

Please quote as: Bitzer, P.; Menschner, P. & Leimeister, J. M. (2013): Success Factors for Technology Mediated Learning Services – First Results of a Delphi Study. In: Die e-Learning Fachtagung Informatik (DeLFI), Braunschweig, Germany.

Success Factors for Technology Mediated Learning Services – First Results of a Delphi Study

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Abstract: This article presents success factors for the delivery of Technology Mediated Learning Services (TMLS) in the field of software training. The latter are a significant component in regards of the introduction of software in companies. However, very little research exists that collects the factors of various dimensions of TMLS factors of influence from a service perspective, and assesses the effective employment, in particular the influence on the learning success. Factors of influence that affect TMLS are evaluated, derived and expanded by means of an expert Delphi study. An overview of the success factors rated most important is presented, taking the dimensions (1) characteristics of the trainer, (2) promotion of the learning process, (3) learning material (offline and online) as well as (4) organizational influences into account. By means of this estimation, recommendations for advanced training services are deduced. Thereby, to the best of our knowledge, for the first time a comprehensive comparison of multi-dimensional measures is conducted.

1 Introduction

The dynamics of the software market and the according, continuous development of IT in companies and organizations lead to a constant demand for advanced training in the field of software products. It is undeniable that training is a critical success factor for the introduction of software. According to the "Foresight 2020" study of the Economist [Ec06], 23% of the interviewed managers regard personnel development and training as areas that will display large potential for the enhancement of productivity in the next 15 years. Furthermore, the authors of the study predicted that the IT expenses spent on the promotion of IT supported learning will strongly increase at the expense of IT infrastructure investments. Arthur et al. identified technology mediated learning services (often referred to as Blended Learning services) as a main trend in employee training.

Technology mediated learning services come in many variations and are often a combination of the following learning methods: web-based or computer-based, asynchronous or synchronous, taught or self-learning, individual or team-based. More

precisely, the aim of technology mediated learning services is to combine synchronous (face-to-face-learning) and asynchronous (online-based) learning activities [GK04]. Nevertheless, besides the results from IS research (e.g.), numerous research results concerning technology mediated learning services exist in many different fields. Psychology (e.g.), Pedagogy (e.g.) and Business Studies (e.g.) have extensively contributed to the topic, either directly or indirectly [GB08]. The large number of possibilities of variation and fields of application lead to unclear results, or results that are difficult to transfer [GB08]. First and foremost, this is due to the fact that in most cases quantitative, empirical aspects are extracted and closely examined, yet not in the context of the whole provision. Therefore, most experimental designs merely focus on the individual factors of influence. This leads them to neglect crucial aspects in the context of the learning methods or the entire learning process [GB09].

Consequently, a comprehensive set of success factors for TMLS can help to acquire further results for an effective provision of IT supported learning services. In order to guarantee this, success factors of differing disciplines must be taken into account and assessed equivalently.

2 Success Factors in Literature

In the run-up of this study, a thorough review of literature was completed. The determined factors were divided into four groups.

The first group deals with the characteristics of the instructor. These characteristics were determined as essential success factors for a successful provision of E-learning services in the examined studies [e.g. VL00; BE01; Se07; OMC09].

The success factors identified in the studies were the following: didactical competencies of an instructor [A112], his teaching style [Se07; OMC09], his confidence [BU12], interactivity [VL00; BU12] technological competence [BE01; Se07; OMC09; HC11; A112; BU12], control of the technology [Se07; BU12], affinity for technology [BE01; A112], the attitude of the instructor towards IT or E-learning [Se07; BU12], the attitude of the instructor towards the students [VL00; BU12] his distributive, procedural and fairness of interaction [BU12], and his ability to motivate students [BE01].

The second group essentially concerns the structuring of the learning and structuring of the process [KMH06; WU08; JC09; OMC09; YKK11; A112; BU12]. The assessments of the studies identified the following success factors: authentic task orientation / establishment [JC09], attitude of fellow students towards technology mediated learning services [A112], quality of the course [A112; BU12], flexibility of the course and program [A112; BU12], support [BE01; Se07; OMC09], design of the course [OMC09; YKK11], the tracking of profiles and performance [YKK11], the level of collaboration [BE01] and interactivity [OMC09].

The third group of success factors that became evident in the context of the studies is that of the learning materials, which substantially influence E-learning services [e.g. WU08; JC09; OMC09; YKK11; AI12; BU12].

The fourth group identified concentrates on the organizational support, which fundamentally contributes to the success of IT supported learning services. In particular, the success factors preparation [OMC11; AI12; BU12] and operational and occupational support [CH12] were listed.

3 Experimental Design

We employed recommendations made by Okoli and Pawlowski [OP04] for the identification by developing an assessment frame for the experts. Several potential candidates were selected from the career network Xing, and were informed via email about the method and intention of the Delphi study. Ultimately, of the 92 who received an email, a random sample of 18 eligible experts was recruited. In the course of the study, three of those chosen withdrew, leaving a remaining 15 on the expert panel. Analogous to Pfeiffer [Pf68], the study was conducted in three steps.

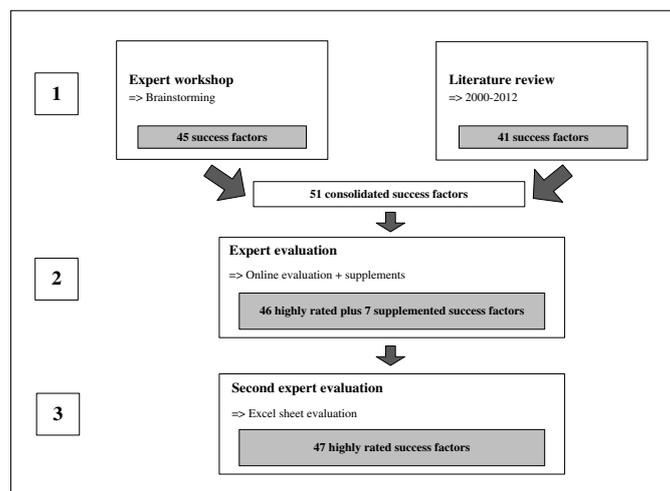


Figure 1. Research Method Employed in the Delphi Study

4 Results

4.1 Characteristics of the instructor

The motivational skills of the trainer were, without restrictions, determined as an essential success factor for the effective provision of an IT supported advanced training.

In addition, the professional expertise, the didactic skills and the social skills were rated important. Merely the motivational skills were regarded as less significant. Experts noted repeatedly that the instructor must be capable of presenting difficult and complex facts in a comprehensible manner. The social skills are another factor that play a role. Here, according to the experts, conflict management and communication skills are also included. One expert stated, "the sympathy one feels towards an instructor has a higher influence on the perceived learning success than the professional expertise".

4.2 The Learning Process

The learning process was divided into a preparation phase, a presence phase and a post-processing phase.

Activities which enhance attention, such as opportunities to practice during training and a regular activation of participants, were rated as especially important. Furthermore, the individual consideration of the needs, demands and previous knowledge of the participants were graded very high. The learning objective oriented control of the group dynamics was estimated as slightly less important (5.5). The active employment of E-learning offers ranked on the border of positive rating (5), as did the possibility to give participants the opportunity to assess their own learning success. Tests (5) and providing participants with enough time to define their transfer goals for themselves (5) were regarded important here.

The activities of the post-processing phase were generally disputed, which is evident in the relatively high interquartile range. The availability of a compact reference volume was rated as the most important criterion in the post-processing phase (7). Furthermore, the exchange with qualified contact persons, instructors (both 6) and other participants after training in a virtual platform (5) as well as the exchange of contact information for the preservation of contact (5) were regarded important. The determination of specific learning activities among the participants was also rated as important (5), yet it fluctuated strongly in the expert assessments (IQR 2.5).

4.3 Learning Materials and IT-tools

To a large extent, a consensus exists among experts regarding the professional and didactical quality of the learning material as a success factor (7). Also, the content and technical compatibility (compatibility) of various IT tools provided by advanced training services, as well as their easy usability (usability), are regarded as important factors for the success of advanced training (7).

The technical robustness of the IT tools provided by the advanced training provider (system stability) as well as the accessibility for all participants are considered significant (6.5).

4.4 Organizational Support

Here, a completion of the training without disruptions is considered to be an especially important success factor (7). Furthermore, a company meeting the costs for advanced training is also critical for success (7). Clear communication on behalf of the ordering organization proved to be significant. Also, it was rated important that companies clearly communicate the importance via the superiors (7) or in general for the company (7). Support from superiors should be guaranteed (6), or a conversation about the goals of participation (6) should be had before training, as well as a conversation after the completion of participation (5.5).

5 Discussion

Some of the results seem to be surprising, especially the study was conducted in the field of software trainings, e.g. the low rating of factors such as playful elements in the learning material or multimedia preparation of the study content. Moreover, it can be noticed that the experts found factors which take place in the actual training were most important and activities conducted before and after the training sessions were rated as less helpful, e.g. employment of tasks before training or activation measures in the virtual learning community outside the presence phase. One can assume, that the blended learning concept with a focus on the presence learning is a promising approach in the field of software training. However, the section post-processing phase of training had a high amount of additional factors added by the experts, showing a need to find more efficient and helpful measures, also from a research perspective, to support training providers.

Moreover, the study showed that the research conducted so far meets a good amount of the estimations the experts made. Especially the category Learning Material provides factors from literature which were rated as highly helpful by the experts. Nevertheless, this could not be found for all the other categories. Here the organisational support measures were especially interesting, since here more factors could be identified than in any other category. One could conclude that this field has not been intensively researched yet and deserves further consideration of the research community. Moreover, it seems likely that these findings can be transferred to other training areas, since most measures seem to be content-independent, e.g. Communicating the importance of the advanced training for the superiors of the participants.

In conclusion, one can sum up that additional success factors could be identified, especially in the fields of organisational support and post-training field.

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