European International Journal of Pedagogics (ISSN: 2751-OOOX)

Received: 04 March 2026 | Accepted: 28 March 2026 | Published: 22 April 2026

DOI: 10.55640/eijp-06-04-33

RESEARCH ARTICLE

Application of Multimedia Animation Materials in Engineering Graphic Practical Lessons

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VOLUME: Vol.06 Issue04 2026

PAGE: 173-175

Abstract

This article discusses the methodology for introducing multimedia animation materials into practical engineering graphics classes.

KEYWORDS

Engineering graphics, information technology, illustrative materials, animation, multimedia, implementation methodology, practical surface training.

INTRODUCTION

The drawing geometry part of the engineering graphics discipline is a discipline based on spiritual-logical thinking, requiring spatial images and working with mental representations.

To master the material, it is often not enough for students to learn the algorithm for solving problems, it is also necessary to form three-dimensional images in their minds. In modern higher education, geometry, especially planometry, is not relevant both among students and among students, therefore, conceptual thinking in students is not sufficiently developed, it is difficult for them to imagine three-dimensional objects. Since drawing is not required in modern school education, most students do not have basic knowledge of depicting geometric objects on a plane, therefore, it is necessary to fill their minds with vivid graphic images.

Equipping classrooms with modern information technologies allows the coverage of educational materials to move to a fundamentally new level. As part of the teaching methodology of engineering graphics, the application to practical training using multimedia information technologies has been developed, prepared and tested, and is being implemented in the educational process.

The traditional approach to practical exercises teaches students to solve typical problems from a special book, after which they complete 5 or 7 homework assignments in A3 format based on this knowledge and defend them in front of the teacher. All the problems that need to be solved are presented and the solution procedure is explained. This creates some difficulties, especially for young teachers, because it takes a lot of experience to draw a picture on the board, for example, to determine the intersection line of surfaces. Accordingly, a lot of the teacher's time and attention is devoted to drawing the problem, and little time is left for detailed explanations. When drawing on the board, the teacher often blocks part of the drawing with his body. When the student draws the drawing, the lines lose their sequence. In addition, the teacher cannot turn the picture back, because students often show the presentation material more slowly than we do.

To form three-dimensional images, teachers show students simple wooden or plastic models (pyramids, cones, cylinders, and flat parts) that are found only in some specialized classrooms. Using automatic design systems on computers or at your own discretion, you can create a number of complex

three-dimensional objects, display them virtually, and demonstrate their forming features.

The purpose of this work is to increase the efficiency of students' perception of educational materials. To achieve the set goal, the following tasks were set and implemented:

Solving problems by demonstrating methods and algorithms for displaying the objects being studied.

Multimedia technologies allow you to harmoniously present many types of information:

Images, drawings, maps, video slides, and animations. Any movement of objects can be shown in animation. Animations in which information is depicted with graphic images (diagrams, charts) are effective in the learning process. If the amount of incoming information exceeds the ability to perceive it, then overloading the student will only lead to an increase in unperceived information. It has been experimentally established that with a slight increase in the learning process, the mechanisms established by nature are activated, which are aimed at eliminating the excess of information that has appeared. If the flow of information is transmitted for an excessively long time, then brain activity may be impaired. On the other hand, the efficiency of human activity decreases not only with an abundance of information, but also with its lack. With the monotony of external influences, a person quickly gets tired, errors often occur, therefore, when developing educational tools, reducing the speed of information and reducing the flow of information is not always the main task. The main task is to provide a variety of information. It is important to pay attention to the optimal speed of delivery of various types of information, sufficient to maintain student activity at a high level. Psychologically sound, logical, determines the effectiveness of learning for the student in relation to the availability of new material.

The presentation of educational materials should be based on the interconnection and interaction of conceptual, figurative and effective components of thinking.

In psychology, thinking is the process of combining a large number of different information into a single whole, forming associations between elements. Scientists have found that when logical connections are formed between materials, it is better to remember them than to form specific connections or connections at all. Therefore, the form of information presentation is also an important task.

Solutions. When using the information card strategy, the term "information card" means a single area where graphic, textual, and illustrative objects related to one task are located simultaneously.

On one slide, we show one problem, the surface being studied in three-dimensional space, and its depiction on projection planes, which allows students to study the interrelationship of these concepts in their minds. Problems with a more complex task are divided into a step-by-step algorithm, their logical description is given on a single map and depicted in real time using animation effects.

The Autodeck Inventor CADR package is used to create multimedia content. Static images are prepared, all three-dimensional constructions of objects in the model layout are performed, the trajectories of objects are determined and logical information is provided. Microsoft office, Power – Point programs are used for demonstration. It allows you to place a set of files, text information on one presentation area and use various effects on the installed objects. This helps to demonstrate the animation of graphic information.

Now, if practical exercises take the form of a discussion of the main theoretical concepts based on the knowledge gained in the lecture, the application of these concepts will be demonstrated, specific issues on the topic will be solved, the presence of solutions, and algorithms will be shown, so that it is possible to independently solve the problem. Live communication with students on the topic of the lesson will take more time. According to the methodology, some tasks that are performed in parallel with the demonstration are explained by the teacher, and the remaining tasks are performed independently by the students, the teacher monitors their performance and, after many students have completed them, shows the solution to the problem on the screen. The main algorithm can be left on the screen and each student can independently apply it in his notebook.

CONCLUSION

The introduction of multimedia illustrative materials in the process of studying engineering graphics increases students' interest in the subject. As a result, students' learning achievements increase, because the visualization of the objects being studied, the clarity of the methods and approaches to solving the tasks set, leads to high efficiency in presenting the material, and students' understanding of the main topic.

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