their elimination, etc.

It is obvious that the basis of ITS knowledge is presented in classic ITS courses. The main aim of these courses is to provide professionals with the updated knowledge and skills during ITS life cycle. Therefore, it is necessary to consider the full logical chain: planning, design, logistics supply, implementation, operation, management, and evaluation of the operation effectiveness. It becomes clear why all international universities underline the necessity of interdisciplinary educational programs in the field of ITS. It must be a balance between the technical issues of ITS, engineering management, economic, legislative and institutional problems of ITS. The technical knowledge includes courses in ITS architecture, theory of traffic flow, traffic simulation, information and communication technology, systems integration, systems management. Engineering management includes management issues, project management, staff management, evaluation of effectiveness. The economic block must provide the knowledge of cost estimation, ITS economy and risk analysis. ITS institutional issues include knowledge of the legislative framework, the State regulation in the sphere of ITS, protection of intellectual property.

Based on this concept, in the Rostov State Civil Engineering University formed the following main disciplines of profile “Intelligent Transport Systems in Road Traffic”:

- Fundamental course of ITS;
- ITS architecture;
- Telecommunications in ITS;
- Theory of traffic flow;

- Traffic simulation;
- Advanced traffic management system;
- Dynamic route guidance;
- Incident management;
- Transport planning;
- Economy and Management of ITS Projects.

The experience of this program shows that students successfully learn these courses, show great interest in the use of GIS technologies and traffic simulation using modern software-simulating complexes. Implementation of joint projects and participation in workshops with foreign universities show that our students have the same level of knowledge as students of other countries.

If the main issues of students' preparation are clear enough, the retraining of working specialists requires a more flexible approach. First of all, it is needed to differentiate training programs for various target groups with the following classification criteria: qualifications and positions of ITS staff, the required level of ITS professional knowledge, activity specialization and teaching methods. One of the target groups should obviously be represented by employees of the federal, regional and municipal levels to study issues of state regulation, planning and designing, financing, educational activities. For the target group, representing the university level, the most important issues are the implementation of educational activities in the field of ITS, research, technical support of ITS implementation, consulting activities. For organizations operating in the field of ITS, training must emphasize design issues of ITS, ITS operation and updating the information. As regards methodology, many of these training programs cannot be implemented without special training in ITS training centers.

Thus, for the complete use of ITS potential in Russia it is necessary to create innovative educational system of training and continuing education of professionals through training programs that meet international standards, integrated into the process of research so that the learning environment will be constantly adapted to new standards, and experts will be able to adopt new technological challenges.

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