Knowledge Management and e-Learning Integration Model (KMELI)

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Abstract: The article offers a model for knowledge management and e-learning integration (KMELI). The purpose of this model is to support the development of human resources in business environment and use learning as a common field for both these disciplines, with a particular emphasis on the determination of learning needs on the level of the organisation and the employee. The instructional design approach-based methodological framework that describes in detail the activities conducted in each phase is offered for the practical implementation of the model. It is important that, before training development is started, an initial analysis takes place, in order to separate learning needs from those that cannot be met with the help of training.

1 INTRODUCTION

Knowledge management (KM) and e-learning (EL) are developed as recognized, self-contained disciplines for years. By shifting focus on knowledge as the main resource of organization, these disciplines are gaining more and more interest. With further development, synergistic relationships should increase between knowledge management an e-learning (Liebowitz and Frank, 2011). Some of these relationships are quite evident, because both disciplines:

- Deal with knowledge capture, sharing, application and generation;
- Have important technological components to enhance learning;
- Contribute to building a continuous learning culture;
- Can be decomposed into learning objects.

Several conceptual, technological, organizational and content barriers are hindering close integration of knowledge management and e-learning (Brown et al., 1989, Brusilovsky and Vassileva, 2003, Benmahamed et al., 2005, Dunn and Iliff, 2005, Maier and Schmidt, 2007). For example, workplace of a knowledge worker is fragmented: separated work, knowledge and learning space; KM and EL use separate ICT systems and different technologies (Ley et al., 2005); amount of guidance that KM and EL provide for learner is not appropriate; KM and EL have limited and isolated consideration of context (Schmidt, 2005); KM materials are missing interactivity (Yacci, 2005).

By overcoming integration barriers we may expect clear benefits for both disciplines and increased quality, convenience, diversity and effectiveness within an organization (Yordanova, 2007, Sammour and Schreurs, 2008, Islam and Kunifuji, 2011).

There are several theoretical knowledge management an e-learning integration models described in literature (Woelk and Agarwal, 2002, Schmidt, 2005, Sivakumar, 2006, Maier and Schmidt, 2007, Mason, 2008, Islam and Kunifuji, 2011, Ungaretti and Tillberg-Webb, 2011). Analysis of these models shows several integration ways and approaches, however, these models are not implemented in production environment and lack necessary technical specification and application support (Judrups, 2015a). As result of specific organizational goals and needs models employ different adaption and integration approaches (Judrups, 2015b). The more general approach is to base integration on common ground, which was identified as learning.

The goal of the study was to develop a solution that would allow a training centre to be efficient in ensuring the development of employees to accomplish the objectives of the organisation and complete work tasks in business environment.

Unfortunately, none of the models described in

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the literature was of practical use in a situation like this. This is why a new knowledge management and e-learning integration model (KMELI) was created. For the practical implementation of the model, the methodology (implementation framework) based on instructional design approaches was designed. Thus, the goal of this article is to describe the KMELI model developed, as well as its implementation framework.

2 CONTEXT OF THE MODEL

The context of the development of the model was based on a broader study of human resource and business management processes and their interaction, which created a competence-based human resource management framework (Judrups, 2015a). This is why the KMELI model must comply with the following approaches:

- employee development uses a competence-based approach;
- competence assessment uses e-learning-based solutions;
- personalised development plans are composed for employee development;
- development solutions used are described through competences and summarised in a development solution catalogue.

The following requirements were set for the KMELI model:

- meet the learning needs of the organisation;
- meet the formal and informal learning needs of the employees with the use of KM and EL;
- support automated competence assessment;
- support employee competence profile and competence gap use;
- support the use of personalised employee development plans;
- support the use of development solutions described through competences: resource creation, publication, implementation.

It is intended that these requirements and approaches will be elaborated more on further stages of the study; therefore, the KMELI model must be developed as sufficiently conceptual and general.

3 BACKGROUND OF THE MODEL

Training is the basis of both the knowledge management and e-learning, because both these disciplines are crucial components of training processes. The interaction and the specific approaches of KM and EL help achieve the learning goals set by the organisation (Ungaretti and Tillberg-Webb, 2011).

The understanding of KM and EL processes can be considered and compared as value chains of both these disciplines (Wild et al., 2002). The value chains in both the disciplines comprise four sequential processes that can be divided into two stages: (1) identification of needs and goals; (2) design, development, implementation (see Figure 1).

A comparison of the value chains of knowledge management and e-learning shows close relations between these disciplines. The commitment of the organisation towards e-learning is directly related to the first two processes in the knowledge management value chain: that is, the necessity to identify the strategic knowledge needs of the organisation and the lack of required knowledge. The last two processes in the KM value chain (the elimination of knowledge gap, and the distribution and use of the knowledge obtained) coresponds with the last three processes in the EL value chain. Proper development of the content and the learning approach, followed by the implementation of e-learning, allows to eliminate knowledge gap and distribute knowledge in the organisation, boosting its development and improving its competitiveness (Wild et al., 2002).

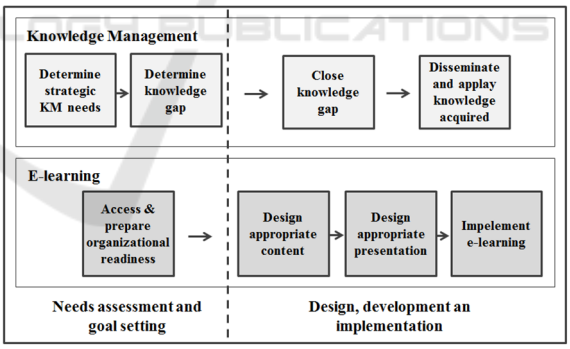

Figure 1: KM and EL value chain comparison.

KM and EL both serve the same purpose: improving learning and competence development in the organisation. However, they use two different perspectives. KM uses the organisation-level perspective, in order to avoid insufficient sharing of information among the employees of the organisation. On the other hand, e-learning emphasises the perspective of the individual, focusing on obtaining individual knowledge (Ras et al., 2005).

Proper selection of metrics and their consistent use allows confirming the accomplishment of the

goals set. The main problem lies not in finding the quality standards itself, but in choosing the most appropriate ones from the broad selection of standards available (Ehlers, 2005).

4 DESCRIPTION OF THE MODEL

The KMELI model demonstrates the integration of knowledge management and e-learning with learning as the common aspect of both these disciplines (see Figure 2).

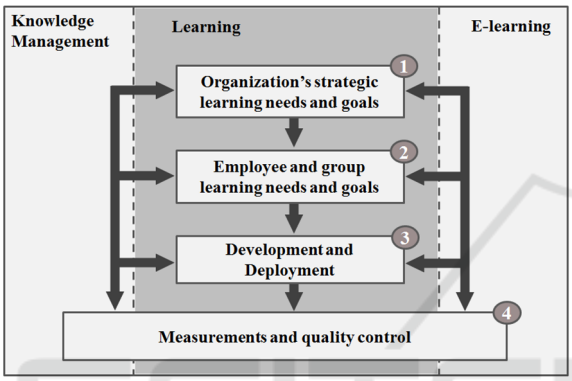

Figure 2: KMELI KM and EL integration model.

The organisation learning cycle begins with the identification of knowledge needs and goals on the strategic level of the organisation (1). This allows to strengthen the traditionally individual aspect of e-learning and to provide a broader learning context by connecting learning results with the strategic goals and objectives of the organisation.

The learning needs and objectives are further specified on the level of individual employees and groups of employees (2). The acknowledgement of the context of the employee (personal learning traits, professional functions, tasks and processes, etc.) allows to personalise the learning solution and to involve the employee better in the learning process, helping the employee be more successful in achieving the results of the learning.

During the development, implementation and execution of the learning (3), the learning is prepared and conducted, ensuring the acquisition, distribution and of the relevant knowledge in the organisation. All the three stages mentioned above are further subjected to quality control with the help of the metrics selected (4). In the model, this process is deliberately shown as a block that comes out of the common part of the integration between KM and EL (learning), because the process of quality control must ensure successful work of all the KM and EL implemented. It is important that the process of quality control allows both ensuring control and introducing correction on all the three levels. This is one of the aspects that will define the quality standards to be used in a practical implementation of the model.

5 ANALYSIS OF THE MODEL

The analysis of the KMELI model confirms that it complies with all the requirements set for its development:

- The learning needs of the organisation are identified on the first step of the model (1) (see Figure 2). The learning and knowledge needs are related to the strategic goals of the organisation, providing them with the context of the organisation and allowing its employees to understand better the goals of learning.
- The formal and informal training of employees is planned for the second step of the model (2). It is coordinated with the strategic goals of the organisation. This step provides for the use of individual development and training plans, particularly for longer-term training and for developing competencies that are more difficult to learn. The acquisition of minor knowledge necessary for daily work may not appear in individual development plans, because it can take place with the help of knowledge management techniques, such as informal training, tips from experienced colleagues, use of an archive for the training completed etc.
- The automated competence assessment can be accomplished with the use of e-learning knowledge assessment tools, which are based on various tests and agent software that monitors the employee during work hours. The results obtained would then be submitted and processed for the employee's competence profile. The evaluation of quality and training results (4) allows confirming the accomplishment of the goals of the training, and the acquisition of the competences planned. This information would then be registered in the competence profile of the user, decreasing the competence gap and updating as needed the further development plan.
- All the knowledge and training objects used in training can be described with the help of

competences as development resources and registered in the development solution catalogue. In order to use these resources successfully, it is necessary to create or repurpose a small, self-contained module in a way that creates a mutual content-based and pedagogic connection among them. Competences are used to describe the training goal of these modules and the prerequisite knowledge for the training (Schmidt, 2005).

It can be observed that, at its core, the KMELI model has an organisation of learning processes with a distinct emphasis on connecting the learning objectives with the general strategic goals of the organisation (1), on taking into account the specific needs and contexts of the employees (2), on quality control applied throughout the process, and on achieving the goals set (see Figure 2).

Although the model is based on the knowledge management and e-learning disciplines, this aspect is not reflected significantly in the organisation of the learning processes. Therefore, the use of the model can be expanded to the entire learning process and applied according to the needs of the organisation.

The learning needs of work groups and employees may not arise directly from the cascading of the strategic goals of the organisation and its needs. These needs can be related to the performance and performance ratings of specific employees. These needs would, in fact, begin being met on Stage 2, while the strategic goals would allow to confirm that the work done is necessary and to provide a broader context for the training.

6 RESULTS AND DISCUSSIONS

Taking into account the analysis and the conclusions, it is possible to determine the main principles of the KMELI model:

- KMELI demonstrates the integration of nowledge management and e-learning with training as the common aspect of both these disciplines;
- The identification of learning needs and goals begins at the level of the organisation;
- The learning needs and goals of the employee at the individual level and the level of work groups are specified and put into the contexts of the employee;
- The development, implementation and execution of training provides the acquisition, distribution and use of knowledge in the company;
- The metrics and quality control on all the three stages ensure the improvement of processes and products, as well as the attainment of results.

Practical implementation of the model developed requires methodology, thus a KMELI implementation framework was developed. It clarifies the activities conducted on each KMELI phase and serves as a detailed example for learning processes at the organisation. The framework helps in the introduction and development of such processes at the organisation. The main target audience of the KMELI framework are organisations that provide their employees, clients and partners with training. The organisations that provide training to external clients may need to modify the training objective identification processes.

A KMELI framework must be able to answer the following questions:

- How are the strategic learning goals and needs of the organisations defined?
- How are the learning goals and needs of employees and their groups defined?
- How is training developed and implemented?
- What are the quality control mechanisms and what metrics are to be used?

The KMELI framework tries to answer the questions that are usually resolved with help of the instructional design. The instructional design is a systematic process that is used to turn teaching and training principles into traininig materials and activities (Smith and Ragan, 1993). The development of training is based on five stages: analysis, design, development, implementation, evaluation. This general approach is called the ADDIE model (see Figure 3), customised variants of which are usually created for practical use in organisations (Molenda, 2003).

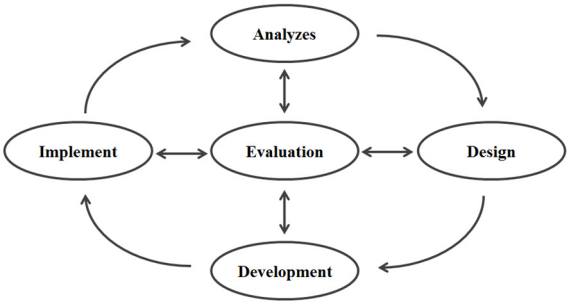

Figure 3: ADDIE dynamic model (adopted from (Schufletowski, 2002)).

During the first stage of the KMELI model, the learning needs of the organisation are determined. This is similar to the ADDIE model, in which the analysis stage is used to study the needs and the environment. Such analysis often employs need evaluation or performance evaluation techniques. In both cases, a list of the needs of the organisation can be obtained, although only a part of these needs would be directly related to the needs of learning (Molenda and Russell, 2006).

A part of the solutions to performance problems would not be related to the use of training at all, and in most cases training will only be a part of a bigger solution. During the initial analysis, the learning needs are separated from other performance problems. The development of training is conducted to satisfy only the learning needs. Therefore, it is practical to introduce the initial analysis stage of the KMELI implementation framework, which will determine the learning needs of the organisation and then transfer it further for the instructional design process (see Figure 4).

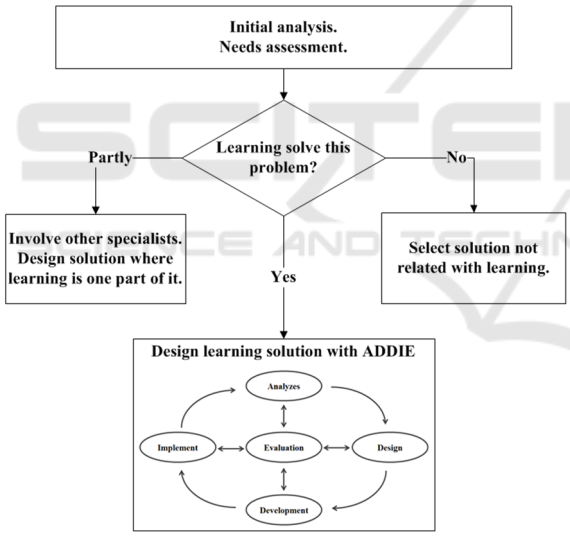

Figure 4: Initial analysis and learning needs assessment.

As a result, the KMELI implementation framework can be divided into six stages: the initial analysis and the five stages of the ADDIE model (analysis, design, development, implementation, evaluation). It is clear that, in practice, the initial analysis will be closely related to the following analysis stage, although the decision on the necessity and justifiability of training will be a crucial milestone.

7 CONCLUSIONS

The KMELI model provides a theoretical foundation for creating a practically usable knowledge management and e-learning integration solution. For the practical use of the model, the methodology – implementation framework based on instructional design approaches was designed. It provides a detailed description of the activities conducted on each of the stages of the model. It is important that, before training development is started, an initial analysis take place, in order to separate learning needs from those that cannot be met with the help of training.

Further study requires that the model and its framework are verified in practice. Successful verification results will allow their further use in the development of a functioning knowledge management and e-learning integration solution.

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REFERENCES

Benmahamed, D., Ermine, J.-L., Tchounikine, P., 2005. From MASK Knowledge Management Methodology to Learning Activities Described with IMS – LD. In K.-D. Althoff, A. Dengel, R. Bergmann, M. Nick, and T. Roth-Berghofer, eds. *Third Biennial Conference, WM 2005, Kaiserslautern, Germany, April 10-13, 2005, Revised Selected Papers*. Springer Berlin Heidelberg, 165–175.

Brown, J. S., Collins, A., Duguid, P., 1989. Situated Cognition and the Culture of Learning. *Educational Researcher*, 18 (1), 32–42.

Brusilovsky, P., Vassileva, J., 2003. Course sequencing techniques for large-scale web-based education. *International Journal of Continuing Engineering Education and Lifelong Learning*, 13 (1-2), 75–94.

Dunn, P., Iliff, M., 2005. Learning Light At Cross Purposes Why e-learning and knowledge management don't get along.

Ehlers, U. D., 2005. *Quality in e-learning: use and dissemination of quality approaches in European e-learning: a study by the European Quality Observatory*. Luxembourg: Office for Official Publications of the European Communities.

Islam, M., Kunifuji, S., 2011. Adopting Knowledge Management in an E-Learning System: Insights and Views of KM and EL Research Scholars. *Knowledge Management & E-Learning*, 3 (3), 375–398.

Judrups, J., 2015a. Analysis of Knowledge Management and E-Learning Integration Models. *Procedia Computer Science*, 43, 154–162.

Judrups, J., 2015b. Analysis of Knowledge Management and E-Learning Integration Approaches. In S. Hammoudi, L. A. Maciaszek, and E. Teniente, eds. *{ICEIS} 2015 - Proceedings of the 17th International Conference on Enterprise Information Systems, Volume 2, Barcelona, Spain, 27-30 April, 2015*. SciTePress, 451–456.

Ley, T., Lindstaedt, S., Albert, D., 2005. Supporting competency development in informal workplace learning. In *Lecture Notes in Artificial Intelligence - Professional Knowledge Management: Third Biennial Conference, WM 2005, Revised Selected Papers*. Kaiserslautern, Germany: Springer Berlin Heidelberg, 189–202.

Liebowitz, J., Frank, M. S., 2011. The Synergy between Knowledge Management and E-Learning. In J. Liebowitz and M. S. Frank, eds. *Knowledge management and E-learning. Innovations in education and teaching international*. CRC Press, 3–10.

Maier, R., Schmidt, A., 2007. Characterizing knowledge maturing: A conceptual process model for integrating e-learning and knowledge management. In *4th Conference on Professional Knowledge Management. Experiences and Visions.* Berlin: GITO-Verlag, 325 – 333.

Mason, J., 2008. A Model for Exploring a Broad Ecology of Learning and Knowing. In *Supplementary Proceedings of the 16th International Conference on Computers in Education, Asia-Pacific Society for Computers in Education (APSCE)*. Taipei, 194–203.

Molenda, M., 2003. In search of the elusive ADDIE model. *Performance Improvement*, 42 (5), 34–36.

Molenda, M., Russell, J. D., 2006. Instruction as an Intervention. In J. A. Pershing, ed. *Handbook of Human Performance Technology Improvement*. Pfeiffer, 335 – 369.

Ras, E., Memmel, M., Weibelzahl, S., 2005. Integration of e-learning and knowledge management – barriers, solutions and future issues. In *Professional Knowledge Management. Third Biennial Conference, WM 2005, Kaiserslautern, Germany, April 10-13, 2005, Revised Selected Papers*. Berlin: Springer Berlin Heidelberg.

Sammour, G., Schreurs, J., 2008. The role of knowledge management and e-learning in professional development. *Knowledge and Learning*, 4 (5), 465–477.

Schmidt, A., 2005. Bridging the gap between knowledge management and e-learning with context-aware corporate learning. In *Professional knowledge management. Third Biennial Conference, WM 2005, Kaiserslautern, Germany, April 10-13, 2005, Revised Selected Papers*. Springer Berlin Heidelberg, 203–213.

Schufletowski, F. W., 2002. *AIR Force Handbook 36-2235 Volume 1*.

Sivakumar, S. C., 2006. E-Learning for Knowledge Dissemination. In D. Schwartz, ed. *Encyclopedia of knowledge management*. Idea Group, 152–160.

Smith, P. L., Ragan, T. J., 1993. *Instructional Design*. New Yourk: Merrill.

Ungaretti, A. S., Tillberg-Webb, H. K., 2011. Assurance of Learning: Demonstrating the Organizational Impact of Knowledge Management and E-Learning. In J. Liebowitz and M. S. Frank, eds. *Knowledge management and E-learning. Innovations in education and teaching international*. CRC Press, 41–60.

Wild, R. H., Griggs, K. A., Downing, T., 2002. A framework for e-learning as a tool for knowledge management. *Industrial Management & Data Systems*, 102 (7), 371–380.

Woelk, D., Agarwal, S., 2002. Integration of e-Learning and Knowledge Management. In *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. 1035–1042.

Yacci, M., 2005. The Promise of Automated Interactivity. In K.-D. Althoff, A. Dengel, R. Bergmann, M. Nick, and T. Roth-Berghofer, eds. *Professional Knowledge Management SE - 24*. Springer Berlin Heidelberg, 214–221.

Yordanova, K., 2007. Integration of Knowledge management and E-learning – common features. *CompSysTech 07 Proceedings of the 2007 international conference on Computer systems and technologies*.