

The Essential Role of Computer Animation in Teaching Technical Courses

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ABSTRACT

Computer animation has a positive effect on the memory of the learner regarding what is taught in the technical courses. It helps in the development of psychology. Animation allows familiarizing the learner with the strategies of solving technical difficulties and showcase the mode of operating machinery and equipment. In the technique, animations are used, and also, in the processes of designing, engineering calculations, visualization and observing technological processes and visualization of the assembly process. This paper discusses the functioning and application for supporting the teaching process of technical courses with the help of computer animation, examples of CAD, CAx and CAM are used for understanding the manufacturing process by the learners. Selected examples of technical processes in both computer-aided design and manufacturing programs as well as in graphics and animation programs are presented.

1. Introduction

Today it is possible to use a lot of technical teaching materials to assist the guide in the learning process to assist the activity of a teacher. It is cost noting but improves the education and the exchange of information being presented to the learners for the technical courses. Many guides use animated programs which help the learner to find solutions in case of any problem they are facing during the classroom presentation, which can give an advantage in their future. Many external factors also have an influence on the learning process as well as recall. With the help of computer animation guides can create numerous exercises which contribute to the development of the brain and the process of memorizing. The human brain has two parts, where the right part is liable for thinking creatively or (out of the box) imagination, whilst the left part of the brain is liable for thinking logically. In the technical teaching process, it is important to make your learner familiar with the visual elements which will help in the development of the left part of the brain which is responsible for the remembrance of mathematical components like geometrical shapes and figures, puzzles, etc., which will contribute in the development of right part of the brain as well. Brain development exercises like this will impact the synchronization of the brain and also in its development, rapid mastery of knowledge and the way in which one interpret the problems [1-3]. As a result brain development exercises using computer animation can add an advantage in the process of development and introduction to technical teaching. An example of this is CAD generated animations. Using animations in the process of teaching aids students in memorizing the technical process and gives them an idea to solve the problems.

The utilization of computer animation in business is very wide. With the help of computer animation, all the process regarding the checking and control can be visualized which later on helps in the automation of the business. It is used at every stage of "life" of a product, starting from conceptual and design phases, through manufacturing, operation and withdrawal of a product from the market or its disposal(it is

used in the development of every phase of product starting from the visualization, designing phase, creation of raw material, operation and upgradation of the product). In the current scenario "virtual manufacturing" is gaining popularity. The utilization of computer-generated strategies using CAx helps in planning and assembling visual forms, which includes both innovation and designing process. CAx programs (CAD/CAM/CAE) are part of a system that manages the life-cycle of a commodity. CAx programs are essential for teaching technical courses[4-6].

2. Importance of animation in teaching technical courses

Computer animation is a process through which we make a series of illustrations and images which appear one after another in a synchronized manner to create an animation. Many different operations and the functioning of any machine can be shown through animation. The broad usage of this form of animations is in the fields of technical, medical and natural science courses for teaching purpose. With the help of still image only limited information will be provided, for more information one needs to change them rapidly whereas in 3d animation this procedure can be replaced by images which are automatically played while presentation and you can pause or stop where ever it is necessary and can also give information regarding different type of content in one. In technical courses, computer graphics and animations are used, inter alia, to teach courses affiliated to material science, both utility graphics and applied science, basics of machine design, automation of forms and production applied science. It portrays the way of operations of numerous machines which makes it easier for students to design such machines, sum its part into an individual unit, assemble, etc. Different types of processes can also be shown with animation, like the process of damage or change caused to elements, preparing and checking forms. This is one of the methods in which any student can interpret things and gets an idea about how many devices works and design. It is worth noting that the introduction of a project aimed at acquiring animated elements by the students into the process of education fosters the development of their both technical and spatial imagination [7-8]. For the education of

medical science students computer animation plays a vital role for a teacher to explain them that how internal organs functions, movement of human body, and how it gets affected by the use of medical devices and how they need to change human organs or parts of the body (artificial bones, inserting screws, bones). It is also seen that students of courses like biotechnology and bio-medical engineering use this simulation process related to animation as well.

The teaching forms must look and use the current methods and means used in business and market. Both graphical representations and animation assist the demonstration of actual issues. It is essential to combine theory as well as practical when teaching technical courses. Thus, animation allows presenting a proper usage of knowledge. It assists the understanding of the problems being portrayed and the interpretation, therefore, it should be kept in mind that animation does not always include the laws of physics and therefore, it is often an element of representing and portraying of technological forms [9-10].

3. Examples of using computer animations of technical issues

It is difficult for a student to imagine 2D-drawing in a 3D-system and to analyze the same. Therefore, the right solution for this problem is that they create the animations but for this, the most necessary thing is to make the students familiarize with the software and to teach them how they need to execute computer animations with different types of programs. Teaching CAx programs, specifically computer-aided programs play a major role in the form of teaching the technical course. In the field of

In the field of technological-computer instruction at the Faculty of Fundamentals of Technology of the Lublin University of Technology, it is implemented, inter alia, in educating of such courses as utility CAD programs in machinery design, building designs, 3D demonstrating, creation building. Illustration of digital geometric figures which lets one know about the composition of a commodity (one or major objects) is the main feature for CAD. Computer-aided design programs are the major pole for the work of an engineer in the first part of commodity development. Latest CAD programs make it possible to perform computer animations. It is utilized for the demonstration of 3D figures, creating technical documents as blueprint, unit motion technique, machine processes, portray the consequence of computational processes, etc, [11]. Animating 3D figures is possible by using most basic CAD programs that are Auto-CAD.

Autodesk Inventor is one of the programs along with CAD which helps to design computer animation in technical issues of assemblies of modeled parts as it is another essential application of the same. A student can execute the machine into the units and then to modify these elements into animation by using Autodesk Inventor. This is the way in which one can learn that how needs to dis-mental the machine and to combine the parts to make is whole. This will also help him/her understand the operations of the units being designed. The creation of an assembly animation makes it easier for a student to prepare technical documentation and to make the

handle. Using assemblies of virtual models, it is possible to simulate the spherical or linear movement of individual elements (motion animation). This helps one in finding own mistakes during the operation so that he/she can eliminate that or rectify the same, this will also give him/her chance to present a visualization of their work. Motion simulation is accomplished by using such CAD programs as Solid Edge, Solid Works, Inventor, Catia, NX [12].

You can easily present the results of your calculation with the help of animation using CAD program as it allows you to create an animation just like calculations of strength using a method called a FEM model. This model helps one to examine the strength of the structure in the model of computer mechanics, simulate deformations, and flow of liquid.

One more essential group that uses animation are computer-aided manufacturing programs CAM. Computer-supported assembling comprises in the joining of the plan and assembling stages. Designing technological processes are made on CAM programs easily. In the field of technological-computer teaching, it is enforced in such courses as visualization and simulation of both research and technological forms, manufacturing engineering. The animation is frequently utilized as graphical elements of demonstrations of the simulated technological form of rolling and mining. The risk of damaging expensive tools during machining, tool breakage can be avoided by animating the machining process. This also assures the machine to avoid an accident as a result of the CNC software fault. Examples of CAD programs are Edge-CAM or Sinutrain software by Siemens which supports the learning of machining forms [13-15]. Students can easily check the rightness of the accuracy of the process and riddance of possible faults as they can easily visualize elements of animation of the machining process to learn CNC machines programming. Usage of 3 ds. Max or Blender are also used in instructing process of technical course as graphics software, it is used in the model of 3D Graphics-Animation. They make it conceivable to make advance animations, including specialized, compositional or generation process animation [15].

4. Conclusions

In present, computer animation and graphics is a fast developing field of IT that has found broad application in many fields of science. In the framework of engineering applications, engineers use modern tools like CAD, CAM, CAE which comes under CAx programs through which the animations are created. In the field of innovation, they are utilized, inter alia, in the form of structuring items, designing calculations, representations of both mechanical and assembly forms, both checking and control modern procedures, and so on.

Animation has a positive impact on the memory of the students and also contributes to enhancing knowledge. The use of animation in technical courses is conducive in the development of the psyche. It also helps students with multiple ways and perspective of looking towards the problems and finding their solutions. It makes possible for a faculty to demonstrate what they exactly mean in courses like media science.

The use of computer animation in teaching technical courses ensures a more effective way of preparing students to carry out the task assigned to modern engineers. In

conclusion, one can say that computer animation is an important element which supports the process of teaching students in technical fields.

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