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**Erasmus+ Programme**

**Strategic Partnership for School Education**

**AGREEMENT n. 2017-1-IT02-KA201-036948**

**CUP: H89D17001200006**

**FLIP2LEARN – F2L**

[f2l.](http://www.schoolmobilitymanager.eu)associazioneeuro.org

**Project of a Flipped Learning Unit**

**Subject: Machines and electric devices**

**Class: 12 Graders – Technicians in electric wiring**

**TOPIC:**

**Assembling the core of the electric converter**

A Flipped Learning Unit Project

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| **subject** | Machines and electric devices |
| Title: | Assembling the core of the electric converter  |
| School | Techno-agricultural High School of Bărcănești |
| Teacher: | Matei Niculae |
| Class: | 12 Graders – Technicians in electric wiring |

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| 1 | The challenge rises three questions:1. Which are the components of the core of the metamorphosed electric converter?
2. What technical-economic conditions should the core of the converter have?
3. How is the assembly of the core done?

Preliminary requirements:Different forms of the sheet plates: the conditions imposed upon the electro-technical plate; the area of use of the modernized single-phased converter. Before beginning the teaching unit, an analysis of the subjects will be forwarded, using an active lesson followed by guided exercise carried out in equal groups of students. During this learning unit several tools will be used, such as:-a computer with internet connection- multimedia and audio-video application-oriented materials -specific educational software.  |

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| 2 | LEARNING UNITS  |

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| Single-phased electric converter Knowing all the elements of the electric converter, the students will perform the assembly of the magnetic core and the electric connections of the terminals of the electric converter.  |

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| DESCRIPTORS DEFINING THE LEVELS |
| KNOWLEDGE | ABILITIES | SKILLS |
| Assembly and connection work of the electric machines, according to the technologic files:-assembly and connection operators-materials, SDVs, measurement and control tools -technologic files -SSM and PSI norms  | -Identification of all the constructive subassembly of the single-phased electric converter.-Associating each type of electric care with its proper area of use-Interpretation of all the requirements mentioned in the technical files -Doing the assembly of the electric cars and respecting the succession of phases –according to the technical files - Performing the electric connections to the terminals of the electric converter.  | -Cooperating with the team partners in order to fulfill the tasks at the workplace -Respecting the technological discipline and the execution dates.-Respecting the security standards at the workplace, as well as those of prevention and firefighting. |

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|  | MATERIAL RESOURCES |

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| **instruments and tools** |  **labs** |
| - a computer with internet connection  |  |
| - multimedia and audio-video application-oriented materials  | -Technological files, materials, necessary SDVs, measurement and control tools, SSM and PSI norms.  |
| -specific educational software  |  |

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|  **Tests Typology** |
| Oral examination  | Oral questions  |
| Written examination  | Multiple choice questions  |
| Direct observation  | TEAM WORK  |
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| **Methodologies** |
|  The teaching methods that are used consist of interactive lessons based on independent reading, heuristic dialogue, learning through practice and discovery, teams work. The challenge is to mobilize student’s energies, to help them focus their attention, to awaken their curiosity. Operational knowledge is highlighted, as well as learning through actions, students coming in contact with real life situations.  The activity in the classroom includes three stages in which, the teacher and the students run activities, such as:The research phase, team work phase, follow-up phase. Activities in the classroom: THE RESERCH PHASE What does the teacher do?The first activity The teacher that uses the video projector reminds the students the topic linked to the cores of the electric converters, and guides the students into the topic of assembling the cores of the electric converters.The second activity The teacher launches the challenge and writes on the virtual wall the students’ answers to the questions the challenge raised.The third activity  The teacher asks the students to visit his/her site to see the clip about flipped method, the video lesson, and asks them to do the activities they find on the same site. The following day, the teacher will answer students’ questions, inserting on the Padlet the e-book the students need to read from.  What do the students do?The first activityThey have an active role during the lesson, revision and guided exercises. The second activity They answer to the teacher’s questions linked to the challenge The third activity They watch the PPP at home and do the activities they were suggested to do, that will be later debated into the classroom. They study the e-book, and the individual exercises about the single-phased electric converter – that will be checked and evaluated by the teacher. The team work phase What does the teacher do?-organizes the students on groups -offers materials and the tools used for measurement and control-makes comments upon the steps of assembly of the magnetic core, according to the technical files. -observes the way the students do the technological operations. What do the students do? -they identify the components of the magnetic core and the necessary SDVs -they do the technological operations of assembly of the magnetic core according to technical documentation -they do the connections to the terminals of the electric transformer-they check their work THE FOLLOW-UP PHASE (Products that will be implemented, comparison strategies, evaluation activities, etc.) What does the teacher do?-checks students’ work, asks questions, provides digital material as to produce evaluation products. Guides the students and supports them.-The work of the students is on Padlet -At the end he gives the objective final test.What do the students do?1. Activity

In groups of two components, using materials provided by the teacher, they reflect upon and discuss offering answers to teacher’s questions, writing the report. They socialize their works and evaluate themselves.  |

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| Tools used during the teaching activity |
| - a computer with internet connection  |
| - multimedia and audio-video application-oriented materials  |

**DESCRIPTION OF THE TEACHING UNIT DEVELOPMENT**

Students work at home.

Students are invited to visit the sites the teacher indicates – places where there are presented informations about the converter and then the PPP about the activity lesson that will be practiced after watching.

https://www.arthra.ugal.ro/bitstream/handle/123456789/3276/

http://www.scritub.com/tehnica-mecanica/Constructia-transformatorului-19315231022.php

https://www.google.ro/search?source=hp&ei=KEbxW4vjIsj5wQLDqbSgBg&q=montarea+tmiezului+transformatorului+electric&btnK

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| Descriptive procedure to make video |
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***First hour of lesson***

Working in the classroom

Using the magnetic board, the questions raised will be written there, so that the teacher can explain. The students will conduct an auto evaluation test (check the Socrative grid of evaluation)

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| Descriptive procedure for the creation of the E-Book |
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 ***SECOND HOUR OF LESSON***

Activities performed in the classroom

* What is needed

- Technological handouts, DVS materials, tools for measurement and control, SSM and PSI norms.

- Worksheets

How to do it:

-we identify the components of the core of the electric transformer

-we enumerate the technological operations needed to assembly the magnetic core

-we identify the terminals of the electric converter

-we check the operations taking place.

Write down the result

-we write down on the worksheets every performed operation

-we consult the technological handouts and compare them with the performed operations

-we comment upon the operations that have been wrongly executed.

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| Descriptive procedure for the realization of augmented virtual reality |
| Descriptive procedure for the realization of augmented virtual reality |

 **SELF-ASSESSMENT OF THE ACTIVITY**

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| INDICATORS | **no** | Partly | **yes** |
| 1. Did I actively collaborate with the group?
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| 2. Are there any consistent results?  |  |  |  |
| 3. Have I answered properly to my colleagues’ questions? |  |  |  |
| 4. The report and the answers are clear enough and satisfy the demands? |  |  |  |
| 5. Did I use a certain language?  |  |  |  |

***THIRD HOUR OF LESSON***

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| **Indicators** | **no** |  **partly** | **yes** |
| The worksheets and the auto evaluation handouts are filled out. |  |  |  |
| The data table schemes show clear results  |  |  |  |
| The problem has been understood  |  |  |  |
| The language utilized uses technical and scientific terminology  |  |  |  |
| The objective has been reached  |  |  |  |

*Summing up (multiple choice test)*

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| **Evaluation of learning**  |
| *The criteria evaluation grid* helps the students to understand the length in which their work reaches the standards, to manage their learning process and to auto- evaluate. This instrument defines clear expectations and pushed the students into being responsible for their work: it defines the quality of the final product and provides criteria for auto and inter-evaluation, as well as for the final evaluation done by the teacher. Using grids attracts students’ capacity to articulate the learning material and to recognize their needs in order to succeed.  *Observation* is informal. The recordings from the observation sheets could be considered a reference for the behaviors, attitudes, skills, concepts, processes, typical mistakes or the perspicacity the students show when they work. This information is gathered after individual or group interaction. (The evaluation handouts are attached)   |

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| EVALUATION FORMSUMMATIVE STRUCTURED TEST |
| ITEM | PUNTEGGIO | FINALITA’ |
| MULTIPLE CHOICE | 4 POINTS  | Allows the checking of the acquired information.  |
| DUAL TYPE (TRUE/FALSE) | 6 POINTS  | Allows the checking of information acquisition, even the complex one, and the understanding and application objectives.  |

 KNOWLEDGE AND SKILLS GENERAL ASSESMENT FORM

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| **MARK** | **KNOWLEDGE** | **Abilities** |
| **1** | NOT EXPRESSED | UNOBSERVED  |
| **2** | VERY POOR | CANNOT APLY THE INFORMATION  |
| **3** | WEAK | CANNOT APLY THE INFORMATION IN THE GUIDE. IT IS INCORRECT  |
| **4** | INCOMPLETE | APLYIES MINIMAL KNOLEDGE WHEN TRYING. IT IS NEVER CORRECT  |

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| Evaluation form test Socrative |
| ITEM | POINTS |
| The vertical distance between bolts should be 1. 100-200 mm
2. 150-300 mm
3. 50-100 mm
 |  2 p |
| The advantages of the core with yoke are:1. on the processed surfaces can appear big loss outbreaks
2. the necessity to use special binding constructions in a single element for the yoke and the column (the width of the core increases)
3. the easiness of assembly and disassembly
 | 2 p |
| 3. A core assembled through weaving is made of layers of sheet plates layered through weaving in a system of two cycles (A).  | 2 p |
| 4. Assembling the columns, from a magnetic point of view, would be more convenient if done without bolts. Using bolts leads to the increase of the iron section and the lowering of iron loss and magnetic flow. (F). |  2 p |
| 5. For cores with applied yokes, each column forms a whole that has to be stiffened using two rows of bolts. (A).  | 2 p |