Intellectual Output no 3

Didactic Handbook - Good practices.

vetri∧ngle

acting together

Promotion of Worked Based Learning via Vocational Education Training Triangle

Project cofounded from Erasmus + Programm
Promotion of WBL via Vocational Education Training Triangle (VET)

Project acronym: VETriangle

016-1-PL01-KA202-026592

Intellectual Output No 3

DIDACTIC HANDBOOK

01.07.2017 – 31.12.2017

Output coordinator

Verein für Europäische Sozialarbeit, Bildung und Erziehung e.V.

Content

INTRODUCTION

The third intellectual output provides trainers and instructors with examples of training methods and ideas for combining them in the context of work based learning. It focuses on the role of trainers and can also function as a manual for implementation of the methods. An empty mask for combining methods is also provided on the website of the project http://vetriangle.eu/.

This makes it possible for external trainers and instructors to develop own combination possibilities and is the interactive part of the intellectual output.

The Output includes a basic description of the method and the context it can be used in, as well as additional contents:

- Pictures of the implementation

- Examples for additional documents, like technical drawings, self-evaluation sheets etc.

- Examples for method combination possibilities

The output includes two examples each for every partner country (Poland, Germany, Spain, Turkey, Lithuania).

Methods which were included provide for a variety of examples and learning areas. There are methods for theoretical learning, practical learning, combinations of both, e-learning… All of them can be used in the context of work based learning and are applicable for the specific (dual) training needs of the labour market.

DEVELOPING ROUTINE IN PRACTICAL WORK PROCESSES

The supervision of apprentices, as well as the learning goals and used methods are based on the skeleton curricula for each profession. The methodological implementation is the free choice and responsibility of the instructors. Individual learning and classical school teaching methods form the basis for methods which link theoretical and practical methods. The skeleton curricula offer some freedom for the design and conduction of apprenticeships. For example, training cooperation is possible and there are additional workshops for apprentices of the chambers of commerce and crafts.

The following two methods can be combined and are implemented often in Germany.

1. EXAMPLES OF METHODS AND SCENARIOS.
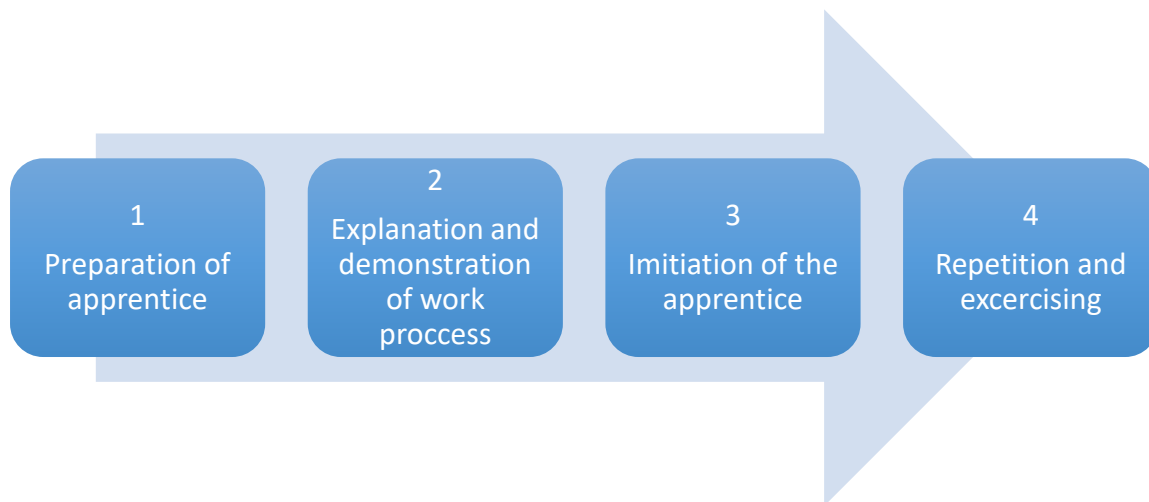
1.1. Four steps method

The four steps method was developed to teach apprentices **basic skills** for practical work processes and activities. The method is an activity oriented teaching method and is very common in the craft sector. It concentrates on one specific activity. For example the apprentice is taught to construct an electric circuit. The four steps method starts with the instructor, he/she will show and explain the activity to the apprentice. The apprentice will later imitate the behavior of the instructor. Therefore the method is a **pre-step for individual learning** and includes elements of planning, analysis, decision and self-control and evaluation. It is also possible to apply the four steps method in group working environments but it is vital that every apprentice conducts the activity or skill to be learned, because often these are basic skills which are needed very often in the professional life. At the end of the four steps method the apprentice can repeat the skill or activity to consolidate the process. In preparation of the method the instructor should provide the apprentice with an explicit (written) task description, in particular if the process is complex and practical. The **task description** should include the following elements:

- Description of the task step by step – What has to be done by the apprentice?

- Integration in the curriculum and practical work processes – Where is the link to the apprenticeship and the profession? The apprentice should get an impression of the variety and possible conduction scenarios of the skill/competence to be learned. This part is important for the motivation of the apprentice!

- Hints and notes which lead to additional information and support sources.

If the four steps method shall be conducted successfully it is important that the preparation is complete, understandable and fits to the knowledge and skills level of the apprentice. The

preparation phase is labor-intensive for the instructor but can be used for many apprentices without a big effort in adaptation.

The four steps in details:

1 Preparation of apprentice	2 Explanation and demonstration of work proccess	3 Imitiation of the apprentice	4 Repetition and excercising

Source: own elaboration.

1. Preparation of the apprentice

The instructor prepares the apprentices for the task. Theoretical knowledge exists already, for example via the guiding text method or classical teaching. Besides the preparation of the apprentices the instructor has to make sure that the work station is equipped and all the materials and tools are there. The instructor has to explain the function of tools and materials to the apprentices and takes work safety regulations and environmental protection into account.

It is also important to motivate the apprentices for the task and arouse their interest for the topic.

2. **Explanation and demonstration of the work process**

The second step is based on the demonstration of the task by the instructor. It is preferable that the instructor conducts the **work process** at least one time in realistic speed and without explanation breaks or other interruptions. This can help the apprentices to estimate the complexity and difficulty of the skill. If applicable, the instructor can change the speed and repetition of the demonstration, this depends on the complexity of the task, knowledge and skill level of the apprentices and their queries. Additionally, a **separation in different steps** of the activity can be helpful. It is vital that the instructor explains and shows every detail and links it to the wider context of the apprenticeship and the task. For the apprentices it is helpful to understand why the instructor conducts the task in the way he/she does. The apprentice takes the role of a watchful observant and asks questions if necessary.

3. Imitation by the apprentice

During the third step the instructor and the apprentice **change their roles**. Now the instructor is a watchful observant while the apprentice conducts and explains the task. Like the instructor in step two the apprentice explains every detail about how and why he completes the task. If the apprentice uses his/her own words for the explanation and is not simply repeating the instructions he was given, this is a good indicator for his level of understanding of the task. The instructor monitors this process with questions, approval and adjustments if necessary. The conduction of the task should ideally take place without interruptions of the instructor. He or she should only interrupt if there are big mistakes. The correct conduction of the task is more important than speed. Speed can be achieved in the fourth step and will be reached anyway in the further professional life of the apprentice. In this phase of learning it is more important that the apprentice can concentrate on the correct conduction and is not including mistakes in his routine.

4. Repetition and Exercising

To achieve consolidation and routine the apprentice repeats the task many times. The instructor stays in the observation role and examines the results. An important part of this step is the **feedback conversation** between the apprentice and the instructor, it includes questions and the discussion of mistakes and is also a good opportunity for **self-evaluation** of the apprentice. This aspect is important because it also is part of the final examination of the apprentice. Because **repetition** takes time and the apprentice should have the opportunity to strengthen his/her skills this should be taken into account. The frame conditions and the context of the task should change during this step and should get as close as possible to real working conditions. The skill or activity which is taught should become an independent tool which can be used by the apprentice in changing and different contexts. For further training construction tasks which include the learned skill are a good option. Also project methods, group working, budy & study[1] are suitable options.

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[1] The budy & study concept brings slow and fast learners together to let them benefit from each other. The fast learner explains topics to the slow learner. While the slow learner learsn because he/she hears an explanantion in other words than from the instructor, the fast learner learns because he is explaining.

1.2. The learner in the focus point Guiding text method.

In contrary to the four steps method the guiding text method is focused on **individual learning** and is based on the model of complete action[2]. It combines elements and ideas of the four steps method and the project method. The BIBB conducted experiments and tests for its implementation in VET. The learner and his/her competence development are the main focus points of the method.

Guiding texts are **written manuals** which support the learning process in a structural way. The guiding text method is an effective supplement for theoretical teaching of basic competences and skills, for example as individual research of the apprentices. It is also possible to integrate practical processes, media, simulation, models or other elements into the guiding text method. The guiding text method is at first independent from the learning goal which shall be achieved. Nonetheless it is necessary to have some kind of measurable result at the end of the work process which can be evaluated and presented with measurable indicators. If this is not possible the guiding text method is not applicable. A suitable result of the work process may be the construction of a part for example. So there is a good linking option to tasks which include construction. Often the guiding text method is used to teach new knowledge and skills but it also can be effective for connecting theoretical and practical contents or the practical conduction of theoretical knowledge. Especially this conduction is evaluated helpful by learners. If the guiding text method is used in a theoretical context the result and the work process should also include indicators or evaluation criteria which are controllable and measurable.

Guiding texts can include the following elements regarding to the learning goal and the complexity of the task:

- **Guiding questions** → What is the task of the apprentice?

- **Work plan** → How will the apprentice achieve the learning goal?

- **Control sheet** → Was the learning goal completed?

- **Guiding text** → How can relevant information and hints be summarized for the apprentice? How can he/she be guided?

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[2] Definition of complete action"… an action which includes all necessary substeps from planning, over conduction until controlling the task." Reich, 2007:1.

In comparison to the four steps method, the guiding text method focuses on the apprentices **competence to act** because he/she is learning individually. The guiding text method enables apprentices to reach the learning goal(s) on their own and to plan and conduct the task by themselves and without too much guidance of the instructor. The apprentices combine elements of gaining information, planning, decision, conduction, evaluation and self-control in one process. Besides individual learning processes the guiding text method is also applicable for group working tasks (3-5 persons), this also strengthens the social and team competences of the apprentices. While the four steps method is mostly implemented for tasks which can be imitated practically, the guiding text method can also be applied for complex processes. The instructor is less active in comparison to the four steps method and acts as a consultant and advisor for the learner. He should not be to distant on the other hand because the guiding text method is working better if all apprentices are aware the instructor is still involved in a passive way. The amount of presence and guidance which is necessary by the instructor depends also from the motivation and work ethic of the apprentices.

Like in the four steps method the whole work/learn process can be separated in different sub steps. Because of the strong **focus on individual learning** the method can be adapted for different learners and learning types. The apprentices can decide on their own how they want to achieve the learning goal and which tools, materials and sources of information they want to use.

This is also the main reason for a passive role of the instructor. While he/she is rather active during the second phase of the four steps method the role of the instructor in the guiding text method is more a watchful observant who becomes active when questions or problems occur. The instructor should only become active when the apprentice makes serious mistakes which let him/her fail on achieving the learning goal or if the apprentice has no idea how to progress or is taking too long. Smaller problems and mistakes should be solved by the apprentices alone. In comparison to the four steps method the instructor should only give advice and hints, the work itself has to be done by the apprentice. For example, the instructor can give additional information (literature, persons to ask for help...) which help the apprentice to achieve the learning goal. The preparation of the guiding text method is work intensive for the instructor because he has to make sure that the setting and the task are suitable for achieving the learning goal and the knowledge and skill level of the learners. Also for the apprentice the method is more demanding than the four steps method because he/she has to conduct the task on his/her own. If the method is applicate as a group task it strengthens not only the individual learning competence but also socials kills and team working competences of the apprentices.

In comparison to the four steps method the **feedback conversation** between the instructor and the apprentice becomes more important. Besides the self-evaluation of the apprentice this is the main opportunity for the instructor to give some (constructive) feedback and advise. For the apprentice it is important to get some feedback for his strengths and weaknesses, the result of

his/her work and the conduction process of the task by the more experienced instructor. Only with this feedback the learner can adapt and modify his personal way of learning.

The guiding text method is separated in different sub steps regarding the model of complete action:
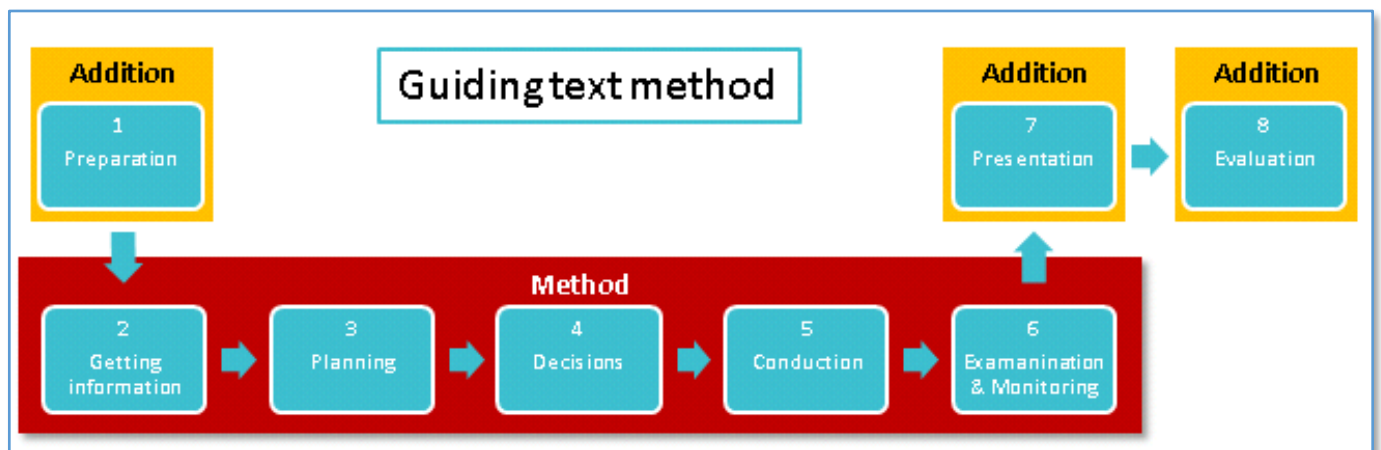
Source: VESBE

1. Preparation

This step includes the creation and preparation of all necessary materials (guiding texts, control sheets, hints. The main element of the method is to develop skills and knowledge which are already included in the learners portfolio. The instructor ensures that the task is suitable for the knowledge and skill level of the apprentices. If necessary he/she closes knowledge gaps before conducting the guiding text method. While this is normally a task of the instructor it can be helpful to ask the different groups to prepare guiding texts for each other. This strengthens their methodological competences. The preparation includes a **detailed explanation** of the instructors for the apprentices regarding the task and sub steps as well as organisation like the availability of tools and materials, contact persons... It is favourable to include different kinds of materials, information and tools. The instructor should take into account that the working process and the new skills and contents are not necessary in a logical order for the apprentices. Regarding this aspect the preparation of guiding texts ia also a valuable task of the instructor because he/she is forced to formulate understandable learning goals and expectations for his apprentices.

2. Obtaining

The apprentice or the group get a first overview and learn about the task, the learning goal and the process with the help of guiding texts and guiding questions. The guiding questions work as a **manual** but do not have to be questions but can also be images, hints, illustrations or other elements.

3. Planning

The apprentice or the group plans every sub step and work process which is necessary to achieve the learning goal. It may be helpful to design a work plan which includes all this sub steps, also control intervals for self-control and evaluation and support tools and materials. The planning phase also includes the design of control sheets and evaluation criteria which will be used for (self)evaluation. It is vital that the apprentice has access to additional information that is more detailed or specific than the guiding texts, e.g. technical literature, manuals, models, computer access... The planning phase shall be completed by the apprentices themselves without to much guidance of the instructor. The instructor should focus on observation. This is positive for the competence development of apprentices because they learn how to plan their work and explore different approaches and techniques to choose what suits them best. For further methods this is also helpful because for construction tasks or real work tasks the apprentices also need planning competences and to be able to structure their work in sub steps.

4. Decisions

This phase is a first opportunity for the apprentice to get feedback from the instructor. The apprentices present their work plan and control plan to the instructor. The instructor gives feedback regarding possible mistakes, optimization opportunities and possible knowledge gaps. Unlike the four steps method the instructor should not become too active or present a complete solution. This is also a challenge for the instructor, because he has to be open minded towards new solutions and new ideas of his/her apprentices. After the feedback conversation the apprentices progress on their own and the instructor returns to the observation role.

5. Conduction

All necessary sub steps are conducted according to the planning in the work plans. If the method is conducted as a group work it is vital that every group member is actively involved in the work. It is also necessary to document all steps and results. The instructor is only intervening if there are serious problems, queries, delay or negative group dynamics.

6. Examination & Monitoring

This phase includes an element of **self-evaluation** for the apprentice with the developed control sheet regarding the learning goal. Mistakes are analysed by the apprentices themselves at first. This self-evaluation is important for the apprentice because it will be part of the later professional life and it will be important for the apprentice to evaluate the own work results as part of **quality management**. The control sheet should include other examples and alternative solutions and possibilities. Graduation is not necessary, methods like agreements on targets and objectives can be more effective in combination with self-evaluation.

The apprentice presents his results and approach with the control sheet and the work plan to the instructor. He/she can also present **solutions strategies for mistakes**. The instructor evaluates if the learning goal was achieved and if the process was effective, for this conversation a moderating and coaching behaviour of the instructor is positive. In cooperation with the instructor the apprentice decides on next steps. These could include repetition of contents with the four steps method (if there were mistakes in some areas), construction tasks or further guiding text tasks. The used guiding texts and documentations can be used for future learning as literature and information sources.

7. Presentation

The presentation of the working approach and the result is a useful addition to the guiding text method but not obligatory. Presentation can be for the instructor, the whole group or other groups and persons. After the presentation the apprentice should get constructive feedback not only regarding the working approach and the solution but also for the presentation itself because presenting results will be an important competence in the future professional life.

Evaluation

Evaluation is now meant **as feedback for the instructors** and is also an addition to the guiding text method. The learner should provide the instructor with feedback for the used guiding text method and its conduction. Was the guiding text understandable? How satisfied are the apprentices with the advice and help of the instructor and his/her role as an advisor? The instructor can use this feedback for adaptation and modification of the guiding texts and his methodology. It can be helpful to appoint some apprentices at the beginning of the guiding text method to act as observant and to ask them to give feedback afterwards. They can give more specific feedback.

This sub steps enable the guiding text method to be effective not only for profession specific learning goals but also to develop competences and skills like self-evaluation, social competences and group working. The learner learns how he/she can design his/her own learning process. Slow and fast learners can be included in the method very easy but it is important for the instructor to keep in mind the level of knowledge and skills when he/she is designing the task and the guiding texts. The

learning goal has to be clearly understandable and reachable. Because of the necessary effort for the instructor the method should only be used in areas which are complex enough to justify the effort.

Frame and additional methods

In Germany trainers and instructors can chose the teaching methods on their own. It has to be noted that the main part of practical contents are taught in companies and the theoretical parts in vocational colleges during dual apprenticeships.

All used methods are adapted by the instructor. A detailed implementation of a single method without added support methods or slight adaptations is rare. The type of addition changes with the individual experience of the instructor, the size of the group, the composition of the group, the learning goal, the equipment and the learning location.

Additions for the presented methods may include:

- Projects: Projects can be implemented as group working tasks or interdisciplinary. Learning goals and conduction may change. An example for such a project could be the construction of a Stirling motor. This project includes interdisciplinary approaches.

- Group work

- Theoretical teaching

- Construction tasks

- Examination simulations

- Self-evaluation

- Simulations & models (e.g. the construction of electric circuits)

- Individual learning

- Buddy & study: The apprentices form tandems or small groups with fast and slow learnes which support each other. The faster ones can help the slower ones and learn while explaining.

- Presentation of work approach and results

- Evaluation of teaching method

- Interviews

- Brainstorming

- Feedback methods

- Reflecting teams

- Exploration methods

- Case studies

1.3. Method Ethazi.

Introduction to challenge based collaborative learning

The methodology is defined as "challenge based collaborative learning" .The following infographic shows schematically the method.
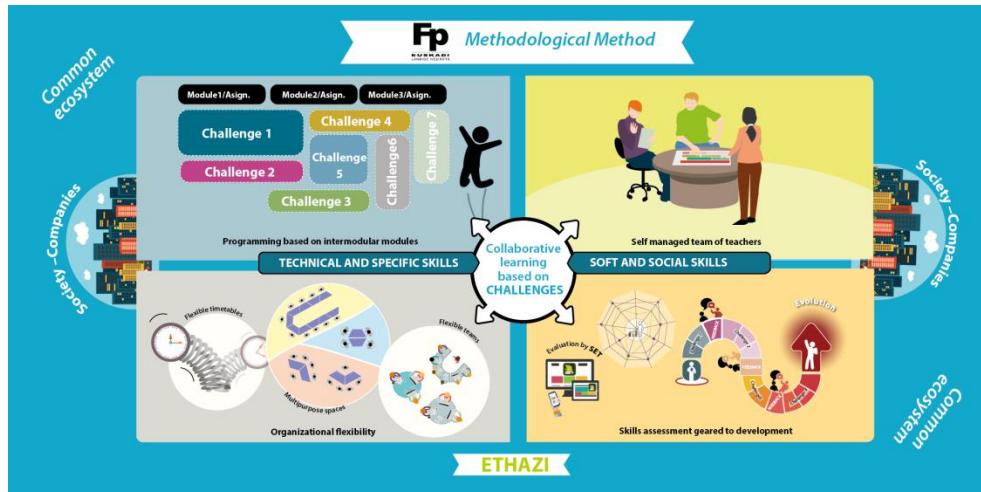
Source: VESBE

Soft skills covered by this method:

1 - TEAMWORK	5 - DECISION MAKING
1.1. RESPECT	5.1. THINKING
1.2. WORK TEAM	5.2. READING
1.3. RELATIONSHIP PROBLEMS	5.3. ACTITUDE
2.1. DETECTION	6 - INFORMATION MANAGEMENT
2.2. DECITION MAKING	6.1. RESEARCH
2.3. ACTITUDE	6.2. SEARCH
3 - COMMUNICATION COMPETENCES	6.3. ASIMILATION
3.1. ATTENTION AND UNDERSTANDING	7 - AUTONOMOUS STUDY
3.2. EXPLANATION	7.1. AUTONOMY
3.3. COMMUNICATION	7.2. SELF KNOWLEDEGE
3.4. NETWORKS	7.3. OVERCOMING
4.CREATIBITY AND INNOVATIONS	7.4. PLANNING AND DEVELOPMENT
4.1. CREATIVITY	8 - INPLICATION
4.2. FLEXIBILITY	8.1 ATTENDING
4.3. ORGINALITY	8.2. PUNTALITY
	8.3.CONMINMENT
	8.4.INPLICATION
	8.5. EVALUATION CRITERION

The main objective of the methodology is to improve the soft skills while technical skills are learned.

More practical oriented method is developed, the so called "learning by doing"

Scheme of the information that a student is receiving to carry out a collaborative challenge.
1. WORKD TO CARRY OUT
2. LEARNING OUTPUTS covered within the collaborative challenge
   a. covered technical skills
   b. covered soft skills
3. TASKS and TIMING
4. Targeted Competences
5. EVALUATION CRITERIA
   a. how will the challenge be evaluated
   b. individual tasks that will be carried out while the challenge is being
   c. Evaluation of soft skills
6. RESOURCES
7. WORKING PLAN
8. PROJECT PRESENTATION AND DEFENSE
9. NOTES

Pictures: Working in group, use of Ethazi Method.

In these four images you can see the different roles and spaces used in the ethazi method.

The instructor uses the different spaces to apply the methodology4. Recommendations for application of the method.

Evaluation of soft skills

This is are the criteria's used to evaluate the soft skills for each "Collaborative Challenges". This table is included in the section 5.3 of the document that describes each challenge.

COMPETENCES GROUP	COMPETENCES	Excellent work / Excelente	Great work / Advanced	Good work / Good work	Proper work	More work to be done / making progress	To work hard! / Must progress
		5	4	3	2,5	2	1
PERSONAL	Entrepreneurial Initiative	Set a target on the ideas / projects / improvements put in place and define a plan for their follow-up	Define a plan to put ideas / projects / improvements in gear, take risks	Put ideas / projects / improvements of own or the equipment in march of autonomous way	He/she turs on his/hers or team's ideas / projects / improvements with aid (has initiative)	Define some idea / project / improvement that could be implemented	He/she has No ideas / projects / upgrades to launch
	Autonomy	In unforeseen situations shows a spirit of improvement and has the resources and capacity to seek solutions by itself	It is planned to carry out its tasks in compliance with the objectives and deadlines set	Carry out its tasks autonomously and within the established period	Carries out the tasks that correspond to you alone knowing to ask for help when necessary.	He/she can develop activities following the guidance of the teacher or peers	Needs constant help from teacher or classmates for any type of activity.
	Implication	Take the lead in the team and take the lead in it	Participates actively in the team and usually makes contributions to it	Participates in the actions / activities of the team and sometimes proposes some of them	Participates in the actions / activities of the team and shows appropriate behaviors (use of time, care of materials and / or fulfillment of commitments)	Although he/she is punctual and participates in part or all of the actions / activities proposed by his peers, he / she does not propose them and shows inappropriate behaviors regarding time use, care of materials and / or fulfillment of commitments	Demonstrates inappropriate behavior regarding basic standards of attendance and punctuality, use of time, care of materials and fulfillment of commitments.
COLABORATIVES	Team work	Follows the conflict using a follow-up plan	He is able to manage conflicts within the team by providing solutions	He/She makes important contributions and is able to detect conflicts in the team	Contributes with normality and generates good atmosphere within the team	It does not contribute in the equipment although it does not generate bad atmosphere within the same	He/she does not contribute in the equipment and also he/ she generates bad atmosphere within the same

RED	Problem's solving	In addition to all of the above incorporates some of the areas of improvement to the project	In addition to all of the above, it detects improvement areas.	He/She is able to carry out the whole process by proposing creative alternatives or adding value to the process	Identifies the problem correctly, proposes different strategies, selects the best alternative and executes and evaluates the results	He/she is able to correctly identify the problem but not to establish a systematic approach	Unable to correctly identify problems
	Decision making	Establish a plan for monitoring decisions taken and possible adjustments	He/she is able to take the initiative and decide both in circumstances that are known to him before a new situation.	Participates in decision making, endorsing the objectives of the group and responding to the commitments made	IHE/she makes decisions valuing different alternatives and analyzing the situation.	He/ she makes decisions without valuing the different alternatives	Hides and does not make decisions
COMUNICATION	Oral communication	He/She communicates efficiently: high, transmitting comfort, in the established time, without using hoses and maintaining eye contact	His/Her speech is clear and easy to understand and provides documents when it is necessary and communicates approximately in the established time	He/She is able to express his ideas, opinions and feelings and invites other colleagues to communicate.	Express his/her ideas, opinions and feelings when necessary.	He/she rarely expresses his ideas, opinions and feelings, and when he does, they are not clear.	He/she has problems expressing his/her ideas, opinions and feelings. He/she does not show respect for the messages of others (interrupts, mocks).
	Written communication	Written works presented in an original, entertaining, attractive and visual way (eg with images, mental maps)	Written works well structured, following a logical order and easy to follow (index, well organized).	His/Her written works are structured correctly	His/her written works have no spelling errors	His/her written works have some spelling errors and are poorly structured	His written works are riddled with spelling mistakes and are poorly structured
DIGITAL	Information processing	Use advanced search strategies (eg search operators or advanced options).		Search for information online using different search engines.		Search for information online using a single search engine.	Do not search for information online.
	Communication	He/She actively uses a wide variety of communication applications to communicate and collaborate online.		Communicates in an advanced way using the mobile phone, email or chat and shares files and content.		He/she communicates in a basic way using mobile phone, email or chat.	Does not communicate with digital devices
	Content Creation	Produces complex digital content (multimedia) using advanced options and edits the one produced by others.		Produces complex digital content (multimedia) and edits that produced by others.		Produces simple digital content.	It is a mere digital consumer. Does not produce any digital content
	Security	Take advanced measures (eg secure passwords) to protect your electronic devices and update them regularly		Take advanced measures (eg secure passwords) to protect your electronic devices.		Takes basic steps to protect her/his electronic devices.	He/she does not take any security measures to protect his/her devices.

	Problem's solving	He/She solves almost all the most frequent problems that arise when using the technology.		Solve the most common basic problems that arise when using technology.		He/she does not know how to respond to technical problems arising from the use of his/her own devices but knows how to seek support or assistance.	He/she does not know how to respond to technical problems arising from the use of his/her own devices.

1.1. Frame and additional methods.

The document presents examples of workshops, ideas according to schemes (procedures), combining different methods, teaching techniques.

A set of schemes - procedures.

Procedure 1:

Example 1

Guiding text **+** Ethazi **+** Face to face companies
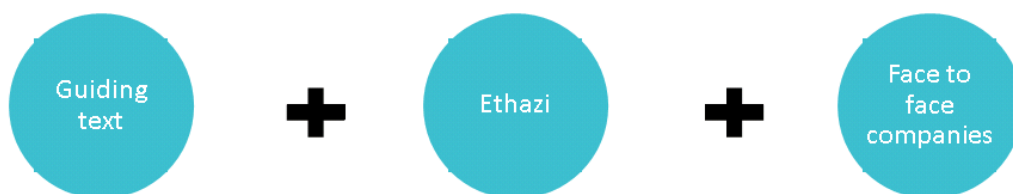
Competences which are strenghened

• Individual learning • Self-evaluation • Self-organisation • Planning of work processes • Decision taking • Problem solving • Responsibility • Development of individual learning techniques • Specific technical skills / knowledge	• Group working • Entrepreneurship / Innovative thinking • Planning of work processes • Problem solving • Communication • Specific technical skills / knowledge • Interdisciplinary thinking	• Classification of realistic work processes • Motivation to learn and be innovative • Awareness of work environment • Developing targets for personal development and target areas

Procedure 2:

Example 2

Group work **+** Training videos **+** Four steps

Competences which are strenghened

• Social competence • Team work • Dividing responsibilities • Dividing work processes • Getting used to other learning types • Organisation • Decision making • Timing of work processes	• Visual processing / learning • Observation • Individual learning	• Imitation of behaviour • Management of mistakes • Learning from a role model • Accepting feedback and critique • Observation • Separation of work processes

Procedure 3:

Example 3

Face to Face job market **+** Ethazi **+** Virtual to reality
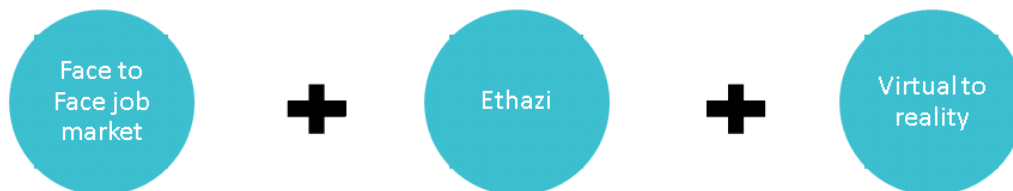
Competences which are strenghened

- Classification of realistic work processes
- Motivation to learn and be innovative
- Awareness of work environment
- Developing targets for personal development and target areas

- Planning & development of work processes
- Planning and conduction of self-learning and learning processes
- Creativity
- Team work
- Getting information
- Interdisciplinary working
- Timing of work processes
- Communication

- Application of Ethazi challenge
- Skills in programming and using 3D-Printing
- Prototyping
- Design

Procedure 4:

Example 4

Simulation **+** DO IN COMPANY **+** DIGITAL CLASS
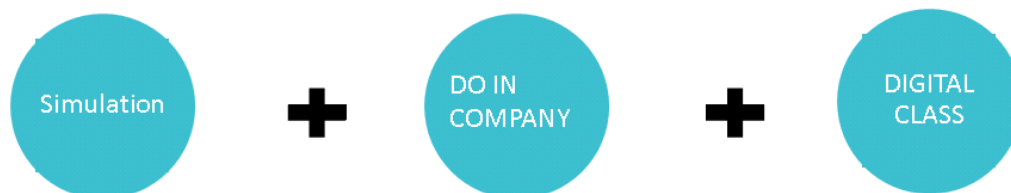
Competences which are strenghened

•Pedagogically neutral, that is, of being able to be used with independence of the methodological style of the teacher
•Complement the traditional teaching
•The students can work autonomously in the aspects treated in the classroom.
•Obtain realistic data during the exercise

•Work on real cases of the company
•Become knowledgeable about many sector
•Provide work experience
•Develop professional skills
• Facilitates the development of attitudes and behaviors specific to the world of work.
•Improves communication skills

•Access to education
•Time freedom
•To combine the study with other activities
•Not having to travel to attend class
• Good tool in collaborative learning between different schools
•Share resources
•Impact on the number of students

vetriʌngle
acting together

Example 5

Works in groups **+** Practical trainer **+** Employer
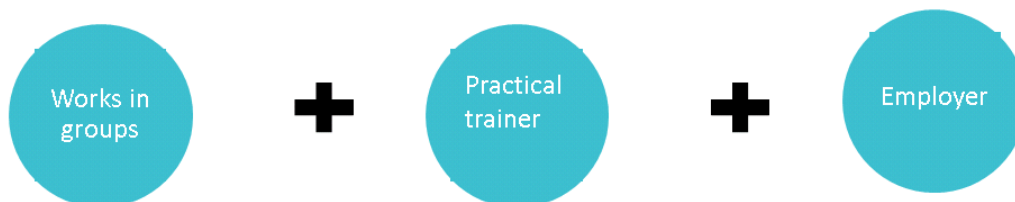
Competences which are strenghened

•ability to work in a team
•the ability to use modern information technology and communication
•ability to solve problems
•the ability to listen to others and take their viewpoints into account
•the ability to use different sources of information
•combining and organizing various portions of knowledge
•ability to organize and evaluate own work

•makes it easier to activate students,
•allows you to plan well and use time to learn students,
• gives you the opportunity to address the weaker students,
•allows to meet and develop many students' educational needs,
• gives the opportunity to get to know students better,
• integrates a class team.

•Communication skills
•Clear and understandable message transmission,
•Active listening - listens to what the other team members say
•Caring for everyone to have a full set of information,
•Completing information on a regular basis,
•Using a language that is legible for everyone and is not offensive to anyone
•Taking care that there is no misunderstanding (eg in terms of who is responsible for a given task),

Erasmus+

vetriangle
acting together

Example 6

| Guiding text | **+** | Practical trainer | **+** | 6 phasy |

Competences which are strenghened

•Decision taking •Understanding the orders issued •Reading comprehension •Problem solving •Responsibility •Development of individual learning techniques •Specific technical skills / knowledge	•supervises the student's work •helps him by giving directions	**Phase 1 - INFORMATION** **Phase 2 - PLANNING** **Phase 3 - FINDINGS** **Phase 4 - EXECUTION** **Phase 5 - CHECKING** **Phase 6 - ANALYSIS**

Erasmus+

vetriangle
acting together

Example 7

| Critical Thinking Skills | **+** | Ethazi | **+** | From virtual to reality |
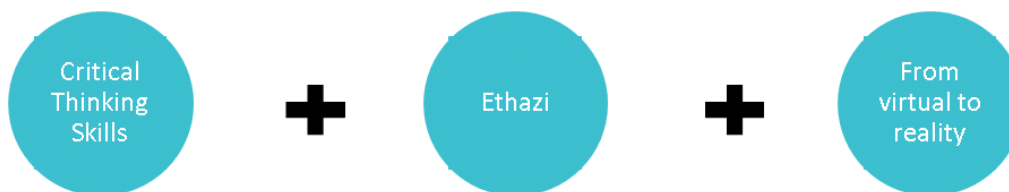
Competences which are strenghened

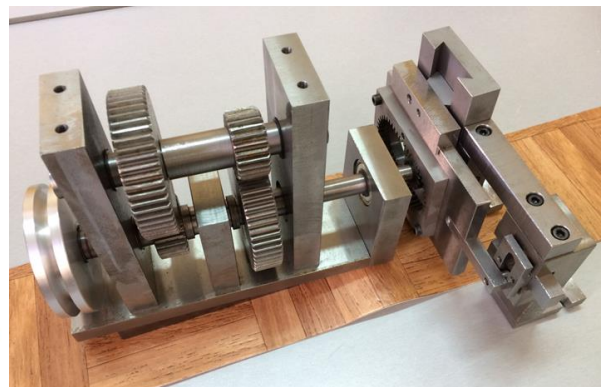|		
• Establishing cause-effect relationships, • Negotiating, • Peer interaction, • Data predicting, • Analyzing, observing and making decisions, • Deduction and induction, • Providing insight into design, • Analyzing needs,	• Group working • Entrepreneurship / Innovative thinking • Planning of work processes • Problem solving • Communication • Specific technical skills / knowledge • Interdisciplinary thinking	• Skills in programming and using 3D printing, • Prototyping, • Designing products in 3D printers • Skills in industrial automation, • Learning by doing

Erasmus+

1.2. Videos and pictures of a challenge

Youtube videos where some challenged carried out by students are shown.

https://www.youtube.com/watch?v=fwUIEW5eF-U   3.23''

(in the same youtube channel there are plenty of videos.)

Images

- Manipulatzailea
- Bultzatzailea
- Bentosa birakaria
- Plater birakaria
- Orga garraiatzailea
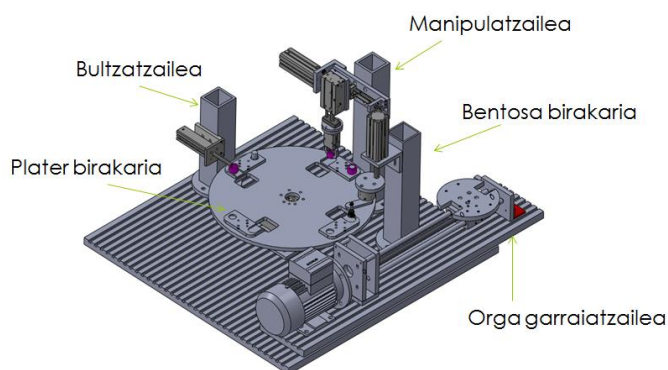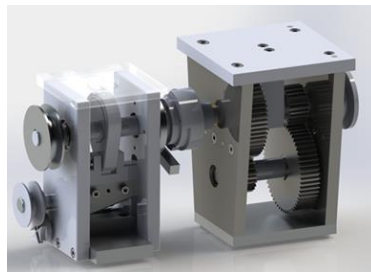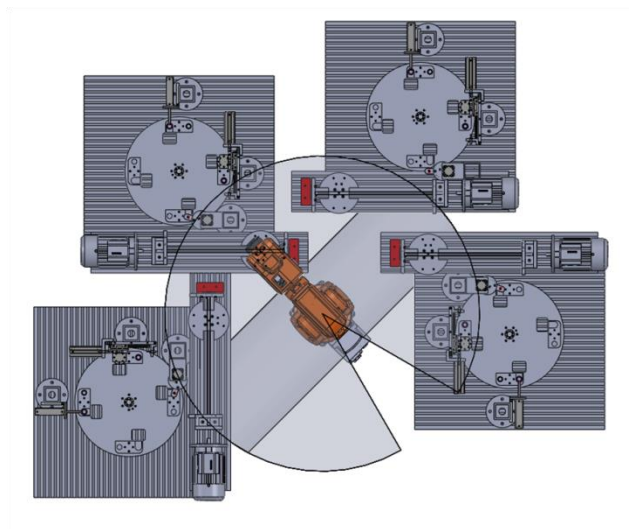
1.3. Example for the guiding text method – Centering angle plates

The following example for a guiding text is taken from a didactic handbook which is in use at VESBEs course. It addresses instructors and apprentices.

This task is prepared according to the RAG-Guiding text method. Therefore, we inform you (the apprentices) about the new approach regarding methodology and changes in the training procedure.

To conduct training with this approach the apprentice can use the following documents.

1. Information for the apprentices
2. Methodological procedure, Task 17
3. Key qualifications, Task 17
4. Guiding questions for the apprentices
5. Technical drawing
6. Workplan
7. Control- & Examination sheet
8. Questions regarding Understanding and knowledge of the apprentices
9. Media information and sources

Task
Construct a centering angle plate according to the technical drawing.

The centering angle plate (Estimated time approx. 9 working hours)

The centering angle plate is the first construction task which includes several parts in the first phase of apprenticeship. This causes questions regarding the technical drawing, planning of construction processes and the list of parts.

All the different processes which are needed for the task provide for a summary of the skills and knowledge which the apprentices learned until now.

The time of 9 hours is an orientation mark for completing the task.

This task is the first use of the guiding text method.

This causes the following changes:

The guiding text methods enables the apprentice to get the main part of necessary information for completing the task on his/her own. When he/she completed this learning process the next steps are autonomous planning, conducting and control of his/her work.

Information to conduct the task
To complete the task the apprentice can use the following socuments:

- Methodological procedure
- Guiding questions for the apprentices
- Technical drawing
- Workplan
- Control- & Examination sheet
- Questions regarding Understanding and knowledge of the apprentices
- Media information and sources

The apprentice has to make sure he/she received all documents and sheets.

After the apprentices have studied the technical drawing, please answer the guiding questions (they may use other information and sources). All guiding questions provide links to knowledge areas which are important for completing the task.

The apprentice decides on his/her own work process, tools, resources and materials.

After he/she did this he/she will receive a first feedback of the instructor regarding the answers to the guiding questions and the work plan. If the instructor is convinced that the apprentice has the necessary knowledge and skills to complete the task successfully he/she can move on and construct the centering angle plate.

When the apprentice got the necessary materials and tools, he/she constructs the centering angle plate accoridng to the technical drawing.

If the apprentice has problems to complete the task he/she should look for solutions by himself/by herself at first before he/she asks instructor for advise.

If the apprentice completed the construction task he/she controls the results with the control and examination sheet. The apprentice should also fill in the measures of his/her work piece in the table and note the time he/she needed for the task.

After the instructor examined the results he/she will discuss his comments and advise with the apprentice. E.g. if there were any problems or if they have different opinions regarding the result.

On the next page you find a workplan sheet example which the apprentice can use.

The apprentice should take into account work safety and environmental protection.

Instructor	Phase	Aprentice
	1. Information	
Task and aim of teh task	Basic information	
	Specific information	Study technical drawing / answer guiding questions
	2. Planning	
	List of parts	Parts / Number / Measures
	Staging list	Tools / Materials / Machines
	Workplan	Which steps are to be taken in which sequence? Time limit? Taking work safety and environmental protection
	3. Decision	
Answers to guiding questions Structure and content of the list of parts Staging list Workplan	Technical discussion with instructor	Answers to guiding questions Structure and content of the list of parts Staging list Workplan
Approval for construction of the part	Decision	
	4. Conduction	
	Construction	Construction of the part
Help and advise if problems occured or if there are questions	Technical discussion	
	5. Control	
	Variance analysis	Control and examination of the part
	6. Valuation	
Valuation of the part	Variance analysis	
Deviation in valuation Causes Construction processes New Knowledge / Information	Technical discussion	Deviation in valuation Causes Construction processes New Knowledge / Information

Key competences and qualifications

The following qualifications and competences are supported when the task will be completed according the guiding text method as individual work.

Development of professional skills	Development of methodological competence	Development of social competences
Self-control	Concentration	Willingness to learn
Self-evaluation	Taking decisions	Objective argumentation
Optimization of work processes	Planning	Vocal expression
Identification with the task	Research	Independence
Forward-thinking	Individual processing of information	Self-evaluation
Commitment	Retrieving of information	Self-confidence
Cleanliness of the work station	Recognition of the own learning method	Critical ability
Behaviour according to work safety	Logical thinking	Reliability
Behaviour according to environmental protection	Mastering learning techniques	Conscientiousnes
Responsibility	Memory training	Co-responsibility
Planning of work-time	Transfer skills	Readiness for experiece exchange
Rational planning of owrk processes	Thinking in systems	Tolerance
Quality awareness	Recognition of targets for work processes	

Guiding questions
1. Whichsources and information are accessable?
2. What is the purpose of a centering angle plate?
3. Which measures are necessary for the semi-finished materials for part one and part two? (Fill in the measures in the list of parts)
4. Which materials do you choose for part one and part two? (Fill in the materials in the list of parts)
5. Which norms do you use for part one and part two? (Fill in the norms in the list of parts)
6. Why is the sectional view (A-B) in the technical drawing necessary?
7. What is the meaning of the scale-notation 2:1 (short description)?
8. Why is there a drilling (Ø 3 mm) in part one at this location?
9. How do you ensure that necessary drillings in part one and two align?
10. Which core drilling diameter do you choose for the thread hole?
11. How do you evaluate the depth of the countersunk points?
12. Which file do you use to achieve the necessary surface finish?
13. Which measures do you take for work safety?

14. Which measures do you take for environmental safety?

Workplan

Workplan				
Order:		Part:		
Identification Number	Work process / work materials	Staging list Machines / Tools / Materials	Work safety Environmental safety	Working time
Date:	Instructor	Date:	Apprentice:	

1.4. Technical Drawing
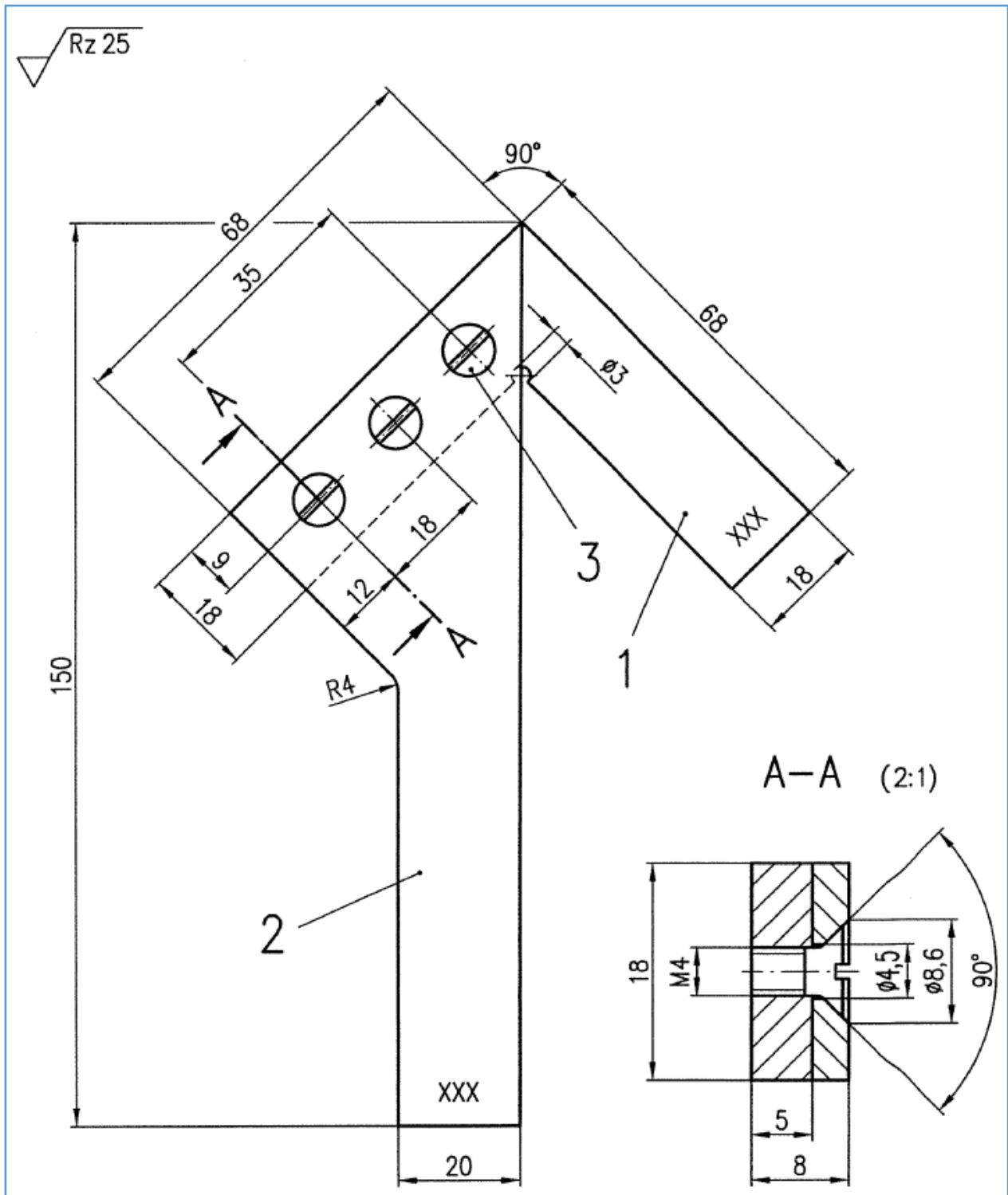
Variance for measures without tolerance ± 0,2   XXX = ID Number

Position	Number	Unit	Notification	Normsheet	Material	Semi-finished material	Note

Control sheet

Name		Surname		Personal number:	
Running number	Position number	**Evaluation and control of function and appearance**	Evaluation criteria examined by:		
		Criteria	Apprentice Self-control Points	Instructor Examination of self control Points	Result (part) Points
1	1-3	Part constructed according to technical drawing			
2	1-3	Function of the centering angle plate (drawing of center point)			
3	1-3	Screws are fixed			
4	1-2	Eveness of surfaces			
5	1-2	Angularity of the part			
6	1-2	Quality of the surface			
7	1-2	Deburring			
8	1-2	Labeling			
9	1-2	Radius R 4			
Evaluation of the control of function and appearance (10-9-7-5-3-0)					

Measures and physical Units

Running number	Number of position	Measures and physical Units	Apprentice Self control			Instructor Result measure control		Evaluation self-control
		Controlled measure / Controlled physical units	Optimal degree	Actual degree	Points	Actual degree	Points	Points
1	1	Linear measure (left)	68 ± 0,2					
2	1	Linear measure (right)	68 ± 0,2					
3	1	Width size (left)	18 ± 0,2					
4	1	Width size (right)	18 ± 0,2					
5	2	Height dimension	150 ± 0,2					
6	2	Width dimension	20 ± 0,2					
7	1-2	Bore spacing	35 ± 0,2					
8	1-2	Bore spacing	18 ± 0,2					
9	1-2	Bore spacing	9 ± 0,2					
Evaluation (10 or 0)		**Sub-result ∑**						

Total result

Running number	Criteria	Result in 10 points method	Divisor	Result in 100 points method	Weighting factor	Points
1	Workplan		0,1		0,1	
2	List of parts		0,1		0,1	
3	Staging list					
4	Evaluation and control of function and appearance (self control)		0,9		0,1	

5	Evaluation and control of function and appearance (constructed part)		0,9		0,3	
6	Measures (self-control)		0,9		0,1	
7	Measures (constructed part)		0,9		0,3	
					∑ Points	
					Grade	
Date:		Apprentice:		Instructor:		

1.5. Exercises carried out individually by guiding text for classes in the profession technician mechanic.

1. Description of the method.

In the demonstration method, this is usually a verbal comment supporting show, that is verbal instruction, called instruction, but in exercises it is the instruction of what activities. Preliminary instruction is all the activities of a vocational teacher implemented in the initial phase of practical activities. In-service instruction is provided during the course and it depends on the teacher's check on how individual students carry out assigned tasks and whether they correctly understood the initial instruction. If necessary the teacher repeats or completes the contents of the initial instruction. The final instruction consists in summarizing students' work whole group with particular attention to both achievements as well as shortcomings at work. It is important that these observations and comments were objective and balanced, and above all to be done in a friendly form.

2. Application by trainers.

The teacher supervises the student's work and helps him by giving directions. Classes are divided into 6 sections, which are discussed by the teacher. Each student has his or her own adequately equipped workstation. In the beginning, the teacher gives introspections and gives the pupils a drawing. From this moment, the student's work on the subject begins.

The main purpose of the course is to properly perform measurements of the machine parts shown in the drawing.

Subject: Measure the clutch hub and determine the dimensions with executive drawing.

Time: 3,5 h

Phase 1 - INFORMATION

Before you begin planning and completing the exercise, answer the following questions. These questions will help you prepare for further action.

1. What is an executive drawing and what does it represent?

2. What is the purpose of the illustrated figure and the material from which it was made?

3. What is measuring and checking?

4. What is the difference between measurement patterns and measuring instruments?

5. What are the measuring tools for measuring length and angle?

6. What are the measurement methods?

7. What can be the cause of measurement errors?

8. What is the choice of measuring tools?

9. What impact does the workplace organization have and the proper measuring technique on the correctness of the measurement tasks?

10. What information will you need to plan the task?

Phase 2 - PLANNING

You already know a lot about the exercise you are doing, so plan what you can do to get it right.

1. What will you be guiding when selecting measurement tools?
2. What additional measuring aids will you need to make measurements?
3. Which boards, guides, will you use while doing the exercise?
4. In what order will you carry out the measurements?

PRESERVE the proposed course of the exercise.
Prepare the set of measurement tools you will need. Provide their type, measurement accuracy and measuring range. Save the necessary measurement aids, boards.
PROPOSE the method of compiling measurement results and assessing their compliance with the executive drawing according to the sequence of measurements you have taken (table).

Phase 3 - FINDINGS

You planned to do the exercise. We need to discuss yours
proposal and set the final conditions.
1. Present your current activities.
2. Maybe you have some doubts to decide?
3. You will find out if everything you have planned can be accomplished under conditions our studio.
4. You will verify your current work and make decisions about possible changes in the further operation.

Phase 4 - EXECUTION
Pay attention to the correctness of your measurements and the danger of measuring errors. Take care of it.

Record measurement results in the prepared table. So:

1. There should be no unnecessary items at the test bench.
2. Keep the measuring objects and measuring tools clean
3. Check that the measuring tools you are using are correct technical condition and properly adjusted.
4. Remember to attach the measuring tool surfaces properly measured to the surface of the object to be measured.
5. Accurately read measurement tool indications, avoid parallax errors.
6. To check the accuracy of the result, repeat the measurement. Make a note of the (+, -) values when performing differential measurements indicates the difference between the dimension of the pattern and the measured dimension object.
8. Note the mistakes you can make with simple addition actions and subtraction.
9. Incorrect recording of measured values in the measurement table may to undo the effects of your work.

Just as important as the correct measurement is to identify them compliance with the requirements given in the figure. Specify dimensions compliance with the drawing properly interpret the dimensional tolerances.

Phase 5 - CHECKING

1. Compare the supplied disc dimension compliance sheet with requirements executive drawing with the results of your measurements (included in the measurement table and their compliance with the drawing).
2. Mark the errors you made in the measurement table.

Phase 6 - ANALYSIS
Think about whether you did the job as best you could. Examine the entire course of the exercise and present your conclusions.

1. Did you manage to perform the exercise without error?
2. What mistakes could you make in avoiding exercise? What of them the result?
3. Did you properly plan the exercise?
4. What messages and skills did you miss while planning and completing the exercise?
5. What bothered you in performing the exercise and what made it easier to do?
6. Could this exercise be done more efficiently and more accurately?
7. What would you do otherwise if you did this exercise again?

1.6. Method: work in group

Subject: Wheel removal, tire and wheel identification, organoleptic status verification, replacement of the damaged tire, wheel balancing and reassembly.

Time: 5 hours

Didactic means of work: UDO - 18 tire mounting and dismounting device, electronic wheel balancer EWK - 18, PO - 1 tire inflator.

Tools: wrenches, socket wrenches, torque wrenches, clock sensor with magnetic washer, RSO - 18 local compression tool, pliers for assembly and disassembly of weights, valve key.

**Materials:** replacement tires, tire repair paste, talc, cleaner, weights for

balancing wheels with different carriages, chalk.

You can also use an instructor video to remind students how to do the task.

The current instruction, analysis of information, the time of about 20 minutes:

- Students analyze the documentation,
- They are thinking about the design of action plans,
- Refers to the inventory of spare parts, tools and auxiliary equipment,
- They are considering the compilation of the necessary equipment to perform the task, measuring and control tools and instruments and auxiliaries,
- The teacher observes the work of students,
- If students encounter difficulties that they can not cope with, I try to lead to the correct course of reasoning.

Current instruction, organization:
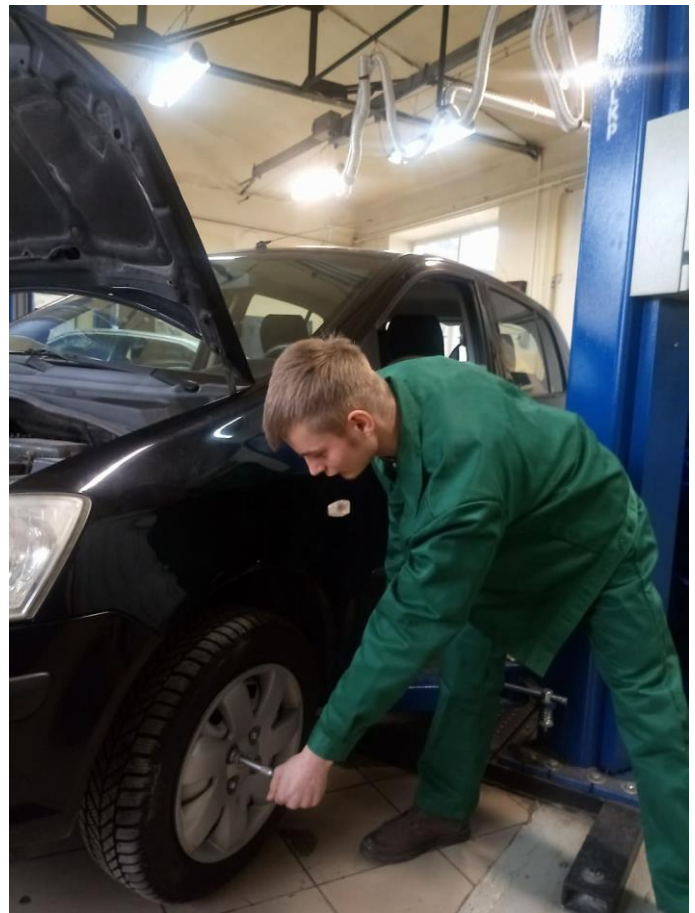
- The students, on the basis of their knowledge of the previous lessons, collect their own tools necessary for the task, the necessary measuring instruments, spare parts, consumables and auxiliary materials,
- Teacher will supervise the students' work.

Current instruction, execution:

- Students follow the rules they have learned so far
- The teacher watches over the correct course of the process,
- I pay attention to the activities that make the students difficult and safe for work,
- Starting from the planning phase, I assess students by filling out an observation sheet for the task they are performing,
- The student's performance is checked by the student, however, because of the student's safety and the state of the equipment and instruments, the teacher personally inspects each activity,
- In case of difficulties, the teacher will advise and assist.
-

Instruction, presentation, presentation should be allocated not more than 15 minutes from exercise time:

After the practical part of the exercise, the students assess the quality of their work and justify the way they do it.

Final instruction, about 10 minutes:

Teacher:
- Discussing classes: I emphasize achievements, analyze errors,
- Discusses the work of each student group on the basis of quantity points obtained in the individual areas of the observation sheet,
- Proposes and justify the assessment of each student,
- Gives the subject of the next classes to remind the students required information and shows appreciation for attending classes.

In order for group work to be as effective as possible, the trainer plays a very important role, which should first of all pay attention to the following issues.

By introducing students to independent work, the teacher helps to form groups and assign students their functions. It's worth it, he observed the following rules:

1. Teams should count so many students that everyone can participate in the work groups of students should have from three to five people. As a result, student has a role at work.

2. Students co-decide on the selection of team members. The greatest benefits come from working in mixed groups:

- pupils dealing differently with tasks in a given subject
- pupils with better or lower concentration difficulties
- pupils with different characters, eg shy and self-confident

The teacher should, however, take into account the preferences of students. He may ask for a list of three people with whom he would most willingly cooperate and place one of them in his group according to the mixed groups rules (keeping the principle of mixed groups).

4. The teacher defines the organizational framework for group working. Before the students start their own work, the teacher explains to them:

- how to use the evaluation tables
- The teacher should start by presenting the instructions to the students in the form of a grading table. Students, knowing the requirements, plan and discuss design tasks more often where to look for information sources, e.g. online databases:
- how many scientific sources can be used, for example when writing a research report
- how to define tasks to be carried out and write a schedule of activities
- how they will be billed for their work (see evaluation tables)
- how it will support the work of students, eg. intervening in case of problems
- The main task of the trainer is to coordinate and support the work of groups. Students work on the tasks themselves and the teacher watches their work and checks their work according to the grading tables. The supports when they encounter difficulties or give tchem explanations nad tips about activities. The teacher can help the students in summarizing their previous work and relate it to the main goal of the project. (It can also remind students about the need to improve their work according to the criteria of the assessment tables).

5. Students post their work by staging eg
It is good practice to involve students in discussing the principles of working together.

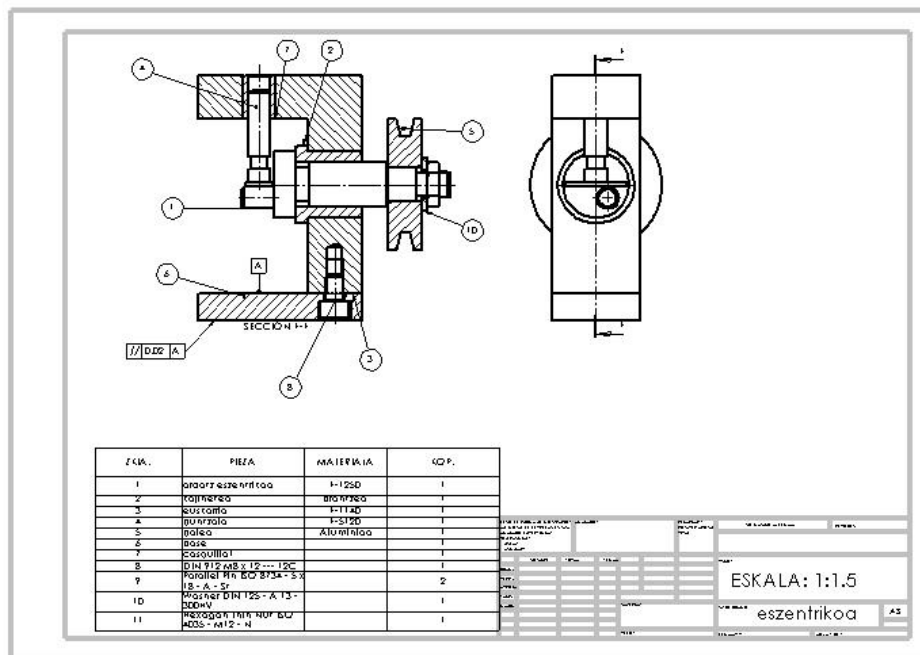## 1.7. Challenge-based learning – the example of Ethazi

WORK TO CARRY OUT

We wish to point out that in this project we are basing ourselves on an idea already developed, of which we include documentation. The students' work, once they have visualized the idea (re. set diagram) will involve dividing up the work, manufacturing the set, while at the same time documenting the process: list of materials, order forms for materials, mechanization processes, etc. Please note that having completed manufacturing and assembling, the appropriate functioning tests will be carried out.

LEARNING OUTPUTS covered within the collaborative challenge
covered technical skills
- PBL
- KPE
- HOW TO MANAGE A PROJECT
- TECHNICAL FACTORS:
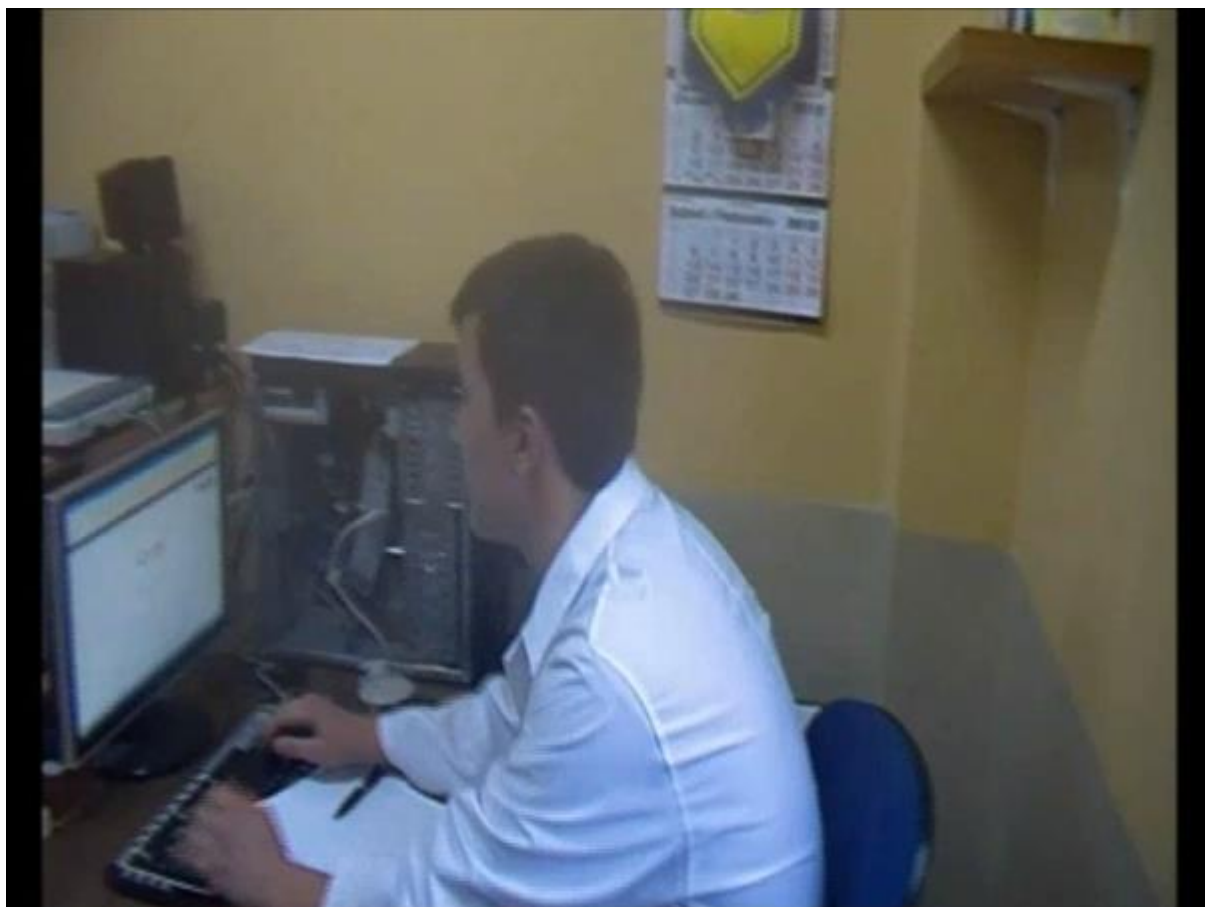 - What is a scale?
    - What is a scale used for
  - Materials

- - o Characteristics of the materials used in the set.
  - Bearings:
    - o How many are there?
    - o What are they used for?
    - o How are the bearing holders to be mechanized?
    - o Tools necessary for the mechanization of the bearing holders (measurements/ Do we have these tools?)
    - o What are the clearances of these holders?
      - o Where do I buy the bearing/what size bearing do I buy?
  - Bolts
    - o How many are there?
    - o What are they used for?
    - o How are the bolt holders to be mechanized?
    - o What are the clearances of these holders?
    - o Where do I buy them/What size do I buy?
    - o Tools necessary for the mechanization of the bolt holders (measurements/ Do we have these tools?)
  - Screw Thread
    - o What is a screw thread?
    - o What are screw threads used for?
    - o How are the screw threads delimited?
    - o How is a screw thread measured?
  - Screw fastener
    - o What is a screw fastener?
    - o What are screw fasteners used for?
    - o How are screw fasteners represented on a diagram?
    - o The screw fastener holders are standard. With tables, look for the dimensions of the screw fastener holders.
- Tools Required
  - o Analyze and select the tools required for the mechanization of the process.
  - Material
- o Analyze and choose the materials necessary for the mechanization.

1.8. EXAMPLE FOR PRACTICAL METHODS IN VET

Where is the method applied?	**IZMIT TECHNICAL AND VOCATIONAL HIGH SCHOOL**
Name of the method	METAL WELDING SIMULATION
Short description	**In the field of metal technology, before the application of the metal welding teaching, field students are trained in the robot welding simulation environment; dust-free, smoke-free and harmful light-free application can be made. So there is no material consumption. The student learns the robot welding to be used in the business life or in the schools and gets ready for the business life. We work with 2 source simulations which provide students with hand skills and report the faults they have made.**
Application by trainers	**With the help of SmartPAD, the trainer helps the students to learn robot movements in different coordinate systems and to perform the welding operation by using the learned movements and welding commands.**
Recommendations for application of the method	**It can be used for all schools providing vocational and technical education in the field of metal technology or machine technology. The simulation will be useful in terms of material consumption and compliance with OHS rules.**
Pictures	**https://imgur.com/a/dJFLg**
Videos	**https://streamable.com/qtz1d** **https://streamable.com/qu60n** **https://streamable.com/g6ayc** **https://streamable.com/8rwhu**

Where is the method applied?	KARAMURSEL 100. YIL TECHNICAL AND VOCATIONAL HIGH SCHOOL
Name of the method	DIGITAL CLASS
Short description	Classes are broadcast live via IP cam from a digital laboratory which is designed to follow the lessons remotely for students who can not come to class because either of sickness and other reasons. Also, open high school studens who are working while studying have the chance to benefit from IP cam classes.
Application by trainers	Classes are broadcast live via IP cam by the teacher in order that students can follow and record them in digital environment.
Recommendations for application of the method	At low cost, many institutions can also install the same system in their schools.
Pictures	https://imgur.com/a/dXVdu
Videos	

Where is the method applied?	**YAHYA KAPTAN TECHNICAL AND VOCATIONAL HIGH SCHOOL**
Name of the method	FACE TO FACE : JOB MARKET - VOCATIONAL HIGH SCHOOLS
Short description	**Profession experts from the labor market share their knowledge and experiences about business world by lecturing in vocational high schools.** **This method, despite not being in the curricula, aims to increase the interest and motivation of the vocational education students towards their professional fields by bringing them together with the profession experts, entrepreneurs, business owners and other competent persons from the sector in the classroom environment.** **In this context, the profession experts teach the students in the last two levels of vocational high school 8 times in a training year in a classroom, laboratory and workshop environment, 2 of which is carried out as vocational trips.**

Application by trainers	The field teachers communicate with the coordinator of the professional chamber and make an annual activity plan. In the prepared activity plan, the date of arrival and the fields of specialization of the profession expert are specified. They also provide necessary environment and equipment for the profession experts. At the end of each training, evaluation questionnaires are applied to the students and the training is evaluated.
Recommendations for application of the method	Starting from the beginning of the school year to the end of the year will be beneficial in terms of effective outcomes. The profession EXPERT must have at least 3 years of work experience, be a member of the professional chamber, have the ability of expressing himself/herself clearly and teaching that is accepted by the professional chamber and educational institution.
Pictures	https://imgur.com/a/wA1sr
Videos	

Where is the method applied?	**KANDIRA TECHNICAL AND VOCATIONAL HIGH SCHOOL**
Name of the method	DO IN COMPANY, TELL AT SCHOOL
Short description	**Chemistry technology students who are having practical training 3 days a week in a company in the last year of their vocational training (12th grade) make presentations to their classmates about the methods they have seen and practiced at workplaces on the days when they attend the school and teach them practically what they have learned. If they need to use chemicals or devices that are not available in the school laboratories, they can record video clips at workplaces and watch them along with the classmates, or arrange trips for other students in the classroom so that other students are informed. These practices and trips continue smoothly to the extent that the business accepts. Thus, when students start their professional career the next year, they become knowledgeable about many sectors and are in an advantageous position.** **In addition, 11th grade chemistry technology students are also included in those business trips to get an idea of the company environment.** **As a result of these method, both the business have the opportunity to get qualified labour force, and the students have the chance to know the labour market while they are still at school.**
Application by trainers	**The trainer coordinates the practical training in businesses and organizes trips by getting in touch with the business owner on business trips, guides students and informs the class about the subject by assisting the students presenting in the classroom environment. The trainer also asks questions to the students in the classroom when necessary to make the topic interesting and compelling.**
Recommendations for application of the method	**This method can be easily applied by all vocational schools, apprenticeship centers and vocational courses. In this way, it is aimed that the students will be able to define each business area in detail and make a better decision in choosing a profession.**
Pictures	**https://ibb.co/hbOMy6** **https://ibb.co/hy0ekm**

	https://ibb.co/nnMkQm
Videos	

Where is the method applied?	**PRIVATE KOTO TECHNICAL AND VOCATIONAL COLLEGE**
Name of the method	KOTOBANK
Short description	KOTOBANK was established with the opinions of the students and employees in our school. Within the scope of the application, the student gets a credit of up to 50 TL from the money in the case in a room and signs the cash book by writing a repayment date that s/he will determine within two months from the date of receipt. If the student does not pay on time, s/he is called by the Bank Manager (School Principal) and talked about money management issues. If excuses are not accepted, students can not use credit until the end of the academic year. This process is **not** under the supervision of any person. It is also **not** monitored by the camera. This method aims to teach students how to manage their money and cultivate the culture of borrowing Money and paying back on time.

	The method is also reinforced with the school canteen with no cashier or worker. The students pay by themselves and take back the change from the case on their own. Again there is no camera or supervisor.
Application by trainers	
Recommendations for application of the method	This method can be applied in order to improve the soft skills of vocational education students.
Pictures	**https://ibb.co/nHHj1R**
Videos	

Where is the method applied?	**PRIVATE ENKA TECHNICAL AND VOCATIONAL COLLEGE**
Name of the method	FROM VIRTUAL TO REALITY
Short description	During the training of 3D design programs (Autocad, Solidworks, Siemens NX), many of our students make solid model applications on the computer. However, instead of examining the output of products on the computer screen in the execution of solid model commands, it is much more useful to print out through 3d writers, to see solid examples of students and to learn by touching. We apply this method in machine, industrial automation courses, 3D design programs training and designing products in 3D printers.
Application by trainers	**The trainer guides the implementation of the training content. Once students have learned the programs and commands, they are guided to work on material development with the 3D printer by the trainer for materializing the learnings.**
Recommendations for application of the method	This method can be used by institutions providing training of design programs and 3D printer.
Pictures	**https://ibb.co/eJ77am** **https://ibb.co/mMxUo6** **https://ibb.co/iAWYFm** **https://ibb.co/eAn7am** **https://ibb.co/i8HJgR** **https://ibb.co/h0cvT6** **https://ibb.co/eNaSam** **https://ibb.co/kT6B1R**

Videos	

Where is the method applied?	**IZMIT YAVUZ TECHNICALAND VOCATIONAL HIGH SCHOOL**
Name of the method	CONTINUOUS TRAINING
Short description	Students in the field of Information Technologies do not remember the applications they made in Web Design and Application courses the following week. Besides, being absent in some classes due to various excuses decrease the students' success. With this method, with the help of the training videos prepared by the course teacher, the students are able to revise the subjects explained in the classes and increase their level of success. In this process, the videos prepared by the teacher, are open for free use of the students on a "youtube channel". The practice is still going on and the results are monitored by the course teacher and the results are recorded.
Application by trainers	The trainer prepares the videos, and upload them in his youtube channel which is known by the students. The trainer also monitors the process by recording the numbers of students who watched the videos.
Recommendations for application of the method	This method can be extended by the videos that all course teachers prepare for their courses, in-service training can be given to teachers to prepare training videos.
Pictures	
Videos	**https://www.youtube.com/channel/UCmrCRuISsM-dDHoK1kpw5Ig/featured**

Where is the method applied?	**FEVZIYE TEZCAN TECHNICALAND VOCATIONAL HIGH SCHOOL**
Name of the method	INTERACTIVE CAR ENGINE TRAINING
Short description	This method is used to ensure that students who are new to Automotive Mechanical training can easily learn the names, tasks and locations of the parts of automobile engine. The student learns engine parts both visually, interactively, and

	theoretically from a touch screen just above the real engine parts and gets detailed information.
Application by trainers	Interactive engine parts training is for electromechanical branch students in the field of automotive mechanics. This teaching method which includes both visual and theoretical education, is an intriguing, autonomous learning driven and research encouraging method for students. The materials for this method are available in the outdoor area and easily accessible for students.
Recommendations for application of the method	This interactive application can be easily applied to all vocational schools providing automotive mechanics education. Similar materials may be prepared for other mechanical and electronic components of vehicles other than automobile engines.
Pictures	**https://ibb.co/cc07rR** **https://ibb.co/gq5Jy6** **https://ibb.co/dwnyy6** **https://ibb.co/npyhQm** **https://ibb.co/h4ENQm** **https://ibb.co/m4CWJ6**
Videos	**https://streamable.com/4wgj1**

1.9. Critical Thinking Skills

Critical Thinking Skills (26 hours): It is aimed to develop students' cognitive skills through experiments that allow for exercises such as induction, deduction, hypothesis formation, observation, data collection.

The purpose of this field workshop is to enable participants to learn to learn on the one hand and on the other hand, to develop critical thinking skills in accordance with professional competences.

In these studies, the instructors ask the students the questions and create the negotiation environments where the students are encouraged to declare their ideas. Then, in group works, the students investigate the question they are curious about by conducting necessary experiments, making a claim based on the data and defending their claims against the whole class.

The role of trainers in this process is basically as follows:

- To ensure that all students actively participate in group work,
- To ensure that students question what they are doing during the experiment and claim creation process,
- To raise awareness of the need for students to question the reliability of information and data sources,
- To ensure that students understand what is discussed during the negotiation process are ideas, not personalities,
- Encourage students to be able to produce solutions to the problems that will be faced in their education life or in their professional life, by using correct thinking techniques
- Raising awareness about the fact that there is not only way to reach the truth, and that instead of memorizing any information or formula, it will be more meaningful and useful to discover what this knowledge corresponds to in real life.

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1.10.Using mobile devices in training

Technical capabilities of mobile devices are constantly expanding and market of users growing. Few of the advantages offered by mobile devices for learning are:

- Less infrastructure investment compared to personal computers (many students already have their own personal phones);
- Training content can be accessed in more places and with greater time flexibility than wired connections.

Creating mobile content

- Developing mobile training materials can be done quite affordably. Creating inexpensive "how to" videos and uploading them to private YouTube channel is very easy;
- PowerPoint slides that are being used for classroom training can be synchronized with spoken presentation and students can view the presentation as a video;
- Software applications that are being used for development of mobile content are: Adobe Captivate and Articulate Storyline or Studio.

Advantages of mobile training

- Very positive responses to the concept of training via mobile devices, such as:
- Students are motivated by technology and respond to it very well (compared to in class training);
- Sometimes it is difficult to keep paper-based manuals and instructions organized. Well-designed mobile instructions can help to avoid confusion and are updated easily;
- Visual learning is an effective means of training.

General guidelines / recommendations

- Mobile learning should be used to provide targeted information (not complete course);
- Content should be presented in as clear and simple a form as possible;

- Use applications that are already installed on the devices or are commonly available;
- Instead of requiring the students to read long sections of text on the small smartphone screen, develop audio files;
- Upload the videos to YouTube so that they would be accessible from the phone's browser;
- Students like the "anytime anywhere" flexibility of learning.

1.11. Innovative lesson – video bridge

In order to interest students (auto mechanics and automatic systems mechatronics), teachers developed and tested concept of video bridge. This innovative lesson expanded possibilities for different groups of students to share theoretical knowledge and demonstrate practical skills.

In technologies classroom students were introduced to geometrical inspection and car maintenance features, deepened theoretical knowledge about maintenance of the steering system and checking of wheels geometry. They were given a practical task - to develop a set of questions and tasks with detailed instructions for students in the educational car service. At that time, in the practical training room, preparatory work was performed: a car raised by a hoist, work tools and equipment prepared. After performing the preparatory tasks, the students of both groups took joint actions: the students and their teacher in the practical training room listened to the detailed instructions (via Skype) and carried out practical tasks. The car service was filmed with web camera as well and broadcasted directly to the theoretical learning classroom.

The students discussed, advised each other, commented on, offered various solutions on how better and more efficiently perform a practical task.
Student activity, burning eyes, the desire to share their knowledge with others have shown that such an innovative lesson helped them not only to better understand the significance of theoretical knowledge, but also to understand the necessity when working as a car mechanic. Most importantly, they were given the opportunity to communicate, to feel responsible for their work, to express their opinions and to listen to what others have to say.

The demonstration of theoretical knowledge in practise gave students new insights and allowed to test what they are capable of.

After the lesson, students and teachers discussed about advantages and disadvantages:

Usual scenario of theoretical lesson is: telling, dictating, reading, making notes. Students are not always encouraged to express their opinions, wishes and expectations. Innovative lessons change learners' perceptions of learning and knowledge absorption.

Helps to learn more efficiently.

Strengthens learning motivation: it is very important that future specialists are able not only to repair, but also to have a good structural knowledge, to apply theoretical knowledge, to seek professional development, to be interested in innovation, to learn and to be motivated to achieve the highest results.

Necessary equipment:

- 2 web cameras
- 2 computers
- Skype
- Wifi

Conclusion

The third intellectual output of the VETriangle project provided for some interesting examples for training methods which can be combined or adapted to different contexts by external trainers. The variety of methods in the output included specific training methods for individual learning, methods which can be used in group learning and other learning contexts. The aim of the output is to provide trainers and instructors with new ideas for training methods and their combination to teach practical and theoretical contents and more important to link these two areas.

While some of the methods are only applicable in a specific context or for specific learning contexts and professions, others can be used in a lot of learning environments.

The didactic handbook can be used to get new ideas and improving (dual) training programmes and help with their implementation as a manual.

Sources & Literature

BIBB:Ausbildung handlungsorientiert planen, 2003, https://www.foraus.de/media/modul1.pdf, zuletzt aufgerufen am 02.10.2017.

Forschungsinstitut Betriebliche Bildung: Vier-Stufen-Methode, http://www.ausbildernetz.de/plus/waehrend/ausbilden/arbeitsplatz/vier_stufen.rsys, zuletzt aufgerufen am 02.10.2017.

AEVO Training: Die Vier-Stufen-Methode, http://aevo-training.de/die-vier-stufen-methode/, zuletzt aufgerufen am 02.10.2017.

Forschungsinstitut Betriebliche Bildung: Leittextmethode, http://www.ausbildernetz.de/plus/waehrend/vermittlung/unterricht/leittextmethode.rsys, zuletzt aufgerufen am 02.10.2017.

HRM Akademie: Stichworte für den Aus- und Weiterbildungspädagogen IHK - Geprüften Berufspädagogen IHK. Leittextmethode, http://www.hrm-akademie.de/stichworte/leittextmethode.html, zuletzt aufgerufen am 02.10.2017.

Reich, K. (Hg.): Methodenpool, 2007, http://methodenpool.uni-koeln.de/download/leittexte.pdf, zuletzt aufgerufen am 04.10.2017.

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