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Innovative approaches for technical, methodological, and socio-communicative competency development in production areas

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Abstract

Learning processes of employees in production areas no longer end with initial training, but continues during the entire working life. Technical, methodological and socio-communicative competencies are becoming increasingly important. This paper is devoted to the question of how industrial competency development can be designed in a demographically sensitive context. In the first step, selected competencies of employees and managers of different ages in the production areas are identified. The situation-related competencies refer to the lean production principle shop floor. A competency development concept, which combines work-oriented as well as work- integrated approaches was developed. This article addresses the work-oriented approaches and demonstrates how companies can design competency development approaches for the training of technical and methodological as well as socio-communicative competencies in production areas by the example of shop floor management.

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1. Introduction

The manufacturing sector is with nearly 26% of the German GDP one of the main pillars of the economy and secures more than 7.8 million jobs [15]. The challenges to lifelong learning in this area have grown in recent years, particularly because of an aging society, a declining dwell time of employees within a function or a company and a stronger international orientation of companies. In addition, there are briefer product life cycles in production, an increasing complexity of production systems and a growing number of decision variables regarding production possibilities [1]. In order to remain technically and methodically up to date, Employees need to develop themselves more continuously than before, to classify, to evaluate, and to shape the manifold possibilities of future developments. As a result, the learning process does not end with initial training, but must be accompanied the entire working life.

This paper presents ideas developed and implemented within the “ZielKom” project to address these challenges. ZielKom is a collaborative project on the topic of "Targeted and age-appropriate mediation of workplace-related competencies through learning factories". In addition to the Institute of Production Management, Technology and Machine Tools (PTW), the Institute of Ergonomics (IAD) and the department of Technical Training and Learning (TD) of the Technical University Darmstadt, three medium-sized companies in the production sector support the project. The companies are DAW SE from Ober-Ramstadt, Mahr GmbH from Göttingen and Franz Kessler GmbH from Bad Buchau. In addition, the bfw as a vocational training center supports the project.

A part of the project is devoted to the question of how industrial competency development can be designed in a demographically sensitive context. In a first step, selected competencies of employees and managers of different ages in the production areas are identified. On this basis, a competency development concept was established which combines work-oriented as well as work-integrated approaches, whereby this article addresses the work-oriented part. The concept was tested and evaluated in the pilot areas of the participating companies as well as the Process Learning Factor CiP.

The paper shows work-oriented competency development approaches for the development of technical, methodological and socio-communicative competencies in production areas. For this purpose, ▸ Chap. 2 refers to the comprehension of competency and work-oriented learning on which the ZielKom project is based. In ▸ Chap. 3 the methods and results of the surveys of the selected competencies are presented. ▸ Chap. 4 is devoted to the competency development concept and exemplifies some of the components of the concept.

2. Current state of research on competencies and work-related learning

Competencies describe the disposition to act self-organized in a reflected manner [4] [9] [20]. The term origins in linguistic [3] as well as psychological [21] approaches.

Erpenbeck and von Rosenstiel define a consistent concept of four competency classes: personal competencies (PC), technical and methodological competencies (TMC), socio-communicative competencies (SCC) and activity- and implementation-oriented competencies (AIC). Personal competencies form the basis for the three other competency categories. Aspects such as basic motivation and learning ability determine how we perceive and develop TMC or SCC and how we behave in application situations. The situation-specific competencies (SSC) enable the use of TMC and SCC [4]. TMC are complex approaches for self-organized, professional problem solving using existing knowledge [17]. Different types of knowledge have to be distinguished [13]: Professional knowledge is required for work-related activities at the operating level. Conceptual knowledge includes cognitive references of the respective professional knowledge at the reflected level. While professional knowledge is determined by a variety of capacities of a production technician, conceptual knowledge is determined by its quality [17], i.e. whether or to what extent a production technician is capable of carrying out a heuristic problem solution, anchoring new information into existing knowledge, and finding creative ways under unusual circumstances. Individual work-integrated and -oriented methods are suitable for further developing individual competencies.

In the case of work-oriented learning, the place of learning is located close to the workplace, e.g. in company training centers. This includes external seminars. The mediated learning contents are work-related, but not workplace-related. In the case of work-oriented learning, the learning contents are adapted to the work requirements and can be processed in operational learning groups. The learning progress is based on constructed learning tasks based on the

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