Variants of an Action Oriented Learning Environment for Technical Vocational Training

Abstract:

Modern vocational training comprises self-directed learning as well as instructional means conducted by the teacher. Thus, situated learning processes are combined with objectivistic elements. The question however, of how the two different orientations should be combined is yet to be answered. One contribution to answer is tried to be provided by comparing different variants of lessons in an empirical study. In four different treatments of an action oriented training the student's written material and the teacher's instruction are varied. Both the written material as well as the instruction is in one variant example-based (situated) and in the other systematically oriented (objectivistic). The results of this study should help enlightening which interdependencies of the investigated characteristics in a constructivistic learning environment are beneficial for an acquisition of knowledge that leads to vocational competence.

Learning a trade in Germany usually is done under the dual system of vocational education and training. The system is called 'dual' because vocational training takes place both in the company and in part-time vocational school. In the dual system the primary task of the vocational school is to foster the acquisition of theoretically controlled and reflected vocational competence. One possible means to achieve this is action oriented training. Action oriented technical vocational training requires a complete and rich learning environment. Students are active in realistic or reality referred tasks which are situation and subject-related. The navigation through the learning process is gradually left to student's responsibility allowing them to make their own decisions. Necessary guidelines in an action oriented technical vocational training are often offered as written documents. Students can learn and work with them almost without directive instruction of a teacher.

Modern vocational training comprises self-directed learning as well as instructional means conducted by the teacher. Thus, situated learning processes are combined with objectivistic elements. The question however, of how the two different orientations should be combined is yet to be answered. One contribution to answer it is tried to be provided by comparing different variants of lessons in an empirical study. In four

different treatments of an action oriented training the student's written documents and the instruction by the teacher are varied. Both the written documents and the instruction are in one variant example-based (situated) and in the other systematic oriented (objectivistic). The results of this study should help to enlighten the question which interdependencies of the investigated characteristics in an action oriented learning environment are beneficial for an acquisition of knowledge that leads to vocational competence.

In the investigated lessons the students work with two types of written documents. A so called 'Leittext' (guiding text) tells them what to do and additional written documents ("Informationsmaterial") provide them with the information they need to solve their tasks. The two variants of "Leittexte" are similar in their structure whereas the structure of the additional written documents differs from each other as described above. The variation of the teacher's instructions refers to the few planned instructions in front of the whole class as well as to the individual instructions and support for the different groups. The students are free to demand support whenever they thought they needed it.

The topic of the lessons - programming sequences of events - stems from the learning field automation technology. Within an automated process programmable logic controllers (plc) are used to implement industrial control systems for machines, manufacturing plants and industrial processes. The learning target for the eight lessons (1 lesson = 45 minutes) is to learn how to program sequences of events with a plc-programming software. In previous lessons the students learned how simple binary functions are programmed. Now their task is to use the different functions to program the sequences of events which are necessary to fulfil the assembling tasks of their station. The students work in groups of three on one station.

In the centre of the described vocational training stands an assembly line. Here electrical switches are mounted sequentially through a series of five assembly stations. Having reached the end of the assembly line the mounted switches are taken off it by a robot who puts them into boxes.

After the 8 lessons the students had to take a test that lasted about 90 minutes. A written test of about 25 minutes was followed by a programming task of about 65 minutes. The written test focussed on declarative knowledge whereas the focus of the programming task was to test the applicable knowledge.

The results of both parts of the final test show a better performance of the students with the example oriented variant of the written documents. Unlike their performance in the final test the students with the systematic oriented programmed more steps during

the lessons than the students with the example oriented variant of the written documents. One reason for this result could be that the students with the example oriented variant of the written documents were better prepared for the final test because they had to work through the worked out examples and extract knowledge from them in order to apply it to their task. Further results of the study will be published soon.