

Annales Universitatis Paedagogicae Cracoviensis

Studia Technica III (2010)

Pavel Dostál, Václav Tvarůžka, Elzbieta Mastalerz

CAD in preparation of the Special Subject teachers

The Department of Technical and Vocational Education of the Pedagogic Faculty of the University of Ostrava guarantees three-year Bachelor and two-year Master study subject called the Special Subjects Teaching in two specialisations – the Trade and Services, the Engineering. These subjects are accredited as combine, non-paid ones, Bachelor study in the study programme of the Specialisation in Pedagogy, Master one in the Secondary Schools Teaching. Bachelor study is finished by the plea of the Bachelor work and the state exam, Master study by the Diploma work and the state exam.

Students are mostly teachers of special high schools that don't have university degree. Their motivation for the study and for its successful finishing is mostly very big and often joined with higher wages or even a condition for their occupation.

Aims of the study subject and the profile of the graduate

Subjects aimed at CAD are sorted only into the specialisation of Engineering that will be noted in the story, however even students of the specialisation of the Trade and Services have an opportunity to join this education which they use a little.

The aim of the Bachelor study subject of the Special Subject Teaching is to prepare teachers of special subjects for teaching at secondary special schools. The graduate is equipped with useful knowledge and skills for the special subject teacher's work, as the special aspect so the didactic aspect.

The aim of the Master study of the Special Subjects Teaching is to prepare teachers of special subjects for teaching at secondary special schools. The graduate is equipped with necessary knowledge and skills for the special subject teacher's work, as the special aspect so the didactic aspect, he can apply theoretic knowledge into teaching and master their implementation. He is able to check implementation of new methods and knowledge into teaching with using a pedagogical search. He is equipped with necessary knowledge from the area of management and law in the way that he can do leading roles.

The specialisation of Engineering is addressed in preparation teachers of engineering, material disciplines and electro technical subjects for secondary special

schools of various types, it means where subjects of this type are taught, mainly at engineering schools.

For both specialisations there are common pedagogic and psychologic disciplines, i.e. General Pedagogic, Social Pedagogic, Special Pedagogic, General Didactics, Didactics of the Special Subjects, General Psychology, Evolutional Psychology, Pedagogical Psychology etc.). These ones make about a half of all the subjects. The rest develops a chosen subject. In the specialisation of Engineering there are i.e. Parts of Machines, Static, Machines and Appliances, Engineering Technology, Materials, Technical Drawing etc. The part of the study is also a compulsory pedagogical practice.

The size of the attendant teaching at particular subjects is made after consultation with individual teachers and issue from the type of the subjects and from equipment by suitable didactic tools. Hour donation of the attendant study for particular subjects is between 4 and 24 lessons it means 1 to 6 four-lesson units. In each semester of study there are 5 or 7 subjects finished by the exam. Attendant part of teaching is made in the Pedagogical Faculty of the University of Ostrava, always once a week during workdays. Every class has made a fixed day of teaching. Teaching runs in two four-lesson units – in the morning and in the afternoon. Lesson donation of the attendant study in particular semesters is between 40 and 75 lessons. Number of days with an attendant study is between 5 and 10 per semester.

The graduate of the Engineering can orientate in theoretic and special subjects of engineering and electro technical character and he can apply this knowledge also in practical teaching in laboratories and workrooms. In the aspect of subject-science competences he is mastered in knowledge of the subject, he can find and process information and he can use them in pedagogical work. In the aspect of general-pedagogic competences he masters processes and conditions of education on theoretic a practical level joined with knowledge of the psychological, social and multicultural aspects, he is able to support development of individual qualities of pupils in the area of interests and hobbies, he has knowledge about law and he respects it in his pedagogical work. In the aspect of social-communicative competences he masters instruments of pedagogical communication and creating of favourable working climate at school, on the base of knowledge of social relations of pupils he masters instruments of socialisation of pupils and can orientate in difficult social situations at school and out of the school and he is able to transmit their solution. He has diagnostic and assistant competences – he uses instruments of pedagogical diagnostic in teaching, he masters an instrument for securing a discipline and solving the educational situations, he knows attributes of social-pathologic manifestation of pupils and is able to identify pupils with specific needs in the area of education. He has didactic and psycho-didactic competences – he manages strategies of education and learning, he joins them with knowledge of psychologic and social aspects, he can use ICT for teaching. In the area of professional and personal cultivation competences he has a general scope, personal condition for team work, he is able to reflect himself on the base of self-evaluation and evaluation by various subjects and to reflect educational needs and interests of pupils.

The graduates are prepared also for doing of technical-economic roles in the production area and in services as well.

With the accession of CAD technologies into industrial practice and also into education at secondary schools it is necessary the graduate of the Special Subject Teaching – Engineering would gain proper competences in this area.

CAD in the Bachelor study subject

In the Bachelor study subject the Special Subject Teaching – Engineering there is, in the winter term of the second class, inserted the subject Technical Graphics. The subject is attendant taught in four four-lesson units. List of the taught matter:

1. Introduction of the problem, basic terms, trends of progress of technical graphics, principles of computer graphic display, introduction with control of AutoCAD, bases of drawing in AutoCAD (types of lines, sections of a line, circles, rectangles, polygons).

2. Bases of drawing in AutoCAD (arches, ellipses, elliptic arch, rings, points, construction lines, hatching, function for managing of the screen, instruments for precise drawing, coordinates, ortho, grid, step, catching modes).

3. Catching modes, curves, multilines, Boolean operations, work in levels, arrangements of objects.

4. Arrangements of objects, processing of the text, dimensioning.

Main content of the subject is AutoCAD that was chosen as the most worldwide expanded CAD and also the most expanded CAD at Czech schools. In the subject, students make 2D designs and drafts, the subject is finished by a credit test – to draw drawing of the set component.

CAD in Master the study programme

In the Master study subject of the Special Subject Teaching – Engineering there are inserted two subjects oriented on CAD. In the summer term of the first class it is the Construct Practice 1 and in the winter term of the second class it is the Construct Practice 2. Autodesk Inventor is used as software there above all – in secondary schools the most used CAD based on parametric modelling. The subject Construct Practice 1 is focused to master working with Autodesk Inventor, the subject Construct Practice 2 continues in the previous subject and develop gained knowledge by solution of a specific set technical problem.

The subject of Construct Practice 1 is attendant taught in three four-lesson units. List of the taught matter:

1. Introduction of the problem, basic terms, basic parametric modelling, bases of working in Autodesk Inventor, creation of parametric drafts, geometric attachments, parametric dimensions, bases of components modelling.

2. Bases of components modelling (extruding, rotating, dragging, separation of components, work elements, arrangements in 3D), bases of creation of formations.

3. Modelling of components and formations, creation of drawing documentation.

The subject of Construct Practice 2 is attendant taught in two four-class units where students, with Autodesk Inventor, solve specific job – calculation and construction by the simple function complexes.

Conclusion

The Department of Technical and Vocational Education has, as the member of the Autodesk Academia Programme, the option to franchise the worldwide certificate "Autodesk Certificate of Completion" to its students that shows the knowledge of the specific product (AutoCAD or Autodesk Inventor). The conditions for franchising of the certificate are to show practical knowledge of the given product and processing of the project. Acquirement of the certificate means a competitive advantage at the work market for graduates.

As the Department of Technical and Vocational Education is joined into a programme "Autodesk Subscription", it has a quick access to the newest versions of the software at disposal and so the teaching runs with the newest programme equipment.

Bibliography

- [1] Dostál P., Slovák S., *Combination Study of Teaching Special Subjects*, The New Educational Review 2005, vol. 5, no. 1, pp. 179–187
- [2] Dostál P., Slovák S., Rychlíková B., *Reakreditace učitelství odborných předmětů*, [in:] *Sborník mezinárodní konference Trendy ve vzdělávání 2006*, Pedagogická fakulta UP, Olomouc 2006, s. 21–24
- [3] Dostál P., Slovák S., Tvarůžka V., *Development of the Combined Study at the Pedagogical Faculty of the University of Ostrava*, [in:] *The New Educational Review*, 2007, vol. 12, no. 2, pp. 103–110
- [4] Fořt P., Kletečka J., *AutoCAD 2006*, Computer Press 2006, Brno
- [5] Fořt P., Kletečka J., *Autodesk Inventor: Adaptivní modelování v průmyslové praxi*, Computer Press 2004, Brno
- [6] Suková A., Dostál P., *Technické kreslení na PC*, OU, Ostrava 2007

Zastosowanie programu CAD w kształceniu nauczycieli przedmiotów specjalnych

Streszczenie

Artykuł przedstawia zastosowanie programu CAD (*Computer Aided Design*) w nauczaniu przedmiotu Przedmioty specjalne. Jest on oferowany w programie studiów licencjackich i magisterskich przez Instytut Kształcenia Technicznego i Zawodowego Wydziału Pedagogicznego Uniwersytetu w Ostrawie.

Słowa kluczowe: CAD, nauczanie przedmiotów specjalnych, inżynieria, studia łączone