Contextualization of Situated E-learning and Knowledge Transfer in Organizations

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Abstract: Sophisticated knowledge of individuals on the one hand and collective collaboration between various disciplines and teams on the other hand are required for complex products and services. Work-related individual and organizational learning processes in organizations provide the foundations for such individual and organizational knowledge and capabilities. These interconnected learning processes are situated in the organizational environment. This paper proposes a methodology for managing situated individual and organizational learning. The development of a questionnaire and results from two organizations are presented and conclusions drawn from the assessment results on recommended measures for the use of e-learning. The goal of the work presented here is to provide suggestions for an organization to develop a training strategy specifically tailored to its particular needs.

1 Introduction

In many organizations and enterprises, the e-learning opportunities offered and the possibilities for generating and transferring knowledge do not adequately fit actual business needs. In addition, company management is often not fully aware of the type of knowledge and competencies needed to run its business (processes) properly.

With these obstacles in mind, the overall objective of the European research project "Process-oriented Learning and Information Exchange" (PROLIX) is to align learning with business processes, thereby enabling organizations to improve their employees' competencies more quickly and better in line with continuing changes in business requirements. However, to ensure maximum effectiveness, PROLIX also has to look beyond simply developing tools and methods and give appropriate consideration to the specific organizational environment in which such tools and methods are to be implemented and used. Therefore, our work within the PROLIX project which is presented here focuses on the question how an organization's training strategy for individual and organizational learning can be aligned with specific characteristics of an organization.

1.1 Individual and Organizational Learning

Individual and organizational learning in the workplace are interconnected processes [Ki93], [Sc06]). They influence each other substantially and are difficult to differentiate. Since the late 1980s, research not only recognizes the impact of the individual, but also the impact of the organization on individual learning processes and/or training success: Several authors in the Human Resource Development (HRD) field analyze organizational factors affecting work-related learning, e.g. [CT05], [CM05], [Ru02], [Ga99], [CK98], [Ta97].

1.2 Situated Learning

To study the transfer of knowledge and skills in organizations, we must first clarify the *nature of such knowledge and capabilities*. From a mechanistic point of view, knowledge and capabilities can be regarded as easily transferable commodities. However, research findings suggest that the use of data and information in organizations depends on the subjective interpretation of those individuals and groups who transform this input into actions and results. Particular emphasis is given to this aspect in *situated approaches* to knowledge and learning [LW91]. Within the situated approach, it has been proposed that companies must seek to influence and support knowledge management capabilities in several different areas (e.g. leadership and company culture) by deploying and integrating the available methods, instruments and technologies to provide a *beneficial environment* for the use and creation of knowledge and competencies. In doing so, they must also actively encourage and support participation in learning activities [PVV04]. Since individuals can be seen as operating both independently and interdependently, their socially-derived personal histories, values and ways of knowing mediate the way they participate and learn in the workplace. They need to find meaning and value in the learning activities offered. Inconsistencies between *organizational and individual values* may lead to resistance to training. Different ways of motivating are required, for example, to attract the interest of and encourage the participation of reluctant employees. Opportunities to participate in the decision processes and learning activities as well as receive support for learning are essential for rich learning outcomes [Bi01].

Approaches like situated learning emphasize the *social context of learning processes* and regard knowledge as socially constructed [LW91]. Working as such is recognized as a source of learning and informal learning does indeed occur in work processes. Consequently, a shift from training to learning can be observed in the field of HRD [St06].

An organization's potential to provide a supportive learning environment depends very much on the way work is organized in that organization and on the actual work processes involved [As02]. Consequently, the complete working and learning context must be analyzed: "...if we are to further our understanding of the process of workplace learning then we must move beyond a narrow focus on the process of interaction in the immediate workplace that has characterized recent research" [As02].

1.3 Objective

Based on a review of literature on individual and organizational learning [PZR07] the goal of our empirical research is to develop an assessment methodology for the analysis of an organization's learning situation and thereby support individual and organizational learning. The result of this assessment serves as input to provide a decision support for the application of e-learning.

2 Learning Assessment Questionnaire

2.1 Methodology

Based on a literature review, a questionnaire – the Learning Assessment Questionnaire (LAQ) – was developed [PZR07], [PR06]. The LAQ assesses organizational factors relevant for individual and organizational learning. Research findings from the fields of HRD and Organizational Learning/Knowledge Management were used to generate an initial item pool [BKH07], [CM05], [CK98], [JR99], [Ru02]. The design and evaluation of the LAQ in the chosen test environments was spread over two empirical phases. In the first phase, nine face-to-face and written interviews with managers and training designers from three different organizations (telecommunication, health care, and publishing sector) provided information relevant to the implementation of process-oriented learning with a focus on the management perspective. Results from these interviews were used in the second phase to develop an online survey to gather information on workplace learning from the employees' perspective.

A pool of 129 items was developed based on both the literature review and the interviews. A subsequent online survey was conducted in January and February 2008 using these items with a 5-point-scale. Overall, 191 employees from five different organizations (telecommunication, healthcare, transportation, IT, and further education sector) completed the LAQ. 30 of these respondents were subsequently excluded as their responses were incomplete. The actual data obtained was used to analyze the structure of the questionnaire and select appropriate items with good test statistics.

Orthogonal factor analysis with Varimax rotation revealed seven factors (accounting for 57 % of the overall variance). To reduce the complexity of the factor structure, items loading substantially on more than one factor were excluded. Within each factor, a reliability analysis was conducted for the remaining items. Items which correlated with a factor score of less than .30 were successively excluded.

2.2 Questionnaire Development

The final scales exhibited satisfactory reliabilities (Cronbach's Alpha) between .64 and .92. Consequently, the final version of the LAQ contains 57 items relating to 7 factors (see Table 1): organizational learning orientation (OLO, 21 items), e-learning orientation (ELO, 9 items), problems with prior work-based training courses (PPT, 7 items), extrinsic motivation for work-based training courses (EMT, 7 items), workload (WL, 5 items), work-orientation of training courses (WOT, 4 items), and face-to-face learning orientation (FLO, 4 items).

Table 1. LAQ-scales: example items, reliability, and intra-class-correlation (ICC)

Scales	Example items	Reliability	ICC
OLO	Are your work colleagues motivated to participate in work-based training?	.92	.12
ELO	Do you currently prefer learning for the workplace on your own?	.81	.23
PPT	Which of the following did not meet your requirements in prior work-based training? Too demanding.	.83	-.01
EMT	Do you expect a promotion as a result of work-based training courses?	.80	.02
WL	Where have you previously encountered problems when taking part in work-based training courses? Too much work.	.89	.07
WOT	To enable you to better apply the knowledge gained in training courses, do the courses need to be better adapted to the requirements of your job?	.71	.12
FLO	Do you find training with a trainer present and without computer-based learning (e.g., without electronic texts) useful?	.64	.01

To further validate the organizational nature of the dimensions assessed by the LAQ, intraclass correlations (ICC) were computed for each scale on an organizational level (see Table 1). A high intraclass correlation indicates more similar scale values within an organization than between different organizations and, therefore, an organizational characteristic. This analysis confirmed that the LAQ assesses predominantly organizational factors: OLO, ELO, WL, and WOT are highly similar within the organization. EMT is similar within organizations, too, but did not gain significance due to the sample size. Interestingly, PPT and FLO seem to feature more on an individual than on an organizational level.

2.3 Exemplary Results from Two Organizations

To visualize the assessment obtained using the LAQ, data from two organizations, one from the telecommunication sector and one from the healthcare sector, was further analyzed and compared. 20 employees from the telecom company (mean age = 37.42 yrs, mean length of service in company = 5.83 yrs, 11 % management) and 25 employees from the healthcare company (mean age = 43.25 yrs, mean length of service in company = 17.26 yrs, 27 % management) completed the questionnaire. As the descriptive characteristics of both samples show, these companies differ greatly both in employee age and frequency of employee change. Despite these descriptive differences the two companies are fairly similar in many of the LAQ scales (WL, EMT, FLO, PPT, WOT, cp. Fig. 1). However, the comparison also shows substantial differences in three scales. Results for the healthcare organization, for instance, show a higher degree of organizational learning orientation (OLO) and a tendency for higher work-orientation of training (WOT). In contrast, the telecommunication company has a higher e-learning orientation (ELO).

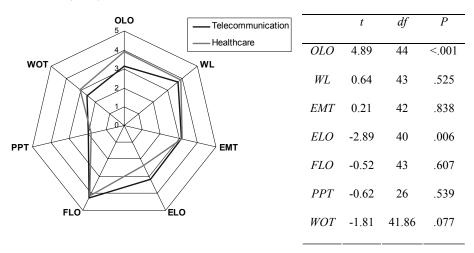|	t	df	P
OLO	4.89	44	<.001
WL	0.64	43	.525
EMT	0.21	42	.838
ELO	-2.89	40	.006
FLO	-0.52	43	.607
PPT	-0.62	26	.539
WOT	-1.81	41.86	.077

Figure 1: Assessment results from two organizations (left) and comparison of means (right)

A comparison of the LAQ values for each of these two companies with other organizations shows that the healthcare company has a significantly lower e-learning orientation, but a higher overall organizational learning orientation and fewer problems with prior training courses. The telecommunication company has a lower extrinsic motivation than other companies.

3 Decision Support for the Application of E-Learning

There is still a lack of research on the correlation of organizational characteristics and suitable didactic measures. However, based on our literature survey and analysis, a number of factors were identified which appear to be linked to this issue. In the following section, we will discuss how each of the seven LAQ factors relates to the introduction of e-learning and which management measures can be employed to improve this organizational characteristic.

3.1 Relevance of LAQ Factors for E-Learning

A minimum prerequisite for the application of e-learning in an organization is a moderate *e-learning orientation (ELO)*. An e-learning orientation as assessed in the LAQ means the availability of the required infrastructure and a sufficient level of IT skills among employees. As IT skills are relevant for e-learning [NHE02], the introduction of e-learning should be delayed if these requirements are not met in an organization. From a management perspective, the potential strategic benefit of e-learning should be analyzed in combination with work-based learning ("blended learning"). Strategic measures can be developed by focusing on the main advantages and challenges of e-learning.

Workload (WL) is also particularly relevant for e-learning. Employees often take part in e-learning courses at their workplace, so learning usually does not take place at a specified time, but when a person has some spare time to do so. People with heavy workloads have little time to participate in e-learning and often no time to transfer the individual knowledge gained to actual work processes for organizational learning purposes [Ru02]. The success of and participation in such training programs could be increased by a temporary reduction in workload. Management must ensure that participation in training activities does not have significant negative consequences for employees, such as substantially increased time pressure.

An *organizational learning orientation (OLO)* is a prerequisite for the success of all forms of work-based training [CM05], [Mo04], [Sa05]. Individual learning will only have an impact at an organizational level if an organization is prepared to encourage its employees to make use of their newly acquired knowledge. In cases where the organization's OLO is low, management could take steps to improve the situation by developing employee competencies and explicitly encouraging employees through their line managers to participate in training activities (e.g. a "dual ladder" [VJ94] or "walk the talk" [Sv07] approach). Another possible option would be to provide an overview of the available internal and external knowledge (e.g. Yellow Pages, Blue Pages) and the knowledge needed in the organization (competence matrix).

If an organization has already introduced different forms of training, the factors *problems with prior work-based training courses* (PPT) and *work-orientation of training courses* (WOT) provide information on the suitability of such training in that particular organization. A high PPT value indicates that training courses did not meet the expectations and requirements of employees and that a change of didactic strategy is recommended. In such cases, a first step would be to evaluate, for example, the qualifications of the trainers, assess the types of courses used and determine whether the prior knowledge of the employees fitted the requirements of the courses. Additionally, a negative attitude towards training by employees due to prior experiences can hinder the success of training courses [ML05]. Therefore, the employee's attitude has to be improved, for example, by incentives. A low WOT value indicates that training courses were not sufficiently work related and that employees did not find the training topics relevant to their particular work requirements. Knowledge is not likely to be transferred if the training available is not work-oriented and employees are thus not intrinsically motivated or encouraged to do so by their line managers [Ve07]. To increase the WOT and the transfer of the material learned, the topics and didactic methods used should be adapted to better suit the working environments and tasks of the employees. If not, management should offer employees support in transferring the knowledge acquired in training courses to their actual work processes.

The factor *face-to-face learning orientation* (FLO) is not relevant for the introduction of e-learning: This factor is rather high in all organizations equally independent from their e-learning orientation. Employees are prepared (or not) for e-learning independent of their preference for face-to-face learning (or not).

Last but not least, the factor *extrinsic motivation for training (EMT)* indicates the extent to which an organization values the training efforts of its employees. Too few incentives may result in only those employees who are highly intrinsically motivated participating in training courses. While few incentives may be needed for voluntary e-learning because a high degree of intrinsic motivation is conducive to investing time and effort in learning on one's own at a computer, extrinsic incentives should nonetheless be provided for compulsory computer-based training courses. Such incentives will motivate employees to invest their time and effort in training and thus encourage individual and organizational learning [TRC05]. However, care should be taken not to offer overly high extrinsic incentives, as these could reduce intrinsic motivation [DKR99].

3.2 Exemplary Decision Support for Two Organizations

By applying this decision support to the two organizations described above, the results of the LAQ indicate that the learning environment at the telecommunication company is suited to e-learning: employees report a high level of ELO, thereby indicating that IT skills and the necessary infrastructure for e-learning are available. To increase employee motivation to participate in training and transfer their acquired knowledge to the workplace, the introduction of training incentives is recommended.

In contrast, the introduction of e-learning at the healthcare company cannot be recommended, due to the low ELO level. If e-learning were to be implemented in the future, the management would have to first improve its technical infrastructure and provide courses to raise the level of IT skills among its employees. However, the company does have a high overall OLO, which is beneficial for individual and organizational learning at the workplace. As only limited PPT were reported for this company, we recommend that it basically maintains its existing didactic strategy. Should the company plan to introduce e-learning, it should first weigh up the benefits against the costs.

4 Conclusions & Future Work

The perception of learning as a situated process has been transferred here to a further objective, namely the strategic management of e-learning. On this basis, the specific organizational context has to be analyzed and taken into account for the introduction of e-learning. Based on literature and interviews with managers an assessment methodology was developed that includes 57 items assigned to 7 factors. We presented the results for two organizations to demonstrate how an organizational learning environment assessment conducted using the LAQ can provide decision support for the introduction of e-learning. By taking the organizations' specific characteristics into account, suggestions for appropriate management measures and didactic support can be provided that enable an organization to define a training strategy specifically tailored to its own particular needs.

Despite the huge data pool that we used for the generation of the LAQ, we are aware that the factors identified in this research are not exhaustive. There are other characteristics of an organization that are of relevance for individual and organizational learning, too; for example, characteristics of the organizational network [CP04]. Therefore, we would like to encourage further research on organizational characteristics that can influence individual and organizational e-learning.

At the moment we successively test and refine the decision support by implementing the LAQ in several organizations and by asking training designers and managers to evaluate the decision support with regard to its usability and practical relevance.

To date, the decision support only provides advice for "high" or "low" values on the LAQ scales. To provide a quantitative threshold for both extremes in the seven factors, we plan to use the LAQ in the test beds and other organizations to generate a large data pool for the LAQ to serve as reference distribution.

A further step in the refinement of the decision support will be to link the LAQ organizational factors to specifically designed training courses and to training success in longitudinal studies. These empirical results will allow to suggest specific didactic forms of e-learning that are tailored to an organizational learning environment.

Acknowledgements

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