E-Learning in Practice – An Empirical Study of the Impact of Web 2.0 Technologies and E-Learning on Companies' Business Performance

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Abstract—This paper aims at presenting the conceptualization of a structural model that was developed to examine the impact of e-learning, Web 2.0 technologies and organizational learning on the business performance of some Slovenian companies with more than 50 employees. In accordance with the stakeholder theory and balanced scorecard (BSC), both the financial and non-financial aspects of the performance are considered. Special attention is given to the findings related to the observed correlations between the aforementioned constructs. The results of the study indicate the strong impact of e-learning on organizational learning and non-financial business performance.

Index Terms— Web 2.0 technologies, e-learning, organizational learning, business performance.

I. INTRODUCTION

Information-communication technologies (ICT) enable us to access a wide range of different sources of knowledge. Mastering this knowledge is becoming crucial for successful operations, and represents an important source of a company's competitive advantage. When companies intend to acquire knowledge by educating their employees, suitable methods can be based on ICT, Web 2.0 technologies and e-learning.

Web 2.0 technologies, social media and user co-creation are just some of the terms that describe changes in the role of ICT in education and business. The collaboration tools like wikis, blogs, micro blogs and other so called social media tools have influenced the society as a whole and have changed the way we do things. Collaboration is considered as any process of working with others with common objective. Implementing Web 2.0 technologies and services guarantee a more interactive e-learning experience. It leverages collaboration among employees and enhances accessibility to various learning resources [1].

Organizational learning has emerged as a key factor for success within the process of replacing the physical capital with human resources. The study of organizational learning is relevant as it seeks to respond to the challenges that arise in a constantly changing business environment and can help companies confront their long-term survival difficulties. Organizational learning thus represents a source of heterogeneity and a potential source of sustainable competitive advantages [2].

The analysis of organizational learning has become an increasingly important study area over the recent years. Various works have dealt with the analysis of this construct from differing viewpoints. There are studies that focus on this construct using a psychological approach [3, 4], a sociological approach [5, 6], or from the point of view of organizational theory [7, 8, 9]. More recently, learning has been considered, from a strategic perspective, as a source of heterogeneity among organizations, as well as a basis for a possible competitive advantage [10, 11, 12]. Recently it is coupled with the question of organizational business performance [13, 14, 15]. Stakeholder theory addresses organizational performance evaluation from multiple perspectives - shareholders, employees, customers and suppliers of a certain company.

This paper presents the results of a study (involving 356 Slovenian companies with more than 50 employees) which aimed to examine the impact of technology enhanced learning and organizational learning on both financial and non-financial performance.

II. CONCEPTUALISATION OF STRUCTURAL SUB-MODEL

A complete research model normally consists of two sub-models: measurement and structural. The measurement sub-model shows how each latent variable is operationalized through observations of corresponding indicators, and also provides data on validity and reliability of the variables observed. The structural sub-model describes relationships between the latent variables, and indicates the amount of unexplained variance.

Development of a quality model requires first to establish a structural framework, which is usually implemented in two steps: presentation of fundamental constructs and review of potential correlations between them. Results of the final analysis greatly depend on good conceptualization of a research model [16]. The next sub-chapter presents the theoretical foundations of the observed constructs.

A. E-learning and Web 2.0 technologies & services

E-learning is a term, introduced along with the introduction of ICT for educational purposes. Up to date the term has been widely used as a synonym for technology-enhanced learning within companies. Definitions of e-learning are various, diverse and lack unity, consequently it is of outmost importance to provide precise definitions of e-learning and related notions. We refer to the process of studying and teaching as e-learning when it includes ICT, regardless of the mode or the scope of its use [17, 18].

With the recent development of Web 2.0 and social software, e-learning is moving beyond utilisation of the

internet for knowledge management, as a store of information, or for course management. Instead, the internet may be used for participation, communication, sharing and collaboration. The term Web 2.0 was coined by O'Reilly [19] as a common denominator for recent trends heading towards the 'Read-Write Web', allowing everyone to publish resources on the web using simple and open, personal and collaborative publishing tools known as social software: blogs, wikis, social bookmarking systems, podcasts etc. The main features of these tools are their dynamism, openness and free availability. According to Mac-Manus and Porter [20], the power of social software lies in content personalisation and remixing with other data to create much more useful information and knowledge [21].

Web 2.0 technologies are changing the way messages spread across the Web. A number of online tools and platforms are now defining how people share their perspectives, opinions, thoughts and experiences. Web 2.0 tools such as instant messaging systems, blogs, RSS, video casting, social bookmarking, social networking, podcasts and picture sharing sites are becoming more and more popular. One major advantage of Web 2.0 tools is that the majority of them are free. There is a large number of Web 2.0 tools, some of the more popular ones are: instant messaging systems, blogs, Video-Wiki and Xo-Wiki, Doodle, podcasting, RSS, etc.

Instant Messaging Systems (IMS)

The need for communication tools in the learning process is often underestimated by educators, especially those who feel comfortable with the traditional, instructive way of teaching. However, even with their 'traditional' approach learners need to communicate with each other. At the beginning of the 90s, digital communication tools were rather limited: apart from direct face-to-face meetings, the main way to communicate was using the plain old telephone. Sharing course materials was possible only by using a copier or a fax machine. However, these devices were quite rare in ordinary households [22]. The only barriers to communication that exist today are the lack of skills needed to operate new technologies. This barrier is not even noticed by most younger people, who have grown up as digital 'natives', rarely pulling themselves away from their computers (even in the street they have mobile phones in their pockets), but it definitely still is a serious obstacle for many educators. However, the new technologies are inevitably filtering down into the daily practice and in 2012, it is probably not necessary to explain what the purpose of instant messaging is. The top 10 instant messaging systems number of users in the world according to statistics from Wikipedia (2012) is counted in hundreds of millions of users e.g. QQ 990 million total, 440 million active 100 million peak online (mostly in China), MSN 330 million active, Yahoo 248 million active, Skype 882 million total, 30 million speak online etc.

Wikis

A wiki is a collection of pages that allows multiple users to collaborate on information together. The innovative element of wikis is simplicity; anyone can edit pages and immediately see the changes made by other users. These edits can be viewed by other users and re-edited again with the simple click of a button. A piece of information posted on a wiki can expand become a huge, collaborative work.

Wikis support collaboration, critical thinking and writing. They help to create learning communities and allow employees to exchange ideas to broaden and deepen understanding, make decisions and solve problems. Teamwork becomes essential: sharing and feedback can be provided from peers, teachers, and others promoting respect for others' viewpoints and experiences.

Blogs

A blog is a type of web site in which entries are made as in a journal or diary and are displayed in reverse chronological order [23]. Regular entries such as comments, descriptions of events, or other types of materials combined with text, images, and links to other weblogs and web sites are the typical ingredients of weblogs. Blogs have gained a lot of attention in educational circles, where they are experienced as tools that support several pedagogical aims and scenarios, ranging from individual knowledge management and competence development to group-based learning activities. Therefore, blogs have become an important educational tool in recent years, providing an opportunity for both facilitators and employees to publish their ideas, essays or simply as a space to reflect upon their particular learning process and reading material. Blogs can be an interesting collaboration tool for users who can join relevant community and find people to collaborate with, and give feedback to the others. The most frequent use of blogs in a learning environment is the publishing and sharing content with others.

Podcasting

Podcasting has become a popular technology in education, in part because it provides a way of pushing educational content to employees. Podcasting is the ability to create or listen to audio or video content either live or downloaded for later use. A podcast is similar to a radio show in that each show consists of a series of individual episodes you can listen to on your computer or on a digital audio player like an iPod. What distinguishes a podcast from a traditional radio show is that you can listen to a podcast whenever and wherever you want to, and you can subscribe to a podcast series so when a new episode is available, it automatically downloads to your computer. Apple, with its strong presence in the education market, has been quick to recognize the learning potential of student podcasting. Apple is heavily marketing its iPod and associated content creation tools (iMovie, GarageBand, and iTunes) to the education sector. The podcasting section of iTunes even has a category dedicated to education. As with blogging, podcasting provides users with a sense of audience - and they are highly motivated to podcast because the skills required seem relevant to today's world.

Media sharing

The photo-sharing site Flickr (www.flickr.com) is also finding use within education - as it provides a valuable resource for employees and other educators looking for images for use in presentations or learning materials. Many of the images uploaded to Flickr carry a Creative Commons Licence (www.creativecommons.org), making them particular suitable for educational use - and the

tagging of images makes it much easier to find relevant content. And like blogging, the commenting function on Flickr allows for critical feedback. A lesser-known feature of Flickr - the ability to add hot-spot annotations to an image - also has much potential as a learning tool.

Scheduling meetings – Doodle

When employees are working on a project together they need to divide tasks among the members of a group and monitor the progress of the project. This requires employees to engage in collaboration, discussion and decision making processes. In the context of bringing different cultures, educational systems, levels of teaching, languages and technology skills into a common virtual learning space, planning a series of meetings several weeks in advanced may very simply not work. Taking this into account, employees must adopt a simple solution to meet their needs. There are plenty of solutions which can help to make project to run smoothly. One of them is Doodle. Doodle can be described simply as a web-based tool for finding suitable dates for appointments with other people. Doodle allows employees to plan their meetings with other employees and colleagues. In addition to time management, it can be used to vote for any other issue that arises as part of the distance learning process: for example, the literature that needs to be selected and analyzed in order to complete a particular task [21].

B. Organizational Learning

Organizational learning is defined in numerous ways and approached from different perspectives. The pioneers [24, 25] defined organizational learning as an individual's acquisition of information and knowledge, and development of analytical and communicational skills. Understanding organizational learning as a process, which can take up different levels of development, makes the learning organizational structure an ideal form of organization, which can only be achieved once the process of organizational learning is fully optimized and the organization is viewed as a system [25]. Jones [26] emphasizes the importance of organizational learning for the organizational performance, defining it as "a process through which managers try to increase organizational members' capabilities in order to better understand and manage the organization and its environment and accept the decisions that would increase organizational performance on a continuous basis."

Dimovski [14] and Dimovski & Škerlavaj [15] provided an overview of previous research and identified four varying perspectives on organizational learning. Dimovski's model managed to merge informational, interpretational, strategic and behavioral approaches to organizational learning, and defined it as a process of information acquisition, information interpretation and the resulting behavioral and cognitive changes which should, in turn, have an impact on the company performance.

The development of our research model is based on DiBelle and Nevis' model [27] of an integrated approach and on the Dimovski approach [15], and as a result combines three aspects of organizational learning: knowledge acquisition (observation of the environment inside and outside the company), the transfer of knowledge (dissemination of good practices among the company staff) and the use of knowledge (concrete data collection, research and findings have been directly used in a concrete environment – at a work place or within the work-process improvement procedures).

C. Business Performance

Business performance assessments have advanced over the past years, and developed from traditional, exclusively financial criteria, to modern criteria, which include also the non-financial indicators. Due to numerous disadvantages of the classical accounts and the growing need for quality information on company performance, the theory of economics started developing improved models for performance assessment, taking into account all shareholders: employees, customers, supplier employees and the wider community, also advocated by the Freeman's shareholders theory [28]. There are several approaches to the non-financial indicator selection, the most established of which is the Balanced Scorecard – BSC [29]. The existing models, based on the accounting categories, combine with the non-financial data and the assessment of the so called 'soft' business areas, which mostly improve the assessment of companies' perspective possibilities.

III. CONCEPTUALISATION OF MEASUREMENT SUB-MODEL

Having understood the hypothesized correlations between the latent variables, the following question is logically raised: '*How should these four constructs be operationalized and measured?*' There are certainly various approaches available, since the number and the type of indicators to be used for the assessment of a certain construct, the number and the type of items to be included under an indicator and the methods for their integration are decided on the basis of validity and variability of specific measuring instruments. Table 1 presents constructs, indicators used for construct assessment and number of items summed up to give the value of an indicator.

In short, the hypothesized model shall be composed of four constructs and 13 indicators, and will be of recursive nature, meaning that there shall be no cases of two variables appearing simultaneously, i.e. as a cause and a consequence to one another.

TABLE I.
SPECIFICATION OF CONSTRUCTS

Latent Variables (constructs)	Indicators and Number of Items from Questionnaire
E-learning (El)	▪ Information and communication infrastructure (ICI) ▪ Education technology (ET) ▪ Learning contents (LC)
Organisational Learning (Ol)	▪ Knowledge acquisition (KaC) ▪ Knowledge transmission (KTr) ▪ Use of knowledge (UoK)
Financial Performance (Fp)	▪ Return on assets (FP1) ▪ Return on capital (FP2) ▪ Value added per employee (FP3)
Non-Financial Performance (Nfp)	▪ Employee fluctuation (NFP1) ▪ Share of loyal customers (NFP2) ▪ Number of customer complaints (NFP3) ▪ Supplier relations (NFP4)

IV. DEVELOPMENT OF RESEARCH INSTRUMENT

The questionnaire used has been under constant development and validation for more than 10 years. Dimovski [14] used it on a sample of Ohio credit unions in order to measure the organizational learning process as a source of competitive advantage. Dimovski and Škerlavaj [15] upgraded it to include the measures of non-financial performance, while he replaced the industry-specific measures of financial performance with two measures valid for all companies. For this study the operationalization of all four constructs involved was improved and applied on a sample of Slovenian companies with more than 50 employees in 2007. The measurement instrument used in this study has 22 items for the e-learning construct, 29 items for the organizational learning construct, 3 items for the financial and 4 items for the non-financial performance. The pre-testing procedures were conducted in the form of interviews and studies with managers and focus groups of research and academic colleagues.

V. RESEARCH HYPOTHESES AND MODEL

A flow chart offers the best possibility of a graphical representation of the interrelations between various elements of a model. In Fig. 1 the measurement variables belonging to exogenous latent variables are marked with an x, while their measurement deviations are marked with an δ. The endogenous latent variable indicators are marked with a y, and the measurement deviations with an ε. The structural equation deviations are ζ, the exogenous latent variables are ξ, the endogenous constructs are η, and the one-way influences of the exogenous latent variables on the exogenous are γ. To describe the relations between the latent variables and their measurement variables we use λ.

Fig. 1 shows a conceptualized research model that presents all the basic constructs and the hypothesized correlations between them. We aim to prove the following: (H1) that the latent variable of e-learning (El) has a positive impact on organizational learning (Ol), (H2) financial (Fp) and (H3) non-financial performance (Nfp); and (H4) that organizational learning (Ol) leads to improved financial results (Fp) as well as to (H5) improved non-financial results (Nfp).
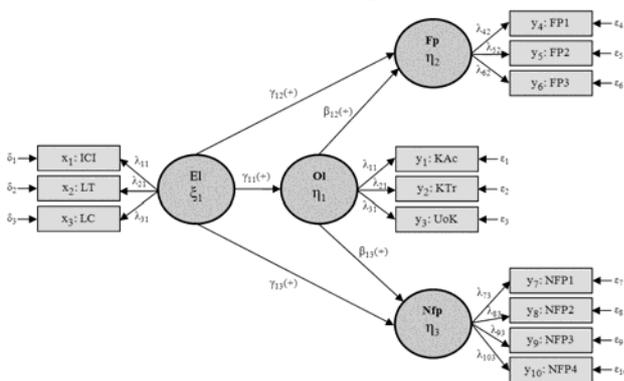

Figure 1.   Conceptualized research model

VI. RESEARCH PROCEDURE

The methodology applied to test our research model was structural equation modeling (SEM). This involves a combination of confirmatory factor analysis (CFA) and econometric modeling, which aims to analyzed hypothesized relationships among the latent constructs, measured with observed indicators (measurement variables). First, the item analysis was performed to describe the sample characteristics, to investigate the item means, and to assess item-to-total correlations. Second, exploratory factor analysis was performed to explore whether the items load highly on their intended latent construct, and have low cross-loadings. After the exploratory factor analysis, reliability of the underlying factors was discussed in terms of Cronbach's alphas. Third, confirmatory analysis (CFA) was performed to ensure that the constructs are valid and reliable; this refers to the measurement part of the model. Consequently, CFAs (without any structural relationships) were performed with LISREL 8.80 to check whether the items meet the criteria for convergent and discriminant validity, as well as construct reliability. Properties of the four research constructs in the proposed model (Figure 1) and the five hypotheses were tested using LISREL 8.80 and PRELIS 2.30 packages for structural equation analysis and procedures. As estimation method for model evaluation and procedures, the maximum likelihood (ML) method was utilized. Structural equation modeling (SEM) is designed to evaluate how well a proposed conceptual model that contains observed indicators and hypothetical constructs explains or fits the collected data. It also provides the ability to measure or specify the structural relationships among the sets of unobserved (latent) variables, while describing the amount of unexplained variance. Clearly, the hypothetical model in this study was designed to measure structural relationships among the unobserved constructs that are set up on the basis of relevant theories, and prior empirical research and results. Therefore, the SEM procedure is an appropriate solution for testing the proposed structural model and hypotheses for this study.

VII. PARAMETER VALUE ESTIMATES

The results of structural equation analysis by LISREL were utilized to test the hypotheses proposed in this study. As discussed in the previous section, the relationships between the constructs were examined based on t-values associated with path coefficients between the constructs. If an estimated t-value was greater than a certain critical value ($p < .05$, t-value = 1.96) [30], the null hypothesis that the associated estimated parameter is equal to 0 was rejected. Subsequently, the hypothesized relationship was supported. The maximum likelihood (ML) method was used to estimate the parameter values. In this phase, the hypotheses posed in the conceptualisation phase are tested. Even though several methods can be used for this purpose, ML is the one most often used and has the advantage of being statistically efficient and at the same time specification-error sensitive because it demands only complete data and does not allow for missing values. All methods will, however, lead to similar parameter estimates on the condition that the sample is large enough and that the model is correct [16]. Fig. 2 shows a path diagram of our model (with completely standardised parameter estimates).
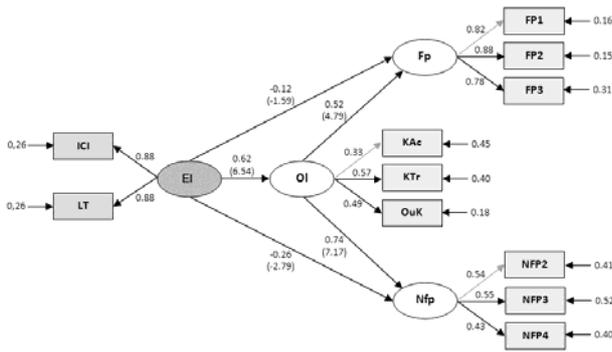
Figure 2.   Research Model (completely standardized parameter values,
*significant at p > 0.05)

The e-learning (El) demonstrated a statistically significant, positive and strong impact on organization learning (Ol). Namely, the value of the completely standardised parameter almost equals the margin of 0.70. E-learning did not exhibit any statistically significant impact on the financial performance (Fp), meaning that hypothesis 2 must be rejected. The organization learning construct demonstrated a statistically significant positive and strong impact on Fp and an even stronger one on the non-financial performance (Nfp). This means that hypotheses 4 and 5 can be considered to have empirical support from the data at hand.

VIII.   CONCLUSION

Regarding to the recent researches and studies about technology-enhanced learning in Slovenia, we can summarize that the concrete activities on the implementation level started recently. Companies are starting to consider more serious and comprehensive introduction of technology-enhanced learning in their environment.

However, it was noticed that in spite of all the advantages of the technology-enhanced learning companies still consider this type of education and training of their staff as the expense and not the investment for the future. On the basis of the results obtained from the data gathered by the research Top 10 – Educational Management and Analysis, carried out by the independent institute SOFOS, educational habits and investments in staff development and human resources in Slovene companies (e-learning and other types of learning) can be systematically followed and interpreted. The share of incomes, earmark for staff education and training has been considerably lagging behind in comparison with the European Union. The results of the research could be summarized in a couple of items:

- Slovene companies earmark in average 0,97 % of their income to education and training activities of the staff; the average of the European Union is around 5 % (for example German companies spend around 18 billion €/per year for corporate training);

- on an average each worker in Slovenia receives 44,1 training hours a year;

- the average percentage of staff, including into company's training activities is 93,27 %;

- the majority of stakeholders of training activities are coming from middle (56 %) and top management (17 %);

- the most usual themes dealt with education and training activities are management, foreign languages and ICT;

If we want Slovenia to follow the above mentioned European trends, first of all, the strategic importance of e-learning as a key-factor for the development of should be recognized and accepted by top management of companies.

The aim of this paper was to present one of the possible models for assessing the impact of e-learning on the organizational learning and business performance of Slovenian companies with more than 50 employees. With this in mind, five hypotheses were tested. A sample of previously collected data was used throughout the survey questionnaire, circulated to the CEOs and presidents of the management boards. The empirical part of the study was analyzed by the means of the structural equation modeling (SEM) methodology.

The results of the survey prove a statistically significant, strong and positive impact of e-learning and Web 2.0 technologies on organizational learning, and a decisive influence of organizational learning on the financial and non-financial business results. The companies which systematically incorporated various advanced educational tools and systems into their daily work, and ensured high quality information and communication technology equipment recognized the importance of organizational learning as the most effective process for the production, dissemination and application of knowledge. Furthermore, the positive effects of organizational learning on the financial and non-financial business results confirm that this concept really guarantees the achievement of higher performance both in financial and non-financial terms. Knowledge is definitely one of the most important criteria of the competitive advantage, which is confirmed by the results of the study.

The study contributes to the e-learning and organizational learning base of knowledge in the following three dimensions: (1) theoretical, (2) methodological, and (3) practical. E-learning contributes to sustainable competitive advantage through its interaction with other resources. Recent literature suggests that organizational learning is a process that plays an important role in enhancing company's competitive advantage, which may benefit from the judicious application of e-learning. It has also been argued that a prerequisite for the firms to be successful is the completion of e-learning with organizational learning. Within the broader conceptual framework, this study focuses on the relationship between e-learning, organizational learning and business performance. As such, the conceptual model offers several research opportunities and provides a solid base for further empirical testing of hypotheses related to e-learning and organizational learning.

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