



Original Contribution

DEVELOP A TRAINING PROGRAM MODULES FOR GENERAL TECHNICAL DISCIPLINES IS THE APPLICATION OF E-TECHNOLOGIES

K. Georgieva*, V. Stoykova

Technical College-Yambol, Trakia University, Stara Zagora, Bulgaria

ABSTRACT

Information and communication technologies in recent decades have become a factor which predetermines the development and organization of education, industry but also society as a whole. Education in the Information Society offers new content and organization, which requires radical changes in the learning process. Development of training programs training modules on general purpose technical disciplines necessary for better absorption of interdisciplinary theoretical and practical knowledge.

The use of software modules creates a prerequisite for algorithmic thinking quickly making independent design decisions in practical realization of future technicians.

Key words: e-learning technologies, training programs, CAD

INTRODUCTION

Using the capabilities of modern computer and communication equipment and technology in education studied, studied by future students and technicians can make them more interesting, attractive, and accessible, to illustrate better what will improve the overall quality of training. Along with traditional forms and methods of training in modern educational process to strengthen the use of computer training programs that can be Web-based or CD (DVD) applications. In the first case the application can be accessed anytime and from anywhere. You can keep updated and improved at a lower price. The disadvantage is low throughput. In general, in universities or companies access is restricted to registered users.

In the second approach the user is limited in the timeliness of the application. Advantage is rapid access and availability of large media files.

***Correspondence to:** Krasimira Georgieva,
Technical College-Yambol, Trakia University-Stara
Zagora, "Graf Ignatiev" street №38, Yambol,
8600, e-mail:kr.g.georgieva@gmail.com

EXPOSE

In the training of students of engineering major place is given to general purpose technical disciplines (CTD). They provide fundamental training necessary for the study of specialized courses in the above courses. For better visualization and utilization of educational content in CTD can be done using software modules that are studied over an upgrade of the students already CAD system. There is another approach that requires no programming skills, but skills for a particular CAD system and knowledge for working with Windows operating system and Microsoft Office, received by students in the first course in "Computer" or "Programming and Computer I "(ARC I).

Ensuring continuity and methodological relationship between subjects included in the curriculum of students in engineering education will make them attractive and better motivation for the practical application of acquired knowledge. In the first or second semester students acquire basic knowledge in Computer and Information Technologies (ability to work in an environment of Windows and applications included in Microsoft Office

package). The course "Engineering Graphics", studied in parallel with the subject "Informatics" (ARC I), students have become familiar with the types of coordinate systems, geometric design of 2D objects and 3D models, sizing and getting the required quality of surface and others. In the second or third semester, according to curriculum, students in the course acquainted with the capabilities of modern CAD systems and acquire skills for a particular studied computer aided design of components, assemblies and objects. The course "CAD systems" or similar to it, have in recent years in connection with mass application in practice of the CAD system from a different class. Requirements imposed by the industrial user of engineers are mostly related skills to create 2D drawings or 3D models and engineering analysis follow them. This requires the inclusion in the curriculum and learning capabilities of modern CAD system to perform detailed and assembly drawings of relatively simple machinery, electrical and electronic circuits, etc.

Automation systems design multivariate create conditions for the construction and optimization solutions, has repeatedly shortening the time for routine computational procedures and exemption from formal activities, such as storage and search of information and preparation of construction documents. Its introduction in engineering education contribute to a better visualization and utilization of content and is a prerequisite for the construction of structural and algorithmic thinking in students and prepares them for work in modern enterprises, which use and preparing technical documentation is fully automated. Increasingly, at home and abroad are using integrated CAD / CAE / CAM (and recently PLM - Product Lifecycle Management) systems and future technicians must be prepared to work under these conditions.

In subsequent semesters depending on the students with engineering major field study subjects such as "Machine elements" and / or "Design ...". Performing all calculations on the project with traditional methods with a sheet, a pen and calculator and drawing with pencil on cardboard, is long outdated and would not be interesting for students of modern so-called "net generation" using computers in their daily lives and prefer to work with a keyboard rather than pen on the screen rather than on paper. In

these subjects in the training and development of projects students can use knowledge obtained from the subjects studied in previous semesters, the relevant calculations can be performed using another software module studied (e.g. MS Excel or Mat Lab in some specialties). When the algorithm of calculation is complex and requires a series of actions may create a short program modules in the appropriate application (eg, macros in Excel, the appropriate dialog interface), the result is a table of data in a suitable format to import into AutoCAD. For this purpose, using students learn and use multiple commands Copy / Paste commands and AutoCAD Multiple, Point, Line.

Microsoft Excel is a powerful means by which we can process data from them to get complex geometric objects that would be very laborious to be entered manually, point by point in AutoCAD (AutoCAD, and AutoCAD are not civil or additional add-ons). It is possible to introduce successive points X, Y and Z coordinates, which form the connecting piece. This may be building, longitudinal profile, etc. – i.e. completed project (1, 2).

This method can be made quite complex drawings, longitudinal sections as targets, generating floor levels and 3D shapes. Naturally, the more complex operations are AutoCAD, so grows the need for more tasks to be solved by Auto lisp program (3).

Routine and labor-intensive activities, all calculations relevant methodology for the design of products and the introduction of ready data (coordinates of points) in AutoCAD, can be automated in two main ways: by some manipulation in Excel or Auto lisp program. The second approach requires programming skills, which have students from all technical disciplines. But this method can also develop training program modules for designing parts and products in various fields (4).

AutoCAD is one of the most commonly used and studied CAD system with versatile technology base and design. Created by the company Autodesk Inc in the early 80s and is the most popular CAD system for automated creation of technical documentation in various fields: mechanical engineering, electrical engineering, construction, architecture, cartography, etc. Although maintaining

dimensional modeling, it is aimed mainly at creating technically perfect drawings.

When working in an environment of AutoCAD is often necessary to repeat the same action repeatedly –drawing the same or similar objects, writing the same text repeated commands, settings and more. In such cases, are indispensable helpers models, blocks, links and script files. Unfortunately, they can not meet all our requirements. In the process of designing a product / detail is required using data tables, perform calculations, using information from the drawings ready, set criteria, optimization of existing structures and others. This requires the use of programs running in an environment of AutoCAD, as mentioned above.

Necessary parameters in this type of software applications are selected from tables introduced in separate text files or programs to work with a database (Excel, etc.). Data are presented graphically in AutoCAD environment. Variants of constructive solutions to choose from dialogs. Thus, it can

easily be done introducing fasteners, profiles, standard texts nitpick, ratings and more.

In the software module based on AutoCAD can be performed all structural calculations. It is possible to create programs that calculate, draw and even complete units of finished product.

AutoCAD environment program modules help to quickly create the necessary drawings. They ensure repeatability of input elements and perform the necessary calculations automatically. Provide lists of commonly used signs necessary, structured in a user defined line, library materials, components and other factors. To achieve time savings when creating a design that can be recovered for analysis of various schemes solutions to optimize the design and improving design.

As a result of experience and analysis of existing solutions can be proposed the following scheme "Design ..." to the summary program module (**Fig. 1**).

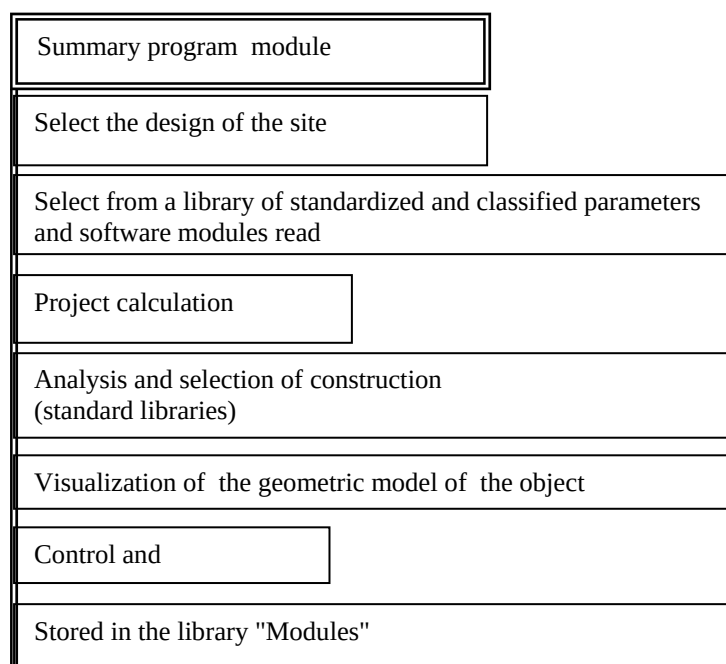


Fig. 1. Sample scheme design stages of object program module summary

In studying the general purpose technical disciplines to better illustrate and motivate students by means of modern design, can be used CAD / CAE systems, high-end. Students' work with these systems will better prepared for their future implementation, but

specifically in the study of CTD subjects may not allow them to learn better algorithm for calculating the individual parts and assemblies schemes. This question is the subject of future research and development of the research team. Another problem is the high price of

CAD / CAE systems and high-end requirements, which call for the hardware that will lead to increased costs of training.

CONCLUSION:

1. Using the training program modules in general purpose technical subjects consistently contributes to better utilization of theoretical and practical knowledge.
2. Allow to use classified and standardized data and modules for designing stored in libraries, saving time and effort to carry out routine operations.
3. Implementation of software modules in the process of learning studied, a prerequisite for

GEORGIEVA K., et al.
algorithmic thinking, rapidly making independent design decisions in practical realization of future technicians.

REFERENCES

1. <http://blog.tsukev.com/auto-cad-izchertavane-situacija-rancho-zamervane.html#more-1266>
2. <http://blog.tsukev.com/auto-lisp-uroci.html>
3. George Omura. AUTOCAD 2000 professionals. ed. Alex Soft, 1999.
4. Paskaleva K., Topalova M., program modules for design of shafts and axles. Twelfth National Conference "Robotics and Mechatronics 2002.