

Supporting Digitization by Learning Process Consulting

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Abstract – Neither the digitization of existing business processes nor the development of new digital business models can take place without human interventions. They must be accompanied by effective learning, which needs to be supported systematically. This article introduces the concept of learning process consulting, which is developed on the basis of psychological and educational theories and tested in an energy company. Learning process consulting is the “didactic joint” in digitization projects. In terms of personnel, it is realized by learning process consultants for whom a role with concrete tasks is described here. These consultants ensure sequences of reflective communication and cooperation. Furthermore, they enable and monitor the participation of employees and managers (non-computer scientists) – with the aim of generating transparency, acceptance and trained system users. The concept provides starting points for further educational and informatics research and applications, e.g. regarding the design of technical aids for data-based learning process consulting.

Keyword – *Reflective communication and cooperation, human learning, participative system development, process consulting*

I. DESIGN AND TESTING CONTEXT

Digitization projects often aim at using IT solutions for restructuring the cooperation in business processes [1]. Thus, acceptance and competent handling of IT solutions are crucial [2]. In order to meet these criteria, it is necessary to initiate and support learning processes. Hereafter a concept for learning process consulting is depicted. It is based on psychological and education theories, and was tested in a digitization project in a company of the European gas transport system [3]. The project included the design and implementation of a ticket system that could be used to deal with complex complaints from business partners (e.g. customers, service providers, authorities) across spatial distances as well as department and discipline boundaries. Learning process consultants guided the digitization project by enhancing learning through didactically sequenced communication and cooperation. In the following the conceptual fundamentals of this specific consulting role as well as some project results are outlined.¹

¹ The paper was presented on the 15th International Conference on Wirtschaftsinformatik, March 08-11, 2020, Potsdam, Germany. Here, it is republished based of research results of the author’s habilitation project [3], which was realized in the field of Business Education and Management Training (Wirtschaftspädagogik) at the interface to Business Administration (Betriebswirtschaftslehre) and Business Informatics (Wirtschaftsinformatik). The case study in the energy company lasted 2.5 years (2012–2015). It was based on a new design-oriented methodological approach to “analytical-constructive modelling” [3]. This approach allows to interlink concepts of different disciplines

II. TASKS OF LEARNING PROCESS CONSULTANTS

In the energy company involved, it has been evident that learning in digitization projects can be systematically supported when consulting is oriented on scientific approaches to subject-, team- and system-oriented business process management and business education [3], [6], [7], on concrete business situations, and on the personality of the learners [9]. These scientific, situation and personality principles provide a framework for a concept of consulting that is focused on the learning processes (see FIGURE 1).

Supporting learning processes includes recording, analyzing, designing and testing reflective communication and cooperation – with digital and non-digital media – in order to reduce complexity and acquire previously identified development needs [3]. Accordingly, learning process consultants accomplish several tasks:

- They carry out target group analyses focusing on cognitive, motivational and emotional learning premises, social structures in business situations as well as on technical working conditions (e.g. with the help of online-surveys, interviews, social network analyses [10], and typifications [11]). Additionally, they evaluate project results from the point of view of both the individual as well as the collective development [12]. Beside data collection and data analyses it includes a didactical preparation of empirical results. Thus, findings are transformed into learning objects.
- Furthermore, they consider the participatory character of system development [6]. That means, they involve the prospective system’s users (non-computer scientists) during the process of IT development as “co-designers” [13] in order to generate transparency about the goals, conditions and the process of digitization. While teaching them the acceptance of IT solutions is promoted simultaneously. Even employees without management responsibility are involved in the

addressing empirically founded learning as well as reflective communication and cooperation in and between large process teams ($n \geq 20$), e.g. concepts of cooperative learning [4], subject-oriented “agile” process management [5, 6], team development [7], and “mass communication” [8] together with combinations of research methods for qualitative and quantitative data analyses. The approach is also used in a recently launched project dealing with vocational training for an innovative energy transition.

development process, including the decision making on digitization, e.g. in meetings and workshops with a top-down-bottom-up decision-making sequence [6].

- Additionally, they ask prospective system's users to engage with the learning objects (findings) in a communicative and cooperative way enabling interdisciplinary problem-based learning [14]. Above all, they initiate and support the learning while all project members involved are planning and conducting the digitization, and then while using the project results for daily business and process management.

In the energy company it has been shown that current learning (in the digitization project) and future learning (in the digitalized business processes) can be supported when communication and cooperation is realized in the sequence of "Experience – Abstract – Reflect & Design – Test" (see FIGURE 1).

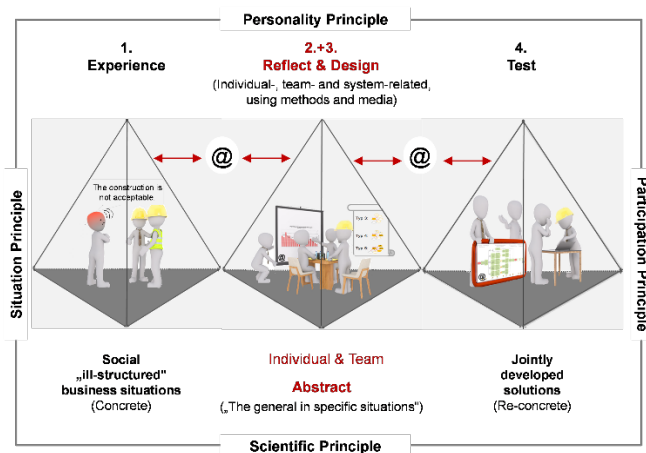


FIGURE 1: SEQUENCING LEARNING AND PRINCIPLES OF LEARNING PROCESS CONSULTING [3].

This sequencing idea is based on the psychologically founded approach of Achtenhagen et al., who address the microsequencing of teaching-learning processes in business contexts [15]. The authors summarize their idea in the established wording "Concrete – Abstract – Re-concrete" and emphasize that an individual understanding of concepts and the collective negotiation of meanings can thus be realized (symbolized in FIGURE 1 as a gray marked foundation). Moreover, Euler's psychologically based sequencing approach is taken up [4]. He states that the development of communication and cooperation skills (including skills for social interaction using digital tools) can be promoted when the individual learning process is embedded in concrete business situations and when the teamwork is realized with regard to the triad "Experience – Reflect & Design – Test" (symbolized as social space in FIGURE 1). Both approaches are interconnected as explained below:

1. The starting and reference point for learning are concrete (social) business situations which are experienced by employees and managers and are perceived as "ill-structured" (complex) [16]. FIGURE 1 shows an example situation in which a business partner articulates his dissatisfaction with a construction project and in which the complaint is dealt within interdisciplinary teamwork by businessmen and engineers.

2. With reference to the learning premises and working conditions of the target group (prospective system's users), the

experienced situations are reflected individually and collectively (e.g. in meetings). These activities aim at identifying the general and characteristic elements of specific situations. On top of that, these seek to describe the development needs for employees and managers, for teams and for the company, e.g. by diagrams, networks and typologies (abstract).

3. On the basis of experiences (step 1) and with regard to the development goals possible courses of action are discussed from the point of view of the persons involved and of various professions. Decisions on digitization are made in a participatory way, e.g. to process complaints more effectively by the team in the future. Accordingly, new IT solutions (prototypes with model character) are designed which enable reflective communication and cooperation within and between teams as well as across spatial distances (symbolized by "@" in FIGURE 1).

4. The jointly developed solutions are tested in a "protective space" (e.g. in pilot tests). After a successful trial run they are implemented in operational practice (re-concrete).

III. PRACTICAL IMPLEMENTATION AND OUTLOOK

In the digitization project of the energy company, two pedagogically trained learning process consultants supported a group of 20 employees (non-computer scientists) interacting with one business process manager and one IT specialist developing a ticket system which facilitates communication, cooperation and learning of 270 employees in daily business. The evaluation results [3] lead to the conclusion that it is possible to gain insights into how learning process consulting can and should be realized by conducting a participative research approach. Additionally, the project has shown that in a company where such role has not been established, employees and executives need to be supported – at least during the initial stages – by pedagogically trained personnel. It remains to be examined whether and how IT-consultants can be prepared effectively as learning process consultants. Furthermore, it should be investigated to what extent consulting teams need to consist of experts from different disciplines working together with distributed roles and different work focuses (e.g. on didactical support of individual and collective learning processes, on the management of large interdisciplinary process teams, on participative system development). Furthermore, it should be explored which kind of technical aids could support the data-based learning process consulting in other industries, business and IT contexts. Finally, the methodological approach to "analytical-constructive modelling" [3], which was used to design the new consultant role, should be reflected from a Business Informatics perspective. Could the presented educationally accentuated approach help to overcome limitations in "agile" software development-methods (e.g. scrum, kanban) which were recently stated [17], [18]? At least, this requires a broad interdisciplinary discussion as well as cooperations between actors from Wirtschaftspädagogik and Wirtschaftsinformatik. This paper aims at providing an impulse for that.

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