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The Project Method Applied in Teaching Technical Drawing

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Abstract
This paper presents an effective pedagogical approach in teaching technical drawing using the project method. This active-participatory teaching-learning-evaluation method is based on the active involvement of students in the learning process, by carrying out concrete projects that allow them to apply theoretical knowledge in a practical context. The use of the project method in teaching technical drawing can bring multiple benefits to both teachers and students, activating their involvement, while also developing practical skills.

Keywords
technical drawing, project method, active involvement

1. Introduction

In the process of professional training, technical drawing occupies an essential place, representing the universal language of engineering and modern technologies. In order to develop the necessary skills in understanding and creating correct graphic representations, it is important to apply active teaching-learning methods that stimulate students' critical thinking, creativity and collaborative spirit.

One of these modern methods is the project method, which involves the active involvement of students in carrying out practical, applied work, starting from a concrete problem. Through this method, the learning process becomes student-centred, and theoretical knowledge in the field of technical drawing is integrated and applied in real contexts [1].

The use of the project method in technical drawing enables the development of professional skills, a sense of responsibility and the ability to work in a team. It also helps students understand the importance of precision, technical norms and standards in professional activity, getting them prepared for the requirements of the current work environment.

2. The Project Method

The project method is an effective pedagogical approach that can be used in teaching technical drawing, as it allows students to apply theoretical knowledge in practical contexts, develop teamwork skills, and express their creativity [1].

The purposes of the project method in technical drawing are [2, 3]:

- To facilitate the active assimilation, based on practice and collaboration, of knowledge and skills in technical drawing;
- To develop professional skills of students: correct design of technical drawings, compliance with norms, solving a real problem, teamwork and responsibility;
- To relate theory (norms, standards, work tools) with practical application, so that students understand the relevance of technical drawing in the professional context.

The benefits of project-based learning method are:

- Improving practical skills: By engaging in projects, students have the opportunity to apply technical drawing principles in real-world contexts, which improves their practical skills and understanding of concepts;
- Developing technical skills: Working on projects allows students to develop the technical skills needed in the field of technical drawing, such as the use of computer-aided design (CAD) software;
- Development of critical thinking: projects allow students to analyse problems, identify solutions and make informed decisions, thus developing critical thinking;

- Increased motivation: practical projects are often more motivating than traditional theoretical lessons. Involvement in concrete projects can increase students' motivation and commitment to the learning process;
- Development of time and resource management skills: working on a project involves planning, organizing and managing resources, essential skills in any professional field;
- Collaboration and teamwork: the project method promotes collaboration between students, thus developing essential communication and teamwork skills.

3. Case Study – Making an Assembly Drawing: Gear Milling Device

The paper presents a case study on the development of the assembly drawing for a gear milling device, correct and complete, according to technical drawing standards (ISO, STAS), aiming at [4, 5]:

- Understanding the function of the assembly;
- Identifying the component parts and the role of each part in the assembly;
- Creating the necessary views/sections;
- Applying functional dimensioning rules;
- Using sections to highlight internal elements;
- Preparing the parts list;
- Constructing the necessary scale drawings for the component parts, according to the parts list.

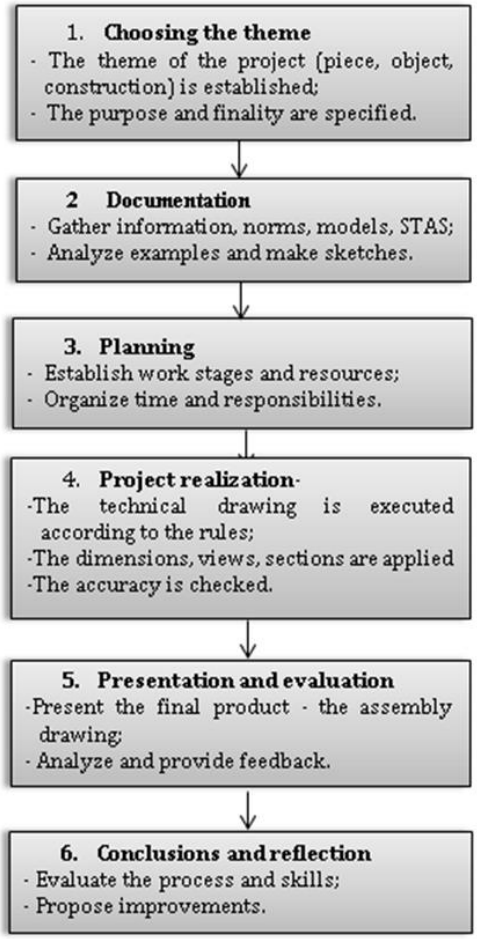

Fig. 1. Diagram of the stages of the project method applied in the technical drawing [1-4]

- Clear, precise and complete presentation of the subject of the case study. The teacher will first choose a significant case of the researched field and the proposed objectives: the creation of the assembly drawing and execution drawings for a gear milling device. The case will be processed and carried out by a group of six students;

- Establishing the clarity of the case and understanding the need for resolution by participants / students. At this stage, unclear aspects related to utility, precision are clarified, questions are asked by students (for example, what size of drawing should they use for the assembly drawing, what scale should they use for the drawings). Also, at this stage, information is indicated regarding bibliographic sources: laboratory guidance, standard catalogues.
- Individual study of the proposed case, where students establish and note their solutions. Each student chooses the parts they will represent.
- Group debate on ways to solve the case. The drawings made by the group of students involved in making the overall drawing are analysed and then in front of the entire group.
- Conclusions are formulated;
- The way to solve the case is evaluated by analysing the degree of student participation. It is specified that the same procedure can be followed for other assembly drawings.

Due to the fact that the case study chosen by the teacher, respectively the assembly drawing, is part of the field studied, a connection is ensured with real life and the problems they may face, while also establishing the connection between theory and practice.

3.1. Lesson project

Subject: Technical drawing and infographics;
Duration: 100 minutes;
Type of lesson: Knowledge application lesson - project method;
Topic: Creating an assembly drawing - Device for milling teeth;
Form of organization: Group work;
Main method: Project method;
Other methods: Conversation, explanation, demonstration, brainstorming.

3.1.1. Operational objectives

Table 1 presents the connection between operational objectives, activities carried out and methods of evaluating the assembly design achieved.

Table 1. Operational objectives [2, 3]

Current number	Operational objectives	The concrete activity	Taxonomic level	Method of assessment
O1	Identify the main elements of a technical drawing (views, dimensions, lines, symbols)	Observing and analysing a board with an assembly drawing	Knowledge / Understanding	Oral questions, guided conversation
O2	Uses drawing tools and graphic conventions correctly	Execution of component part sketches	Application	Observation of practical activity
O3	Develop, as a team, the assembly drawing of the "Dental milling device"	Collaborative work within the group	Application/ Analysis	The final product (the drawing)
O4	Argues the technical solutions adopted within the project	Presentation of the drawing and justification of decisions	Analysis/ Synthesis	Oral presentation
O5	Evaluate your own product and that of your colleagues	Self-assessment and peer assessment	Assessment	Evaluation sheet

3.1.2. Specific skills

- Applying graphic conventions in the production of technical drawings;

- Using drawing tools with precision and complying with STAS norms;
- Technical communication through drawing;
- Efficient collaboration in graphic design activities.

3.1.3. Content
- Types of lines used in technical drawing;
- Dimensioning rules;
- Selection and representation of main views;
- Elements of execution of an assembly drawing.

3.1.4. Didactic strategies
Methods: project method, problematization, explanation, heuristic conversation;
Means: flipcharts, video projector, drawing tools, worksheets;
Forms of organization: frontal, in groups, individually.

3.1.5. Lesson development
Table 2 presents the way the lesson is conducted in stages, the activities of the teacher and students, as well as the time allocated to each stage.

Table 2. Lesson development [2, 3]

Lesson stage	Teacher activities	Student activities	Time
1. Organizing the group and capturing attention	Presents an example of an assembly drawing and the related execution drawings	Observe, discuss, answer questions	10 minutes
2. Announcing the theme and objectives	Present the project topic: Creating the assembly drawing for a gear milling device	Write down the topic, discuss the tasks	5 minutes
3. Project training	Explain the project steps: documentation, sketch, drawing, presentation. Distribute sheets with requirements and evaluation criteria	They form teams, establish roles (coordinator, illustrator, documentary)	10 minutes
4. Project development	Provides support, guides students, answers questions	Develop the project as a team, study the sketch, create the assembly drawing	40 minutes
5. Project presentation	Invite teams to present their projects. Ask clarifying questions.	Present the work and justify the solutions	15 minutes
6. Evaluation and conclusions	Evaluate according to the grid, provide feedback and appreciation. Highlight positive aspects and areas for improvement	Self-assess and note what they have learned	10 minutes

The lesson dedicated to the creation of an assembly drawing through the project method offered the opportunity to combine theoretical training elements with practical activity, oriented towards the final product. The use of the project method proved appropriate, as it has favoured the active involvement of students, collaboration between colleagues and the application of technical knowledge in a practical context, similar to real situations in the technical field.

The students showed interest in the task, especially due to the applicative nature of the project. The team organization allowed the efficient distribution of roles and responsibilities, which stimulated communication, coordination and decision-making in the group. During the practical activity, the rules of graphic representation, dimensioning and the creation of execution drawings were correctly applied,

a sign that the theoretical basis discussed at the beginning of the lesson was well understood. The final presentations of the projects highlighted progress in the way of technical expression and in the ability to argue.

The lesson was effective, with good results both in terms of the final product – the assembly drawing – and in terms of the development of technical and social skills. The project method proved to be suitable for this type of content, and the reflection on the activity provides valuable points for improvement for future lessons.

4. Conclusions

The project method applied in technical drawing offers an effective way to develop essential skills in the job market. By actively engaging in projects, students can improve their practical skills, critical thinking, and ability to collaborate. This approach not only enhances learning, but also prepares students for future challenges.

The assembly drawing is the essential technical document for the production and assembly of a technical mechanism. By carrying out this case study, all the necessary steps were taken to move from the conceptual model of the mechanism to the final technical documentation.

The study proved the importance of understanding the interactions between parts, respecting representation standards and functional dimensioning, elements that ensure the correct functioning and reliability of the final assembly. By applying these procedures, the assembly drawing becomes a complete and accurate tool for technical communication.

References

1. Danciu E.L. (2006): *Modalităţi de optimizare a procesului de predare-învăţare din perspectiva teoriei comunicării* (*Ways to optimize the teaching-learning process from the perspective of communication theory*). Orizonturi Universitare Publishing House, ISBN 9786-3830-83, Timisoara, Romania, (in Romanian)
2. Cerghit I. (2006): *Metode de învăţământ* (*Teaching methods*). Polirom Publishing House, Iaşi, Romania, eISBN 978-973-46-2248-1 (in Romanian)
3. Cucoş C. (1996): *Pedagogie* (*Pedagogy*). Polirom Publishing House, ISBN 973-9248-03-9, Iaşi, Romania, (in Romanian)
4. Olteanu F., Clinciu R., Olteanu C. (2007): *Elemente de proiectare în ingineria mecanică. Desen tehnic* (*Designing elements in mechanical engineering. Technical drawing*). Transilvania University of Brasov Publishing House, ISBN 9789-7359-8052-8, Brasov, Romania (in Romanian)
5. Dale C., Nitulescu T., Precupetu P. (1990): *Desen tehnic industrial pentru construcţii de maşini* (*Industrial technical drawing for machine building*). Technical Publishing House, Bucharest, Romania, ISBN 973-31-0122-2 (in Romanian)