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METHODS AND STRATEGIES FOR ONLINE TEACHING OF TECHNICAL DRAWING

Abstract: The present paper aims to highlight the fact that the online teaching of the technical drawing is as efficient as the traditional teaching, if the objectives are set properly, if the right resources are chosen and if modern teaching methods are adapted and reinvented, such as to respond to the learning needs of students, while giving the teacher the opportunity to self-assess.

Key words: online teaching, technical drawing, modern teaching methods.

1. INTRODUCTION

Online education is a form of distance learning, easy, useful in certain situations such as the current period, offering the same high quality education. It is an alternative mean of distance learning in which teachers provide appropriate training, enabling students to achieve a high level of training.

Online education meant rethinking the content transmitted, the learning process being based on the characteristics and immediate needs of students: curiosity, autonomy, the satisfaction of being part of a group, of being appreciated [1].

The modern approach to the teaching, learning and assessment process must be student-centered so as to meet their learning needs. This can be achieved by using modern tools in the teaching process such as: blogs used for exchanging information and opinions, video conferencing that facilitates remote communication via the webcam, discussion forums that allow interaction and discussions between students and teacher, email.

Online teaching offers both advantages such as an unrestricted educational environment, flexibility of time and location, better organization, ease of access and sharing, as well as disadvantages, interaction or novelty.

The platform used provides students with a virtual framework with content appropriate to the program, providing the possibility of structured training, streamlines the training and education process due to learning opportunities and easy access to learning [1].

2. MODERN TEACHING METHODS FOR ONLINE TEACHING

The teaching methods used in the online environment must emphasize the flexible approach to student work by increasing their commitment and critical thinking. The teacher must propose authentic materials, which provide a rich and nuanced context, compared to the hypothetical concepts, which lack authenticity. With the help of questionnaires, discussion spaces, interviews and question sheets, the teacher should help students to reflect on their own learning [2], [3].

In case of interactive online teaching methods, the learning process of the educational material is much simplified, the training is individual, taking into account the needs of each student and their cognitive activity is improved. Examples of interactive online teaching methods are presented below.

- *Structured information*

To structure the information to be taught, one can use PowerPoint presentations in which the slides are attractive and contain only the most important information, following the course topic to be developed by the teacher, together with the students.

- *Quizzes and quizzes*

They can be used at the end of each hour, to verify the information taught, but without being noted, to be perceived as educational activities. These methods have the advantage of being able to go into more detail in the knowledge assimilated during the class, as well as the teacher's ability to self-assess their teaching technique, because if most students have mastered the information taught, then it is clear that the teacher does what is needed. These methods also allow the teacher to see which students did not understand or were not paying attention in class.

- *Online project*

The method started from the classic project, being adapted and designed so that it can be used in online lessons. This assessment method is complex, and usually takes place at the end of a module or semester. Students' progress over time can be assessed. Students analyze and research information using online platforms or other applications, learning to structure their information and integrate it into the project so that it is understood by all.

- *Educational games*

They are effective in the teaching-learning-assessment process, due to the fact that they are easy to organize, they are efficient, they are captivating, and they can either be created by the teacher or they can be chosen from those that are especially designed.

- *Case study.*

This method helps to create favorable conditions for mobilizing students to discover the essence of the subject taught and gives the opportunity to express opinions about the case presented, but also to choose the best solution as a result of the debates.

3. STRATEGIES FOR ONLINE TEACHING

The didactic strategy represents the way in which the teacher selects, combines and organizes the methods,

means and materials necessary to achieve the proposed objectives [5].

There are no exact rules by which a teaching strategy could be built, but an experienced teacher must master a wide range of general and particular strategies, which in time will become features of his teaching style.

Building an effective strategy is based on a number of criteria:

- The pedagogical conception of the teacher, formed over time;
- Specific instructive-educational objectives;
- The nature of the content, because the same content can be taught in different ways;
- The type of learning experience offered to students which involves ensuring specific conditions that will favour the production of the desired learning;
- The principles, norms, didactic rules, which are the basis for explaining the learning mechanisms;
- Endowment with teaching materials;
- Available school time.

In establishing an effective teaching strategy in the online environment, it is very important to design a well-structured instructional plan that allows the acquisition of acquisitions by the student. This involves first of all the formulation of the learning objectives so that, at the end of the class, the students acquire the desired knowledge and skills. Secondly, it is fundamental to specify the way of evaluating the performances and the knowledge acquired by the student in relation to the proposed objectives.

Online evaluation can be done through summative evaluations through projects, portfolios, etc. or through formative evaluations through tests, weekly tasks.

Establishing the actual learning activities, including the specific contents are absolutely necessary in an online teaching strategy.

In the online teaching, the way of carrying out the activities is also essential: synchronous or asynchronous.

Teaching activities carried out synchronously - are those teaching activities in which the interaction with students is done in real time. The teacher can send both verbal and nonverbal messages, at the same time being able to obtain the nonverbal feedback of the students through video conferences, discussion forums.

Asynchronous teaching activities do not take place in real time, and students do not access the posted materials at the same time. Students can go through the loaded content and solve work tasks when they have time. These activities support and consolidate the flexibility of online education and can be: monitoring student activities and their feedback, going through the course materials uploaded on the platform [5].

4. THE LESSON PLAN OF THE CHOSEN THEME

Lesson title: Reading the assembly drawing.
Discipline: Technical drawing.
Time allowed: 100 minutes.
Lesson Type: Skills acquirement and skills training lesson.

Venue: Online, through the E-learning platform.
The aim of the lesson: To form the skills in order to interpret the assembly and assembly drawings and to construct execution drawings for some component parts of the assembly.

4.1 Learning outcomes:
Knowledge
- Execution drawings for different parts of the assembly drawings [4].
Abilities
- The use of the standards and rules for dimensioning in the technical drawing, for the representation of some parts from the assembly drawing;
- Reading and interpreting assembly drawings;
- Correct use of common and specialized vocabulary.
Attitudes
- Assuming responsibility in applying the general rules of representation of parts;
- Assuming responsibility for the task received;
- Assuming the quality of the works and tasks entrusted for the manufacturing of the parts from and assembly drawings.

4.2 Specific skills:
- Interpreting the information included in the assembly drawings;
- Interpreting special drawings;
- Applying the information from the technical documentation in the practical activity [4].

4.3 Lesson objectives:
- O1: To identify the machine parts represented in the drawings and to specify their functional role;
- O2: To read and interpret the data entered in the parts list and in the title block;
- O3: To draw up the execution drawings for different parts from the assembly drawings;
- To read the interpretation and correlation of the information from the assembly drawings with the technological documentation [4].

4.4 Teaching strategies:
- Material resources:
  - Worksheet uploaded to the platform;
  - Technical drawing course loaded on the platform;
  - Computer/laptop.
- Methods and procedures:
  - Explanation;
  - Conversation;
  - Exposure;
  - Exercise.
- Forms of activity organization:
  - Synchronous;
  - Asynchronous.

Table 1 presents the lesson plan of the chosen theme, used at the lesson about Reading the assembly drawing [4].

Lesson plan of the chosen theme

Lesson sequences	Instructive-educational content	Student activity	Didactic strategy			Assessment
			Methods and procedures	**Teaching aids**	**Forms of organiza-tion**	
The organizational moment	The presence is checked; The teacher makes observations and recommendations regarding the conduct of the lesson.	Students connect on the E-learning platform; Students answer the questions asked by the teacher.	Conversation Observing	Computer / tablet / smartphone with internet connection	Synchronous activity	Systematic observation
Updating previous knowledge	Review the knowledge gained with the help of a PowerPoint presentation. Theoretical questions are related to the recognition of specific representations of some parts of the assembly drawing (machine parts, assembly parts).	Requested students answer questions. The others listen to the answers and eventually add information.	Conversation Explication	PowerPoint presentation Computer / tablet / smartphone with internet connection	Synchronous activity	Ability to present previously learned notions
Announcing the theme and objectives	The theme and objectives of the lesson are announced. The teacher refers to the content of the lesson	The students are attentive, respond to the teacher's requests and retain his explanations.	Exposure	Computer / tablet / smartphone with internet connection	Synchronous activity	Ability to understand the topic and objectives proposed.
Conducting the actual lesson	Teacher: - Shows an assembly drawing; - Interprets the information written in the respective drawing, reads the overall and functional dimensions; - Performs the reading and interpretation of the data entered in the parts list; - Makes the execution drawing of a part from the respective assembly.	The students are attentive, respond to the teacher's requests and retain his explanations.	Exposure Explication Conversation	Computer / tablet / smartphone with internet connection	Synchronous activity	Ability to understand the teacher's explana-tions

Fixing and systematizing knowledge	The teacher presents to the students the individual worksheet, which consists in extracting another part, from the same assembly drawing; the worksheet is uploaded on the platform.	Students are attentive and remember his explanations. They solve the worksheet in the time indicated by the teacher and upload the solved worksheet on the platform.	Observing The exercise	Computer / tablet / smartphone with internet connection	Asynchronous activity	Ability to make the worksheet loaded on the platform.
Lesson evaluation	The worksheets solved by the students will be presented. The teacher, together with the students, will make an analysis of the way in which the lesson was carried out. Recommenda-tions will be made in order to improve the results.	Students are attentive, respond to the teacher's requests and retain his explanations, correct any mistakes in the worksheet.	Conversation Explication	Computer / tablet / smartphone with internet connection	Synchronous activity	Ability to correct mistakes in the worksheet.
End of lesson	The content of the homework theme will be presented.	The students are attentive and remember the explanations of the teacher.	Conversation Explication	Computer / tablet / smartphone with internet connection.	Synchronous activity Asynchrono-us activity.	

5. CONCLUSIONS

This paper presents how we can adapt the classical instruction for the online format, carefully choosing the content and building rich activities that will maintain and stimulate the students' attention.

Online learning, as an alternative form of learning process, presumes careful design and planning of training, taking into account the age and individual characteristics of the students.

The particularities of the technical drawing subjects allow methods and strategies for online teaching, such as online teaching of technical drawing can be as effective as traditional teaching if the objectives, means and methods of teaching are clearly established.

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