тельной программы Электроэнергетика заочной формы обучения. Мнение респондентов распределилось следующим образом: всего в опросе участвовало 58 студента; образовательную программу с параллельным направлением обучения выбрали 37 студент, что составило 63,79 %.

Выводы

В Шяуляйской государственной коллегии становятся все более популярными образовательные программы с параллельным направлением обучения, когда наряду с основной специальностью появляется возможность получить и дополнительную специальность. Выбрав такую форму обучения, студенты надеятся на то, что двойное образование предоставит больше возможностей для успешного трудоустройства. После окончания обучения выдается один диплом, в котором указывается двойная квалификация. Спрос студентов на образовательные программы с параллельным направлением обучения с 2014 по 2016 года увеличился на 24,66%.

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VIRTUAL REALITY AS AN INNOVATIV SETTING FOR SIMULATIONS IN ENGINEERING EDUCATION

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The article is devoted to simulation techniques in engineering education. The distinctive features that are useful for educational purposes are stressed. The author gives an example of using Building information models (BIMs) for postgraduate engineering students at practical English classes. The course design focuses on learning about virtual reality by simulating interdisciplinary industrial projects and it aims at developing skills such as methodical approach to practical engineering problems, teamwork and working in interdisciplinary groups.

Key words: virtual reality, real life simulations, Building information models.

Virtual worlds, games and simulations represent the future of learning environments. They enable a wide range of learning activities from complex laboratory simulations to collaborative communication projects facilitated by the creation of user-generated content allowing for incremental improvements in response to evaluation and changing educational contexts.

The application of simulation techniques to education and training is a comparatively recent but promising development. Although the first applications of games and simulations in the field of military training date back to the end of the eighteenth century it was only in the mid-1950s that the use of complex teaching methods such as games, simulations and case studies was successfully introduced into business management training. Further developments of these techniques as educational tools allowed their application in the social sciences in the 1960s. In the 1970s they spread to a range of other disciplines at all levels of education. Aided and stimulated by the didactic opportunities that computer technologies offer the use of games and simulations within education is still growing rapidly.

A generally accepted definition of simulations is that given by Barry E. Collins who characterizes a simulation to be an operating representation of central features of reality [1].

Simulations have distinctive features that have proved especially useful for educational purposes for the following reasons [2]:

1) the possibility to include all the necessary activities for teaching;
2) the flexibility of created teaching environment.

Contrary to real life situations simulations can be tailored according to the desired educational objectives. A simulation can include all features which educators consider necessary and have all aspects left out that are found irrelevant or distracting. Complexity is reduced at the same time important aspects can be accentuated. Constraints of real life settings can be avoided. In many cases real situations and settings are too complicated, too dangerous or too expensive or even impossible to create whereas. Therefore a lot of simulation techniques are used to supplement and/or substitute conventional laboratory work in chemistry, biology, physics or technology. Simulations allow experiments in human genetics, in reactor physics or population dynamics. In many cases it is less expensive and less dangerous to build a simulation than to use a real system.

Due to the features of reduced complexity and accentuation simulations are highly versatile and flexible. Therefore a variety of difficulty can be achieved according to the cognitive and/or affective objectives that are to be attained. Additionally simulations can either be run by one person or simultaneously a number of persons.

Simulations are modern student-centered teaching methods requiring the students' involvement and active participation in the simulation process to operate the system. Therefore students can develop their interdisciplinary skills such decision-making, problem-solving, divergent thinking, interpersonal and communication skills. That is why this methodology should be widely used in technical universities for engineering students. For example virtual learning environment was created in Widener University (Pennsylvania, USA) at engineering classes [3]. Students created the model of rocket to optimize launch conditions by adjusting the launch angle. To help embellish the exercise they supplemented the bottle rocket with a model using virtual reality and a photorealistic simulation of the launch that allowed the students to appreciate the optimization problems associated with water and air pressure and launch angle. Obtained usage data indicated that the students easily adapted to the virtual reality simulation and used the simulation for intuitive experiments on their own to optimize launch conditions.

In the present work the author reports an example of using Building information models (BIMs) during one year of the Integrated Master Degree at Civil Engineering Faculty of Belarusian national technical university.

At present BIMs software is widely used by postgraduate engineering students for construction design. Traditional building design was largely reliant upon two-dimensional technical drawings (plans, elevations, sections, etc.). Building information modeling extends this beyond 3D, augmenting the three primary spatial dimensions (width, height and depth) with time as the fourth dimension (4D) and cost as the fifth (5D). Therefore BIMs covers more than just geometry. It also covers spatial relationships, light analysis, geographic information, and quantities and properties of building components (for example, manufacturers' details). All these advantages can be applied not only while making a construction project but also put into practice for analyzing this project at English classes.

Our work was divided into two equal parts. The first half of the work included lectures on "Building materials and technology" and instruction that provided the students with the tools they would use throughout the course, particularly in their master's dissertation. At their professional practical classes postgraduates developed virtual project models with the help of BIMs.

The second half of the work included using BIMs in construction management. This task was carried out within activities going at practical English classes. In this way the students became participants in the building process. They are constantly challenged to deliver successful projects despite tight budgets, limited manpower, accelerated schedules and limited or conflicting information. This virtual construction helped the students reduce uncertainty, improve safety, work out problems, and simulate and analyze potential impacts. Therefore they leant to input critical information into the model before beginning construction with opportunities to pre-fabricate or pre-assemble some systems off-site.

The aim of this work was to explain the students how useful those experiences have been, allowing them to explore many engineering activities within their postgraduate engineering education.

The students found this kind of learning to be more interesting and motivating than having conventional classroom teaching. Evaluations of student-centered teach methods have shown that student motivation and interest are significantly stimulated. How much students actually learn depends of course not only on the quality of teaching method itself but also on their prior knowledge, their general and specific abilities and on instructional quality. So it is very important to create an innovative setting for simulations in technical university to help students master their professional skills.

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ПРОБЛЕМНОЕ ПОЛЕ МОДЕРНИЗАЦИИ МАТЕМАТИЧЕСКОГО ОБРАЗОВАНИЯ СТУДЕНТОВ ТЕХНИЧЕСКИХ УНИВЕРСИТЕТОВ

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Аргументируется необходимость модернизации математического образования студентов технических университетов. Анализируются возникающие при этом педагогические проблемы и пути их решения.

Ключевые слова: технические университеты, математическое образование, модернизация, педагогические проблемы, професиональная компетентность, математическая компетентность.

Введение. При всех достоинствах содержания математического образования в технических университетах, сложившегося последние 70 лет, его нельзя признать совершенным и адекватным для современного периода. Зафиксированное нормативно содержание обучения математике (высшей математике) при подготовке по