

ComEd
“Development of competences of educational staff by integrating operational tasks into measures of vocational training and further education”

Further developed conception for integrating the learning/teaching method „Exploration in enterprises“ into the configuration of measures concerning vocational training and further education in the field of Micro- and Nanotechnologies with recommendations for its institutionalization in the educational processes

(Status: 09/2010)

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1 Background, problems and objectives in the project ComEd

Vocational training and further education in areas of high-technology as micro- and nanotechnologies require new methods in order of strengthening the part of teachers and trainers. Due to the dynamics of technical-technological developments and a high variety of products, materials and technologies in MNT enterprises the need of educational concepts and offers is different and changes quickly. Considering this situation there are special requirements in order of developing and designing educational processes and developing the competences of the educational staff. In addition to a continuous development of new knowledge from international research it has to be implicated know-how generated in companies in teaching and learning processes as well.

A suitable approach encouraging the development of competences of the educational staff is a stronger implication of exploration tasks aiming on working processes, carried out by apprentices or participants of further education. Explored information about working processes, problems, approaches of solutions and innovative development results are an important potential of learning for teachers and trainers.

Our project deals with a model of integrating exploration tasks in vocational training and further education, which was primarily developed and proved in other German industrial sectors. This model has been adapted in the context of qualifying the educational staff of MNT enterprises and educational service provider (ESP) and transferred to the European partner countries. As a result a model has been further developed on an European scale which includes products fostering European exchange (e. g. pool of operational tasks, handouts and a web based exchange platform for multipliers, teachers and trainers).

Furthermore it was the common effort of all partners to adjust the understanding of vocational training and further education in order to force the economical development in Europe. The partnership which realised the project ComEd, involves educational service provider for companies of MNT. These ESPs have a different institutional background and different focus on professional topics concerning vocational training and further education. ESPs will complement one another and assure a wide consideration of learning content.

Main objectives of ComEd were:

- **Strengthening the role of qualified employees** including educational staff within vocational training and further education in the field of MNT in terms of new functions and tasks in conjunction with high dynamic of technical-technological development

- **Increasing mobility of apprentices in MNT**
Actually, apprentices in industrial-technical occupations in mobility projects are comparatively low. For that reason, preconditions for future European mobility projects for apprentices in companies of MNT shall be created simultaneously within the project ComEd

Target groups of project were:

- **Education personnel** within vocational training and further education for MNT involved in transfer (teachers, trainers in educational institutions and in SME) and
- based on it, **learners** within vocational training and further education in MNT in all involved countries during proving of concepts and instruments

2 Preliminary considerations for the conception to integrate the teaching/learning method „Exploration in enterprises“ into the arrangement of measures of vocational training and further education

Long-term assurance of economical sustainable acting of an educational institution requires closeness to economy.

Increasing dynamic of economical and technical/technological developments requires adjustments and customising in terms of configuring vocational training and further education measures.

It has to be questioned continuously if there are changes in terms of job-related activities as well of expectations and requirements to qualification of employees (see Figure 1).

It is the question, how such processes can be configured practicably.

- Job-related activities in company
 - Which tasks have to be done concretely?
 - Under which conditions they have to work?
 - What work equipment (e. g. Hard-/Software) is available?
 - Who has to work together with whom?

- Expectations, requirements concerning qualification
 - What does a company expect from apprentices/qualified employees?
 - What kind of knowledge, abilities and skills are necessary?
 - In what are precise deficits and what are possible reasons for it?
 - Are there possibilities to optimise learning content/learning co-operation? What could be possible approaches?

Figure 1: Chosen aspects, questions for evaluating stock requirements situation in companies

For this purpose, operational exploration tasks are regarded as appropriate method offering possibility to optimise vocational training and further education by considering and including real working environment.

Positive learning results are achievable for teachers/trainers as well as for learners. Learning potential for learners consists of gaining knowledge compared with operational reality and for education personnel it is possible, to get actual view at job-related and operational reality concerning taught occupational fields out of information out of exploration tasks. This fact enables adjusting and completing teaching-/learning materials with actual contents out of job-related experience and -reality.

3 Conception for integrating the teaching and learning method „Exploration in enterprises” into the configuration of measures of vocational training and further education

Based on the experiences in the pilot project ErNach, the model pictured in the following figure is seen as promising to integrate the teaching and learning method “exploration in enterprises” into the configuration of measures of vocational training.

Thereby the establishment of circuit processes has to be aspired in terms of sustainable processes and by the promotion of a close teamwork of educational institution and enterprises.

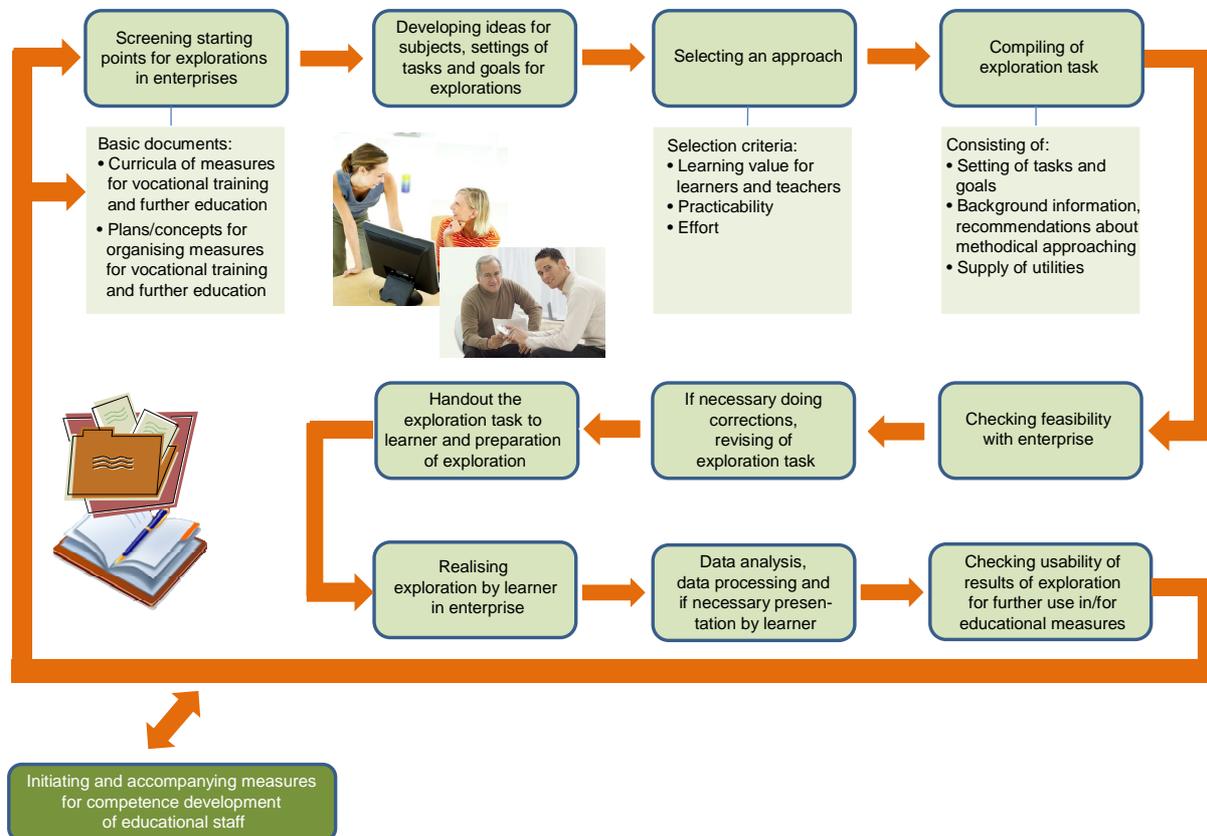


Figure 2: Concept for integrating the teaching and learning method „exploration in enterprises“ into the configuration of measures of vocational training and further education

Starting point for the use of exploration tasks is the question, which basic approaches can be found in existing curricula, plans and concepts of measures of vocational training and further information and how the development of exploration topics and their objective can be tied in with. The idea of exploration has to fulfil certain criteria, among other things a good learning content for learners and teachers, a workable feasibility and a passable work for realisation. If a topic is defined, the exploration task has to be formulated very accurately. It has to describe tasks and objectives precise, deliver sufficient background information and to offer hints for methodical course of action, in order to assure a result-oriented feasibility.

Before the exploration task is given to the learner as topic, it should be agreed with the enterprise, if the realisation of an exploration is wise there or if an adaptation/revised version is

necessary. Only after that, the learners will be prepared for the exploration and the exploration task is explained. Following, the learners realise the exploration in the enterprise independently and document all relevant information and data.

Evaluation and preparation of the carried information are fundamental for the learning success, aspired by the exploration. All carried data are necessary for analysing operational activities and to benchmark working processes especially concerning existing problems. The description of the results can be done as a presentation.

Completing the process, the results of the exploration are checked, to which extent they can be used for other education measures. At the same time they are used for the creation of new exploration tasks. By and by a pool of exploration tasks develops, which can be used by the education personnel. Measures for the qualification of teachers/trainers concerning handling and application of this specific method are part of this process. Best-Practice-Compilations for the realisation of the concept in concrete education measures as well as for the configuration of qualification activities for education personnel concerning the integration of exploration tasks into vocational education measures arise out of this procedure.

Knowledge concerning different activities of job descriptions and problems will be identified and actualised continuously. Furthermore it is aspired to couple the solution of operational problems into measures of vocational training and further education. This is an additional incentive for enterprises, to engage in such processes.

An operational exploration task is a conceptual ambitious method. Thus it is necessary to familiarise and instruct teachers and trainers with the instrument, in order to achieve intended effects. For this purpose the so called "Train the Trainer"-principle shall be realised. It is explained in which way operational tasks can be adopted in education processes. In this process all relevant aspects (starting with conception, realisation, handling of results) are addressed. It is possible to initiate a series of workshops.

4. Recommendations for sustainable institutionalization

The experiences within the ComEd project confirmed that the model of the integration of exploration tasks in measures of vocational training and further education represents a practical approach to skills development of teachers in the field of micro- and nanotechnology. In particular, the exchange of relevant topics on vocational training and

further education between teachers in educational institutions and trainers in companies supported by exploration tasks endorse the processes of informal learning. It has proved that the method of exploration task is an important way to make company generated knowledge useful for learning and teaching processes. The achieved results of the project will be available for those interested in vocational training and further education in the field of micro- and nanotechnology by using the continue existing web-based exchange platform (<http://forum.comed-project.eu>). Furthermore it is possible to develop the results on a wide base.

To ensure a wide implementation of the model in educational institutions and companies, it is recommended to approach the subject step by step. An important starting point is to make clear the benefit of the concept for teachers and trainers for themselves and learners too. Therefore, an important contribution in addition to the organisation of exchange of experiences between educational staff of different disciplines can be the support tools as developed in ComEd (e.g. pool of exploration task, best practice etc.).

A pool of exploration tasks, used by many teachers, supports the exchange regarding the topics represented in the pool. The effects are complex. With that, the education staff get to know others and / or adjacent topics and recognise thematic interfaces. Especially the interfaces related to technological questions are of particular importance in the micro- and nanotechnology. Here often innovative technological solutions and products (for example, MST in the medical technology) arise. Such a pool also encourages the educational staff to develop and formulate additional new exploration tasks. Therefore it is helpful getting feedback from the trainers in companies in which the exploration tasks will be carried out. The teacher can verify the results of an exploration task and deepen the own knowledge by visiting the companies. Hence suggestions for future exploration tasks may results as well. In best case the results also lead to approaches for new tasks of vocational training and further education in the education institution.

For a sustainable anchoring of the model, it is advisable to integrate the process model in standard procedures. For example in BWA the application is regularly discussed and experiences are exchanged during meetings of the educational department staff. At the Technical University of Kosice, the application of exploration tasks was anchored in curricula.