Analysis of Teachers' Use of Web Technologies: Focus on Teachers' Enterprise 3.0 Application

Andreas Ahrens[*1], Jeļena Zaščerinska[2]

Department of Electrical Engineering and Computer Science, Hochschule Wismar, University of Applied Sciences, Technology, Business and Design[1], Centre for Education and Innovation Research[2]
Philipp-Müller-Straße, PO box 1210, 23952 Wismar, Germany Country[1], Kurzemes prospekts 114-102, Riga LV-1069, Latvia[2]

[*1]andreas. ahrens@hs-wismar.de; [2]knezna@inbox.lv

Abstract

In the last years which are characterized by the global economic crisis, businesses are making more efforts to reach efficiency of use of Web technologies in business performance. To facilitate business effectiveness and competitiveness, Enterprise 3.0 has recently emerged. Education and training are the key factors for maintaining and improving the efficiency of Enterprise 3.0 application. In education and training, teachers are the key actors for the enrichment of learners' use of Enterprise 3.0. To support learners' Enterprise 3.0 application, teachers themselves have to be able to use Enterprise 3.0. The aim of the research is to analyze teachers' use of Web technologies including Enterprise 3.0 application underpinning elaboration of a hypothesis on teachers' use of Enterprise 3.0. The meaning of the key concepts of enterprise, Web technologies and Enterprise 3.0 is studied. Explorative research has been used. The empirical study was conducted at the Leonardo and Grundtvig Partnerships UK Contact Seminar "Back to Learning: Back to Work" at the University of Birmingham, Birmingham, the United Kingdom, 4-7 July 2012. Descriptive statistics was implemented for primary data analysis. The findings allow drawing the conclusions on the teachers' Enterprise 3.0 application. A hypothesis on teachers' Enterprise 3.0 application has been formulated.

Keywords

Web Technologies; Enterprise; Enterprise 3.0; Teachers' Enterprise 3.0 Application

Introduction

Europe is facing enormous socio-economic and unprecedented demographic challenges, including regional disparities, aging populations, high rates of low-skilled adults and of youth unemployment, low birth rates, changing family structures and migration (Lifelong Learning for Creativity and Innovation, 2008) in the context of volatility, uncertainty, complexity and ambiguity. In the light of these challenges, businesses are struggling to adopt the best approach, pursuing efficiency in the alignment between Information Technology and enterprise's concepts and dimensions (Gama, Ostrowski, Da Silva, 2012). To support business effectiveness and competitiveness, Enterprise 3.0 has recently emerged. Therein, Enterprise 3.0 is an Information and Communication Technology's architecture used in the business processes.

Education and training are determined as the key factors for maintaining and improving the efficiency of Enterprise 3.0 application. Some research efforts were made to investigate teachers' use of Web technologies and students' Enterprise 2.0 application (Ahrens, Bassus, Zaščerinska, 2010; Ahrens, Zaščerinska, 2011). However, teachers' use of Enterprise 3.0 has not been analysed. Such an empirical lacuna regarding teachers' Enterprise 3.0 application has to be filled in as teachers have a two-fold role:

- In society, teachers are the agents of change and,

- In education and training, teachers are the key actors for the enrichment of learners' use of Enterprise 3.0.

The aim of the research is to analyse teachers' Enterprise 3.0 application underpinning elaboration of a hypothesis on teachers' Enterprise 3.0 application.

The methodological background of the present research is based on the System-Constructivist theory introduced as New or Social Constructivism Pedagogical Theory. The System-Constructivist theory and, consequently, System-Constructivist approach to learning introduced by Reich (Reich, 2005) emphasizes that human being's point of view depends on the

subjective aspect (Maslo, 2007):

- Everyone has his/her own system of external and internal perspectives (Ahrens, Zaščerinska, 2010), that is a complex open system (Rudzinska, 2008), and

- Experience plays the central role in the knowledge construction process (Maslo, 2007).

The meaning of the key concepts of enterprise, Web technologies and Enterprise 3.0 is studied. Moreover, the analysis demonstrates how the key concepts are related to the idea of teachers' use of Web technologies and shows a potential model for development, indicating how the steps of the process are related following a logical chain: Web technologies → Enterprise 3.0 and its elements aligned with the specifics of teachers' profession → empirical study within a multicultural environment. Explorative research has been used in the empirical study.

The novel contribution of this paper is the definition of Enterprise 3.0 elements aligned with the specific of teachers' profession. Moreover, teachers' Enterprise 3.0 application without limitation to inside or outside classroom activities only has been empirically considered.

Our target population to generalize the definition of Enterprise 3.0 and its elements aligned with the specific of teachers' profession are teachers in formal teacher training.

Our empirical results obtained in the Leonardo and Grundtvig Partnerships UK Contact Seminar "Back to Learning: Back to W rk" at the University of Birmingham, Birmingham, the United Kingdom, 4-7 July 2012 show a level of teachers' Enterprise 3.0 application.

The remaining part of this paper is organized as follows: Section 2 introduces the definition of Enterprise 3.0 and its elements aligned with the specific of teachers' profession. The associated results of an empirical study will be presented in Section 3. Finally, some concluding remarks are provided in Section 4 followed by a short outlook on interesting topics for further work.

Theoretical Framework

The present part of the paper provides the definitions of enterprise, Web technologies and Enterprise 3.0.

Enterprise is usually defined as an organization. However, under the term enterprise both

"organization" and "business, occupation, profession, etc." are understood in the present research. Currently, enterprises have established the Enterprise 3.0 systems based on the construction of information environment to promote their competitiveness and performance (Yoon, Hong, 2012).

Web 3.0 technology serves as a platform for Enterprise 3.0: all dimensions of Web 3.0, namely the infrastructure dimension, the functionality dimension, the data dimension, and the social (or socialization) dimension as depicted in Figure 1 are on their path into the enterprise (Vossen, 2009) and, consequently, Enterprise 3.0.
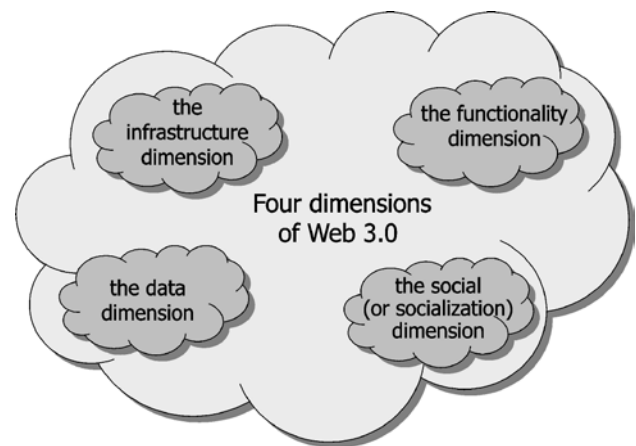

FIG 1. FOUR DIMENSIONS OF WEB 3.0

The present research is based on a widely accepted conception of Enterprise 3.0 as use of Web technologies for enterprise (business) purposes (Bassus, Ahrens, Zaščerinska, 2011). New business ideas such as the payment service offered by RevolutionMoney, the mail service offered by eSnailer, the flight service offered by Virgin Charter, or the personalized TV service from Current.com, Skype, the eBay seller evaluation, or the Amazon recommendation service are classical examples (Vossen, 2009) and have found widespread acceptance in the community. Therefore both teachers' use of Web technologies and Enterprise 3.0 application have to be analysed.

The study of Enterprise 3.0 and Enterprise 3.0 in pedagogy has not had a long story as described in Table 1 (Bassus, Ahrens, Zaščerinska, 2011).

Enterprise 3.0 is defined to be an ideal organization for the 21st century to form new business functions of collaboration with the focus on information sharing within the enterprise and the eco-system partners (Nadhan, 2008). In comparison with Enterprise 2.0 as an Information and Communication Technology's

system aimed at creating social business, Enterprise 3.0 is characterized by such qualities as mobility and semantics. Mobility of Enterprise 3.0 is founded on the concepts of cloud computing and information access anywhere, anytime, on any device. The concept of semantics means to provide a particular Information and Communication Technology's user with the content that is relevant to his/her social networks. Enterprise 3.0 includes but is not limited to online networks. Elements of Enterprise 3.0 depend on the particular job specifics. Teachers' profession has its own specifics, too. Teachers' job is mostly focused on teaching and teachers' professional development.
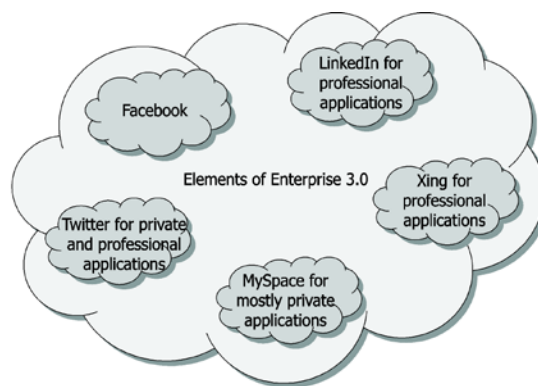
TABLE 1 ENTERPISE 2.0 IN PEDAGOGY IN DIFFERENT HISTORICAL PERIODS

Pha-se	Historical period	Approach	Elements of Enterprise	Educational settings
1	2000-2006	Enterprise 1.0 as socializati-on	Social software	Tasks with use of Enterprise 1.0
2	2006 – up to now	Enterprise 2.0 as communi-ty	Social software and online networks	Teaching techniques with use of Enterprise 2.0
3	2007 – up to now	Enterprise 3.0 as organizati-on	Online networks	Practice of the Enterprise 3.0 curriculum
4	2010 – up to now	Enterprise 4.0 as society	Ambient intelligence, WebOS or Web operating system, artificial intelligence	University Degree

Thus, Enterprise 3.0 for teachers includes such online networks for professional applications as Twitter, Xing, LinkedIn as shown in Figure 2 and many others.

A social network acts as a means of connecting teachers of distinct expertise across departments and school branches and helps them build profiles in an easy way, and it can do so in a much cheaper and more flexible way than traditional knowledge management systems (Vossen, 2009). Once a profile has been set up and published within the network, others can search for people with particular knowledge or expertise and connect to them. If the social network is to be run outside an enterprise and, consequently, school, providers like Ning allow an easy setup of a self-regulated and self-managed community (Vossen, 2009).

FIG 2. ELEMENTS OF ENTERPRISE 3.0 FOR TEACHERS

Empirical Analysis

The present part of the contribution demonstrates the design of the empirical research, survey results and findings of the research.

Research Design

The design of the present empirical research comprises the purpose and question, sample and methodology of the present empirical study.

The empirical study was aimed at analysing teachers' needs for use of Web technologies including Enterprise 3.0. The research question is as follows: What are the teachers' needs for use of Web technologies? In the present research, the term need is defined by the reasons for which the teacher is learning, which will vary from study purposes such as following a course or seminars to work purposes such as participating in meetings or projects (Dudley-Evans, John, 1998). These purposes are the starting points which determine the contents to be taught and learnt (Dudley-Evans, John, 1998). The specifics of teachers' profession allow outlining the following teachers' purposes of use of Web technologies and Enterprise 3.0 and, consequently, teachers' needs for use of Web technologies and Enterprise 3.0:

- Interaction with other people with use of Web technologies,

- Running one's own business with Enterprise 3.0 application and

- Cognition of learning something new with use of Web technologies.

The present empirical study involved 59 teachers who took part in the Leonardo and Grundtvig Partnerships UK Contact Seminar "Back to Learning: Back to Work" at the University of Birmingham, Birmingham, the United Kingdom, 4-7 July 2012.

The sample included 16 male and 43 female teachers. All the teachers have got Bachelor, Master or PhD Degree in different fields of educational sciences such as teaching English as a Foreign Language, Business, technical and other subjects. All the teachers work at educational establishments of different types: schools, vocational education institutions, higher education institutions or adult education institutions. The teachers come from different European countries: Belgium, Czech Republic, Estonia, FYR Macedonia, Iceland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovenia, Spain, the Netherlands, Turkey and the UK. Therefore, the sample is multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. That emphasizes the analysis of each teacher's Enterprise 3.0 application (Luka, Ludborza, Maslo, 2009) within the present empirical study. However, whereas cultural similarity aids mutual understanding between people (Robbins, 2007), the teachers' different cultural and educational backgrounds contribute to successful learning. Moreover, different cultural and educational backgrounds become an instrument of bringing the teachers together more closely under certain conditions such as appropriate materials, teaching/learning methods and forms, motivation and friendly positioning of the educator (Abasheva, 2010). Thus, the group's socio-cultural context (age, field of study and work, mother tongue, etc.) is heterogeneous.

Interpretative research paradigm that corresponds to the nature of humanistic pedagogy (Luka, 2008) has been used in the empirical study. The interpretative paradigm allows creating an environment for the development of any individual and helps them to develop their potential (Luka, 2008). The core of this paradigm is human experience, people's mutual everyday interaction that tends to understand the subjectivity of human experience (Luka, 2008). The paradigm is aimed at understanding people's activity, how a certain activity is exposed in a certain environment, time, conditions, i.e., how it is exposed in a certain socio-cultural context (Luka, 2008). Thus, the interpretative paradigm is oriented towards one's conscious activity, and it is future-oriented (Luka, 2008). Interpretative paradigm is characterized by the researchers' practical interest in the research question (Cohen, Manion, 2003).

Explorative research has been used in the empirical study (Mayring, 2007). Explorative research is aimed at developing hypotheses, which can be tested for generality in following empirical studies (Mayring, 2007). The empirical study consisted of the following stages:

- Data collection,
- Data processing, analysis and data interpretation,
- Analysis of the results and
- Elaboration of conclusions and hypothesis for further research.

The qualitatively oriented empirical study allows the construction of only few cases (Mayring, 2004). Moreover, the cases themselves are not of interest, only the conclusions and transfers we can draw from these respondents (Mayring, 2007). Selecting the cases for the case study comprises use of information-oriented sampling, as opposed to random sampling (Mayring, 2007). This is because an average case is often not the richest in information. In addition, it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur (Flyvbjerg, 2006). Random samples emphasizing representativeness will seldom be able to produce this kind of insight; it is more appropriate to select some few cases chosen for their validity.

Survey Results

In order to analyse the teachers' feedback regarding their needs for use of Web technologies and Enterprise 3.0, the survey was based on the following questionnaire:

- Question 1: Please, indicate the name of the country of your origin. The evaluation scale is nominal.
- Question 2: Do you use Web technologies to interact with people (family, friends, colleagues, etc)? The evaluation scale of two levels for the question is given where "0" means "no" and "1" - "yes".
- Question 3: Do you use Web technologies to run your own business and / or enterprise? The evaluation scale of two levels for the question is given where "0" means "no" and "1" - "yes".
- Question 4: Do you use Web technologies to learn something new? The evaluation scale of two levels for the question is given where "0" means "no" and "1" - "yes".

- Question 5: Please, specify other purposes of use of Web technologies. The evaluation scale is nominal.

59 questionnaires were distributed. Questionnaire responses were received from teachers who participated in the Leonardo and Grundtvig Partnerships UK Contact Seminar "Back to Learning: Back to Work" at the University of Birmingham, Birmingham, the United Kingdom, 4-7 July 2012.

The results of Question 1 of the questionnaire used in the survey show that teachers represent the following countries: Belgium, Czech Republic, Estonia, FYR Macedonia, Iceland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovenia, Spain, the Netherlands, Turkey and the UK.

The results of Question 2 on use of Web technologies to interact with people (family, friends, colleagues, etc.) reveal that seven out of 59 teachers who responded to the questionnaire use Web technologies to interact with people (family, friends, colleagues, etc.). Moreover, one teacher stressed that Web technologies had been used to interact only with colleagues.

The results of Question 3 of the questionnaire used in the survey show that only two teachers out of 59 teachers use Web technologies to run their own business and/or enterprise.

The results of Question 4 on use of Web technologies to cognize something new demonstrate that eight teachers who responded to the questionnaire use Web technologies for learning.

The results of Question 5 on use of Web technologies for other purposes and, consequently, needs show that Web technologies are used for

- Communication with clients and

- Development of electronic catalogues.

Findings of the Research

The teachers' needs from the questionnaire were systematized according to the construct of use of Web technologies and its three domains as presented in Table 2:

- The construct of teachers' interaction with people with use of Web technologies,

- The construct of teachers' running business with Enterprise 3.0 application and

- The construct of teachers' cognition with use of Web technologies.

The data were processed applying SPSS 17.0 software. The determined construct domains were systematized into the codes corresponding to a domain. Only positive answers were taken into consideration for the analysis: answers which were marked as "1" in Question 2, 3 and 4. The number and percentage of the positive answers from the 59 questionnaire distributed among the teachers were analysed as shown in Table 3.

TABLE 2 INTER-RELATIONSHIP BETWEEN CONSTRUCT, CONSTRUCT DOMAIN AND QUESTIONNAIRE

Construct	Construct domain	Number of the question
Use of Web technologies	teachers' interaction with people with use of Web technologies	2
	teachers' running business with Enterprise 3.0 application	3
	teachers' cognition with use of Web technologies	4

TABLE 3 FREQUENCY OF TEACHERS' POSITIVE ANSWERS

Construct	Construct domain	Number of answers	Percentage
Use of Web technologies	teachers' interaction with people with use of Web technologies	7	11.86%
	teachers' running business with Enterprise 3.0 application	2	3.4%
	teachers' cognition with use of Web technologies	8	13.55%

All of the teachers' answers were categorized to the construct Teachers' use of Web technologies. Frequencies were determined to reveal the teachers' needs for use of Web technologies and Enterprise 3.0. The survey showed that the teachers have positively evaluated their interaction with other people with use of Web technologies. Teachers' cognition with use of Web technologies has a positive evaluation, too. However, teachers' running business with Enterprise 3.0 application has been positively evaluated by only 3.4% of the teachers. The interpretation of this result reveals that the teachers did not consider their occupation to be an enterprise and themselves to be enterprising. That allows explaining teachers' lower evaluation of Enterprise 3.0 application in comparison with teachers' higher evaluation of interaction with other people and cognition with use of Web technologies.

Further on, analysis of the results of Question 5 on use of Web technologies for other purposes was based on the following findings:

- Communication is interaction, and

- Development of electronic catalogues is part of running one's own business.

Consequently, the other purposes given by the respondents in Question 5 of the questionnaire are categorized as following:

- Communication with clients refers to the construct teachers' interaction with people with use of Web technologies and

- Development of electronic catalogues relates to the construct teachers' running business with Enterprise 3.0 application.

The summarizing content analysis (Mayring, 2004) of the data reveals that the teachers' feedback regarding their needs for use of Web technologies and Enterprise 3.0 in order to interact with other people and cognize with use of Web technologies is positive. However, there is a need for the increase of the teachers' running business with Enterprise 3.0 application.

Conclusions

The findings of the research allow drawing the conclusions on a low level of teachers' Enterprise 3.0 application as the teachers' running business with use of Enterprise 3.0 has been positively evaluated by only 3.4% of the teachers.

External validity of the research results has been revealed by international co-operation as following:

- The research preparation has included individual interdisciplinary consultations given by other researchers,

- The present contribution has been worked out in co-operation with international colleagues and assessed by international colleagues, and

- The research has been partly presented at international conferences.

Therein, the findings of the present research are validated by other researchers.

The following hypothesis has been formulated: teachers' Enterprise 3.0 application is successful if

- Teachers are provided with the definition of enterprise as both "organization" and "business, occupation, profession, etc",

- Teachers identify their needs for use of Enterprise 3.0,

- A favourable teaching and learning environment for teachers' Enterprise 3.0 application is organized,

- Teachers actively participate in Enterprise 3.0 application.

The present research has limitations. The inter-connections between Web technologies and Enterprise 3.0 application have been set. Another limitation is the empirical study conducted by involving only the teachers at one seminar. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research – the definition of enterprise, Enterprise 3.0 and the explorative research design - may be used as a basis of analysis of teachers' use of Web technologies and Enterprise 3.0 application in other institutions. If the results of other institutions had been available for analysis, different results could have been attained. There is a possibility to continue the study.

Prospects for development include modelling of a favourable teaching and learning environment for the enrichment of teachers' use of Enterprise 3.0. Particularly, teachers' running business with Enterprise 3.0 application has to be increased as the teachers' interaction with people and learning with use of Web technologies have been determined to be of a higher level.

The contemporary concept of Enterprise 3.0 remains as an open point for further research.

Further research tends to focus on the search for relevant methods for evaluation of each criterion of the development of teachers' use of Web technologies and Enterprise 3.0 application as well as data obtaining, processing, analyzing and interpretation in an empirical study within a multicultural environment.

Empirical studies in other institutions are proposed to be carried out. Another direction of further investigation is considered as evaluation of efficiency of teachers' Enterprise 3.0 application. A comparative research of different countries could be carried out, too.

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Professor Dr.-Ing. habil. Andreas Ahrens received the Dipl.-Ing. degree in electrical engineering from the University of Rostock in 1996. From 1996 to 2008, he was with the Institute of Communications Engineering of the University of Rostock, from which he received the Dr.-Ing. and Dr.-Ing. habil. degree in 2000 and 2003, respectively.

In 2008, he became a Professor for Signal and System theory at the Hochschule Wismar, University of Technology, Business and Design, Germany. Professor Dr.-Ing. habil. Andreas Ahrens is a German researcher and expert in wireless communications with vast experience.

He is a member of the IEEE and author/co-author of a couple of text books and numerous conference and journal contributions. His main field of interest is signal processing for communications.

Jeļena Zaščerinska received the diploma in Russian Philology in 1994 from the Daugavpils University, Daugavpils, Latvia, Master Degree in English Philology in 2002 from the University of Latvia, Riga, Latvia. In 2011 she was awarded Dr. paed. Degree for her promotion thesis "Development of Students' Communicative Competence in English studies for Academic Purposes" focused on evaluation of efficiency of the process of the development of students' communicative competence within English for Academic Purposes studies.

Since 2012 Jeļena Zaščerinska has been working as a leading researcher at the Centre for Education and Innovation Research, Riga, Latvia.

In 2012 Jeļena Zaščerinska was bestowed expert rights by the Latvian Council of Science, Riga, Latvia and by Education, Audiovisual and Culture Executive Agency, Brussels, Belgium.