

## 3D-PRINTERS IN EDUCATION

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### **Abstracts**

*3D - technology are booming at the present stage of human development. 3D-printers can print on a new three-dimensional level. All these technologies help to improve modern technology lessons.*

**Keywords:** high vocational education, modern information technologies, science and technology, technologies of the future, 3D-printers.

### **PROJECT ARGUMENTS**

3 D printers and their unique ability to print on a new 3D level play an important role nowadays. 3 D technologies develop rapidly. The modern education requires continuous self-development of pupils and students, and teachers as well. They should learn about modern and future innovations in science and technology. Teachers are to make students familiar with all the technological trends and their abilities.

Modern equipment and materials are not readily available for educational institutions because of their high price. But now the cost of the equipment can be reduced. Low-cost additive manufacturing technologies can be introduced to educational institutions.

### **PROJECT**

We consider the latest English printer and its usage in education. English 3 D printers Bits From Bites (Pic.1) are available so they can be widely used in the classroom.

Using 3 D printers students can design and produce objects that cannot be made otherwise. Earlier students were limited in modeling and production of things by the tools and machines they had. Now these restrictions are almost overcome. Anything you can draw in 3 D program on your computer can be manufactured. Using 3 D printers provides a short path to modeling. Students can model items, print, test and evaluate them (Pic.2). If the items are not good the whole process can be repeated again and again. The use of 3 D technologies will inevitably lead to the increase of innovations in students projects.

Various objects from different areas of science, such as cells, atoms, DNA, can be modeled and then produced with 3 D printers BFB (pic.3,4). The additive manufacturing technologies employment at the lessons of technology are welcomed due to several reasons.

1. 3 D printing encourages students for scientific and technical creativity.
2. 3 D printers open a wide road into the world of 3 D modeling and 3 D visualization.
3. 3 D printers allow you to print objects for the study of different subjects from physics to biology and history.
4. 3 d printers develop creative thinking.
5. Using 3 D printers students can invent new technical products.
6. 3 D printers excite imagination. [4] (Pic.5)

3 D BFB printers is one of the most affordable 3 D CAD / CAM solutions for educational institutions. [1]

There are a variety of CAD programs for schools but we will focus on a few: CAD Kompas-3D and Tinkercad.

Kompas-3D is intended for creating three-dimensional associative models of individual parts and assembly units. The parametric technology allows to make models for typical products on the base of the designed prototype. [2] (Pic.6,7)

Tinkercad program is the easiest for learning and ideal for creating CAD objects for 3 D printing. It allows you to resize objects, move them or delete them. [3](Pic.8)

I made a program of work for the school teenage designers' office (18 lessons).

The students are involved in the process of creating, modeling and producing of items. It is better to hold a real object in your hands than to watch it on the monitor.

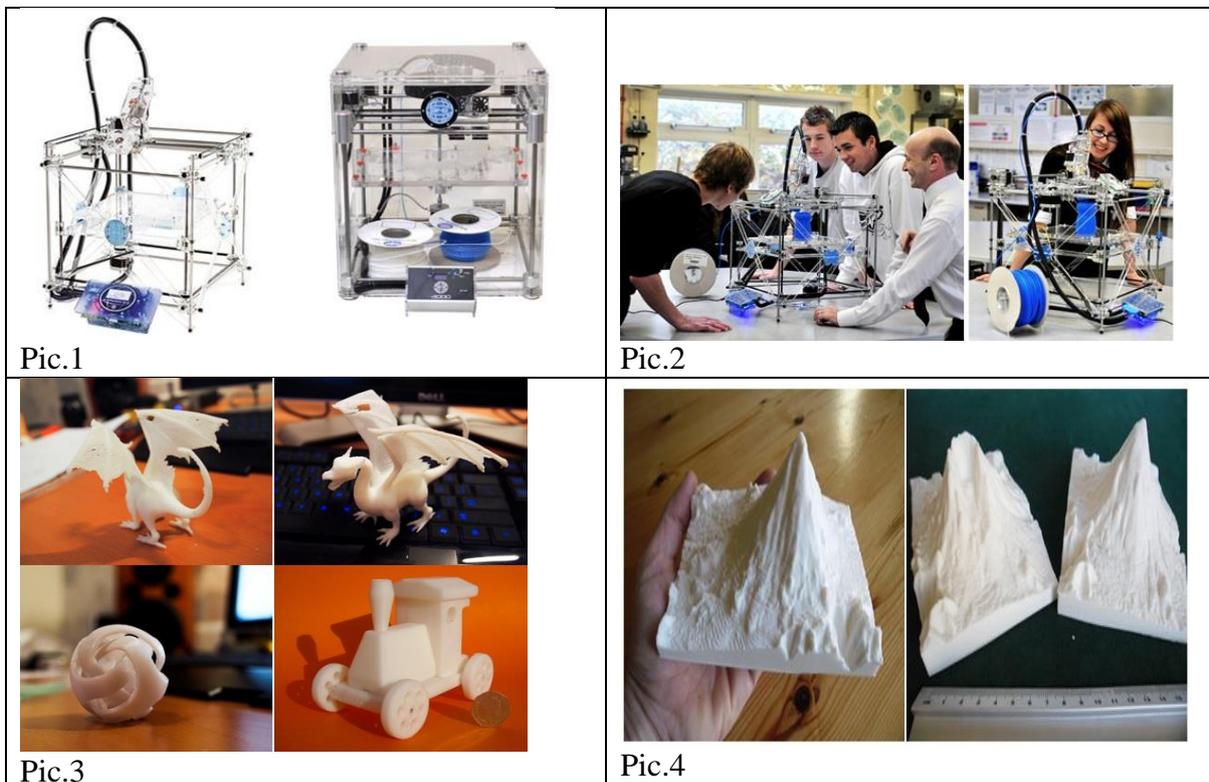
At school 3 D printing can be used no only for the lessons of design and technology. Various works of art can be produced with them, such as sculptures, toys, etc.

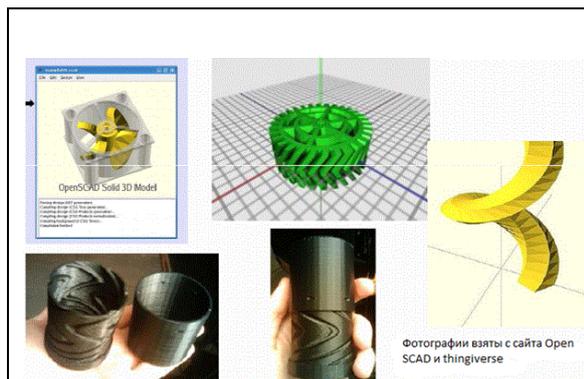
Students and pupils can even produce a new printer studying its parts and printing them under the teacher's supervision in the school designers' office.

## CONCLUSION

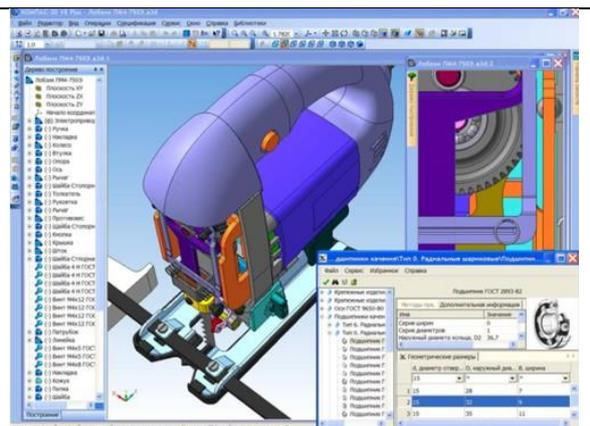
A great future opens for 3 D printing technologies. Soon 3 D printers will be employed at home. 3 D printing is becoming more and more accessible to the people for printing spare parts for broken equipment, ordering components or objects of their own design. The digital database of 3 D models is actively expanded. Anyone can download their favorite design and print it at home. 3 D printers can produce complex structures in remote areas (even in outer space) or in economically less developed countries. [1]

## ENCLOSURE

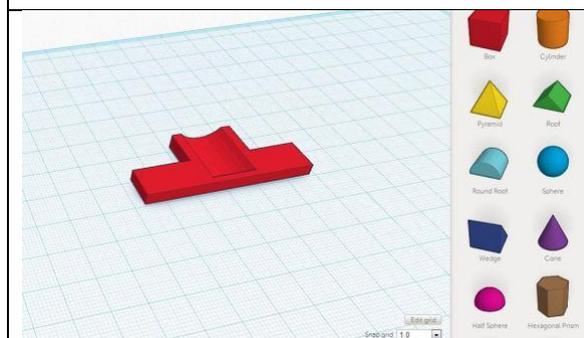




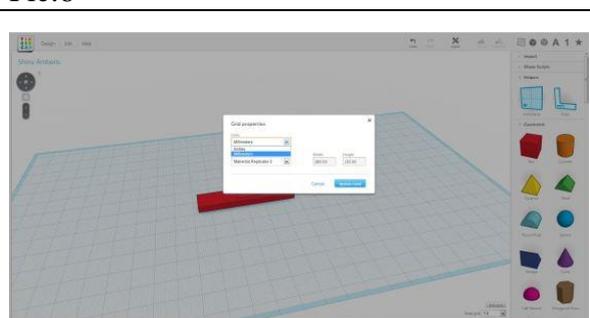
Pic.5



Pic.6



Pic.7



Pic.8

## LITERATURE

1. The use of 3D printers in education URL: <http://baltexim.ru/article/10> / 03.02.2015
2. CAD KOMPAS-3D URL: <http://www.vokb-la.spb.ru/soft/kompas.html> 05.02.2015
3. Tinkercad - the easiest program for 3D printers. URL: <http://3dtoday.ru/industry/tinkercad-samaya-prostaya-programma-dlya-3d-printerov.html> 05.02.2015
4. Project: "3D-printer in every school" URL: <http://vrpb.net/3d-printer-to-each-school/> 05.02.2015