



# PRACTICE GUIDE

## (SELF-)EVALUATION OF PROJECT-ORIENTED LEARNING AND WORK TASKS



The Erasmus+ funded European project 'Improving the Skills and Competences of VET teachers and trainers in the age of Artificial Intelligence' (Tackle AI) brings together partners from five countries to provide initial training and continued professional development for VET teachers and trainers in Artificial Intelligence. The project will seek to support VET teachers and trainers in extending and adapting open curriculum models for incorporating AI in vocational education and training. Furthermore, the project will develop a Massive Open Online Course in AI in education in English and German, open to all teachers and trainers in VET in Europe. The course materials will be freely available for other organisations to use for professional development. It follows the tradition of previous successful TACCLE projects. You can find more information on our website: [www.taccleai.eu](http://www.taccleai.eu)

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The Tackle AI project has been financed within the framework of Erasmus+ programme (KA2 - Cooperation for innovation and the exchange of good practices KA202 - Strategic Partnerships for vocational education and training; Nr. 2019-1-DE02-KA202-006317)

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# 1. Artificial Intelligence in Vocational Education and Training

Artificial Intelligence is particularly important for vocational education and training as it promises profound changes in employment and work tasks. There have been a series of reports attempting to predict the future impact of AI on employment, producing varying estimates of the number of jobs vulnerable to automation as well as new jobs which will be created. However, the greatest implications for VET lies in the changing tasks and roles within jobs, requiring changes in initial and continuing training, for those in work as well as those seeking employment. In addition to knowledge of new technologies such as AI, knowledge of the human-centred design of AI is necessary.

It is becoming increasingly important for young people to also learn social skills such as teamwork skills. It is also assumed that creative thinking and the ability to learn in a self-directed way are gaining in importance.

## 2. Promoting vocational competence

How can these required competences be promoted at vocational school and in in-company training? So-called learning and work tasks (LWT) can be one way of linking theory and practice more closely, to develop learners' competences.

A new way of learning and working is characterised by a holistic framework for action, which consists of planning and preparing the project task, carrying out the task in teamwork and providing the task result. LWT are characterised by a project-based and task-oriented learning process. This is intended to better link learning, working and concrete action with one another by more closely linking the training content from in-company training practice with the learning processes in vocational school (Howe & Gessler, 2018; Lehberger & Rauner, 2017).

The realisation of LWT involves the following four steps (Howe & Gessler, 2018):

- a. Development of LWT:** In this phase, teachers/trainers are asked to provide appropriate tasks by making proposals and matching them with the learners' needs. Advanced students can support the teachers/trainers in the selection and development of tasks.
- b. Implementation of LWT:** Here it is important to advise on the composition of appropriate team consortia so that these teams can achieve their best capacity to act during implementation, to learn from each other and to cooperate well with each other.
- c. Evaluation of LWT:** The project result achieved with the implementation is examined or tested by the learners for its fulfilment of objectives; this includes documentation and presentation of the project result. The learners also show

how they have dealt with certain problems in the implementation of the project task.

- d. **Self-evaluation of LWT:** In a fourth step, the teachers/trainers examine whether they are satisfied with the course of the project and what can be done in the future to improve the task definition.

In this practical guide, we give tips on how to carry out self-evaluation (d) and why it is useful at all.

### **3. (Self-) evaluation of learning and work tasks**

#### **What do we mean by evaluation?**

Before the tool is explained in detail in its criteria and procedure, let us say what we mean by evaluation: Evaluation is a systematic "post-analysis" with which products and processes can be improved. Practitioners such as teachers, trainers, students or trainees are encouraged and supported to reflect on their learning experiences and, if necessary, to make suggestions for improving tasks and future projects.

Previous project experiences show that after the corresponding learning and working tasks have been carried out by the students or trainees, the teachers or trainers often want to know how well or how badly the whole project has succeeded and whether there is still room for improvement<sup>1</sup>.

From the point of view of the evaluation researcher Helmut Kromrey, the situation is similar: An object of evaluation, such as organisations, persons, programmes, projects, work tasks, is evaluated by someone like Experts, trainees, teachers, trainers, are evaluated according to certain criteria, starting from evaluation criteria that are closely related to the object of evaluation and that can be subjected to a systematic assessment in a comprehensible way (Kromrey, 2001, p. 107).

#### **Why is a self-evaluation tool useful?**

With the help of a self-evaluation tool, teachers can check for themselves whether the project task in the way it was carried out is suitable to support the learning process of the learners and whether there is room for improvement for the task and future projects. To this end, an evaluation tool is designed based on evaluation criteria and in an evaluation process and is made available to practitioners. Teachers should be able to check themselves whether the task has been understood by the learners and whether it has been satisfactorily implemented by the learners. The evaluation criteria are kept sufficiently general in the form of questions so that they can be applied to thematically different tasks.

#### **How to use the self-evaluation tool?**

The teacher should, on the one hand, answer the questions for himself/herself and then exchange his/her answers with the team, discuss them to find out in a joint dialogue on which points one has reached an approximation regarding the strengths or weaknesses of the task and where there are deviations. In this way, different assessments are brought together to arrive at a collective overall assessment of the quality of the LWT. However, pupils or trainees can also be questioned in the evaluation process and included in the

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<sup>1</sup> See "Case Study: AI-Gaming Project" on the Tackle AI Website.

evaluation process. There should be a certain relationship of trust between the participants so that negative assessments can also be freely expressed in the team group.

### **The evaluation process**

The following section explains the evaluation process, which is easy to handle and can be carried out by the teachers themselves. The entire process can be carried out in two to max. three hours by the team of teachers responsible for the tasks. The evaluation process of a user-oriented self-evaluation provides valuable and useful evaluation data, this helps the teacher team to improve and further develop the practice of developing and providing LWT. The following steps should be taken to plan and conduct an evaluation:

1. In the first step, a questionnaire is compiled by the persons involved in the evaluation. In the following chapter, a set of questions with all main and secondary criteria is compiled. Criteria refer to the focus of the evaluative (retrospective) examination, which means that a criterion can also be translated into questions, for example. For example, the criterion of time planning, which could then read as follows in question form: To what extent is the time planning sufficiently clear and precise? This is also the case in our SE tool, as can be seen in the following chapter. This process of compiling the questions should be done very carefully, because the questions should be unambiguous, clearly formulated and ultimately always different from each other. If necessary, it makes sense to have an external consultant, e.g. an experienced teacher from a cooperating school or a scientific project partner from the accompanying research, if the participants do not feel confident enough to do so.
2. In the evaluation session, the questionnaire is used by the team of teachers With the support of the moderator the participants are instructed and possible questions of the participants are answered. The following steps have proven to be successful:
  - The moderator explains the questionnaire or the questions contained in it to the participants based on the main and secondary criteria. Questions should be asked by the participants to achieve a better common understanding.
  - Each participant receives a questionnaire, after which the weighting is first carried out individually by each person. The guiding question for this first evaluation step is: Which criterion is the most important for me? Each participant in the evaluation session weights the criteria in percentages, whereby all four main criteria A, B, C and D together make 100%.
  - The individual results are recorded by name in an Excel table on a computer.
  - All participants explain the group why they have weighted the main criteria in this way and not otherwise and what their motives are for doing so. The reasons will be recorded and noted in keywords on a notice board.
  - Subsequently, an evaluation of the criteria is carried out by the participants. They rate the individual criteria in the form of points from 1 (insufficient) to 10 (very good). The guiding question for this evaluation step is: To what

extent were the following criteria fulfilled or not fulfilled for me? How do I rate the criteria?

- First, the potentials of the LWT are individually assessed and discussed and then the realisation of the tasks is individually assessed and discussed. The moderator asks the participants to explain the reasons for their assessments in the evaluation round.
  - The evaluations are explained by the individual participants. The motives and arguments for their evaluation are presented in the round. The moderator records the evaluation in the Excel spreadsheet.
3. A sub-group of teachers (the analysis team) uses the discussion results to systematically evaluate them and prepare the results of the evaluation session for a debriefing with the whole team of teachers.
- Drafting a protocol of the results, summarising the participants' motivations for their evaluations regarding the potential of the tasks and the realisation of the tasks.
  - Graphic visualisation of the % or points ratings of the participants
  - Strengths and weaknesses of learning and work tasks are defined
  - Preparatory questions for the final session are formulated
4. In the final session, the evaluation of the workshop by the preparatory teachers/trainers will be presented. In this session, partly unclarified and open questions are discussed to finally develop concrete conclusions for the future practice of providing project-based learning and work tasks.
- The results of the evaluation workshop will be discussed in detail.
  - The graphics will be shown, explained and discussed.
  - Any questions that remain open are discussed or clarified.
  - The analysis team writes a final (evaluation) report based on the evaluation of the perspective session, which contains the minutes of the evaluation workshop, the graphic illustrations and the agreed perspective results.

### **The main and secondary criteria of the evaluation**

The measuring instrument is developed based on the evaluation instrument SEVALAG (a), the characteristics of learning and work tasks (b) and DIHK<sup>2</sup> requirement criteria (c). Through the combination, three different dimensions can be integrated and the experience gained by teachers from vocational school and training companies has been incorporated into the development<sup>3</sup>.

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<sup>2</sup> The Association of German Chambers of Industry and Commerce e. V. is a registered association under private law whose members are essentially the 79 German Chambers of Industry and Commerce, which are themselves public corporations.

<sup>3</sup> The SEVALAG Tool (a) serves to create relevant questions and to compare potentials and results (Timmermann, U., 2007). The didactic concept (b) was used to divide the tool into sections. The IHK requirement criteria were used as a "check" whether all relevant requirements were present, otherwise they were supplemented.

- a) In SEVALAG two evaluation dimensions are compared: the task potential on the one hand and the concrete task implementation/realisation on the other. (Model test Konsil MV, Timmerman, 2007).
- b) The didactic concept of learning and work tasks represents (1) project-based, (2) process- and task-oriented learning in (3) problematic situations of (4) professional reality (Howe & Gessler, 2018, p. 486-494).
- c) The DIHK (2018) has adopted and compiled requirement criteria for practice-related tasks. The tasks are selected based on the following criteria such as (1) occupational and company reference, (2) depiction of a complete occupational activity, (3) processing of the task, (4) scope for design, (5) evaluability. The criteria are intended to ensure that apprentices can learn in action-oriented industrial projects with a high degree of reference to automation-oriented learning and work tasks under the guidance of company trainers and vocational school teachers in laboratory and testing environments close to the factory in vocational schools (DIHK, 2018, p. 38).

**Main criterion A: Project design with sub-criteria A.1 to A.5 (the individual criteria in bold)**

Potentials	Results
A1. To what extent is the <b>timetable</b> sufficiently clear and precise?	A1. To what extent was the target planning helpful in processing the LWT?
A2. To what extent can the trainees <b>plan, carry out and evaluate the processing of tasks independently</b> in a team?	A2. Were the trainees able to plan, implement and evaluate the LWT independently in a team?
A3. To what extent are trainees <b>encouraged to assume responsibility</b> within school-based or company-based training?	A3. Did the project trigger a greater sense of responsibility among those involved?
A4. What potential does the project have in terms of <b>promoting cooperation between the company</b> (trainer) and the school (teacher)?	A4. To what extent was the cooperation between the companies (trainers) and the school (teachers) encouraged?
A5. What potential does the LWT have in terms of <b>promoting cooperation within the vocational school</b> (pupil - pupil, teacher - teacher, pupil - teacher)?	A5. To what extent did the project succeed in promoting cooperation within the vocational school (pupil - pupil, teacher - teacher, pupil - teacher)?

**Main criterion B: Process- and task-oriented learning (2) with vocational problems (3) with the secondary criteria B.1 to B.5 (in bold the secondary criterion to be examined)**

Potentials	Results
B1. To what extent does the task contain references to <b>alternative solutions</b> ?	B.1 Did the trainees find alternative solutions?
B2. To what extent were there <b>evaluation criteria for the results</b> of the LWT in advance?	B2. Were the evaluation criteria taken into account in the documentation?
B3. To what extent were there <b>phases of reflection</b> in which intermediate objectives were documented or evaluated?	B3. Did the reflection phases help to derive suggestions for improvement?
B4. To what extent are <b>external requirements</b> made clear in the terms of reference? (e.g. customer requirements, legal and ecological requirements; coordination with operational interfaces)	B4. Do the learning and work results reflect the trainees' critical and creative approach to the task?

B5. To what extent does the LWT involve the **motivation and interest** of the group of pupils?

B5. Have the students been inspired by the topic?

**Main criterion C: Relation of the LAA to vocational training practice with sub-criteria C1. To C4. (in bold the sub-criterion to be examined)**

<b>Potentials</b>
C1. To what extent is the LWT <b>typical for the professional tasks</b> ?
C2. To what extent is the LWT based on <b>operational problems</b> ?
C3. To what extent are <b>all the action steps of a work process</b> : acceptance, planning, implementation and completion of the learning and work task stimulated?
C4. To what extent is the LWT suitable for illustrating that <b>work and technology can be shaped by the worker</b> ?

<b>Results</b>
C1. Did the LWT merge theoretical knowledge and practical experience?
C2. Was the technology typical of the company used in the implementation of the LWT?
C3. Were the essential steps of a work process (acceptance, planning, execution, completion of an order) considered in the learning and work task?
C4. When completing the LWT, have the trainees gained insights into the fact that work and technology can be shaped by the worker?

**Main criterion D: Outcome across individual areas to achieve vocational actionability with sub-criteria D1. Up to D4. (in bold the sub-criterion to be examined)**

<b>Potentials</b>
D1. To what extent is the LWT suitable for promoting <b>professional knowledge</b> and skills?
D2. To what extent is the LWT suitable for promoting <b>self-organised learning</b> ?
D3. To what extent is the LWT suitable for promoting <b>communication skills in a team</b> ?
D4. What <b>special skills</b> do pupils acquire through this task?

<b>Results</b>
D1. To what extent have the professional competences been acquired through the processing of the LWT?
D2. To what extent was self-organised learning supported during the work on the LWT?
D3. To what extent did the work on the LWT promote communication skills, teamwork and cooperation skills?
D4. Did the pupils have the feeling that they had learned something?



## Literature

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