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# Mapping Students' Informal Learning Using Personal Learning Environment

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Personal learning environments are a widely spread ways of learning, especially for the informal learning process. The aim of this research is to identify the elements of students' personal learning environment and to identify the extent to which students use modern technology for learning as part of their non-formal learning. A mapping system was used for gathering data and an analysis of percentages and frequency counts was used for data analysis in the SPSS. The results show that students' personal learning environment includes the following elements: Wikipedia, Google, YouTube and Facebook in 75% of all cases, and an interesting fact is that all of them belong to a group of Web 2.0 tools and applications.

**Keywords:** Personal learning environment (PLE), informal learning, lifelong learning, students

## 1. Introduction

In the industrial age a person was educated to be able to work in one type of job, and was expected to work in the same conditions and in the same manner during their whole life. In the modern world, a person must continuously invest in acquiring new skills and knowledge, and constantly work on improving their value on today's global market. To meet this requirement a person has to be able to learn, adapt and re-learn the things they learned just a couple of years ago. Therefore, lifelong learning has become an integral part of our lives and our way of learning. In accordance with the requirements of the modern working environment, it is necessary that students be prepared to adapt to the usage of modern information and communication technologies (ICT) in the workplace. Therefore, students need to get used to using ICT more during the studies. The aim of this research is to identify the elements of students' personal learning environment and to identify the extent to which students use modern technologies for learning as part of their non-formal learning.

## 2. Definition of lifelong learning

Marick and Watkins define learning as "the way in which individuals or groups acquire, interpret, reorganize, change or assimilate a related cluster of information, skills and feelings. It is also primary to the way in which people construct meaning in their personal and shared organizational lives".

According to Rubenson, the European Union, the OECD and the UNESCO proclaimed three fundamental attributes in 1976 that lifelong learning is based on:

- It is lifelong and therefore concerns everything from cradle to grave,
- It is life-wide recognizing that learning occurs in many different settings, and
- It focuses on learning rather than limits itself to education.

Lifelong learning is mostly recognized as its one segment - adult education. The contemporary literature does not mention the classification of education but rather the classification of learning, as a base of the educational process. The distinction has been made among three categories of settings where purposeful learning activity takes place (the European Commission 2000):

1. Formal learning. This learning typically takes place in an education or training institution; Formal learning is structured, institutionally sponsored, often classroom-based, with an instructor or trainer planning, implementing and evaluating the learning taking place; it is structured (in terms of learning objectives, learning time, or learning support) and leads to certification. From the learner's perspective, formal learning is intentional.
2. Non-formal learning. This is a learning that typically does not lead to certification and is not provided by an education or training institution. It is structured (in terms of learning objectives, learning time, or learning support). Non-formal learning can take place in the working environment. From the learner's perspective, non-formal learning is intentional.
3. Informal learning. Informal learning is learning resulting from daily life activities related to work, family or leisure. It is not structured (in terms of learning objectives, learning time, or learning support) and typically does not lead to certification. It may be intentional, but in most cases it is unintentional, incidental or random. Other definitions of informal learning by Marsick and Volpe (1999) conclude it is an integration of work with daily routines, triggered by an internal or external jolt, not highly conscious, is often haphazard and influenced by chance, inductively occurs through action and reflection, and is linked to the learning of others.

Marsick and Watson emphasize that there is a difference between informal and incidental learning. Informal learning is mostly experiential and non-institutional. It differs from formal learning by degree of control exercised by the learner, location (not classroom-based), and predictability of outcomes. The examples of informal learning are self-directed learning, networking, coaching, mentoring, performance planning and trial-and-error. Incidental learning is unintentional, a byproduct of another activity. It differs from formal because it is a subset of informal learning. The examples of incidental learning are: learning from mistakes, assumptions, beliefs, attributions, internalized meaning constructions about the actions of others, hidden curriculum in formal learning.

Different researchers use non-formal as informal learning, and informal as incidental learning. It is not possible to state with certainty that during the non-formal and informal learning, incidental learning does not happen. In this paper we address non-formal, informal and incidental, collectively as informal learning. We analyze informal learning as a type of learning that occurs in the learning process using personal learning environment (PLE).

Within this paper we observed the informal learning using contemporary information and communication technologies (ICT), in the Web 2.0 environment. We wanted to assess to what extent particular Web 2.0 learning tools are used in a student's PLE on the course E-Learning at Faculty of Organizational Sciences.

### 3. Personal learning environment

Personal Learning Environments (PLE) is the term used to define a new approach in a way in which learning is transformed through a range of new technologies and Web 2.0 platforms which are currently available to us. It can be best described through the 3P Learning model which encompasses three core elements: Personalization, Participation and Knowledge-Pull. We can try to define PLE as a unique personal digital interface which integrates both personal and professional interests of an individual including formal and informal education.

According to V. Teemu and H. Stina the main idea with PLE "is to put students in the central position in the learning process by allowing them to design their own learning environments". It is not considered as a software application or technical approach to learning "but rather as a philosophical, ethical and pedagogic approach", which should foster students to exercise their capacities as autonomous learners within a structured context. Through personalization students should be able to handle a huge amount of information, while still keeping their "heads above the water", to avoid information overload and efficiently adopt the required knowledge.

Starting from the definition of PLE we gave at the beginning of this document, the concept of PLE will define the environment through which an individual learner will be able to search for information and adopt knowledge, while at the same time contributing to the others in their own learning environment through sharing research and knowledge.

Web 2.0 platforms allow individual learners to gather information from different sources and choose to adopt it in the order they personally feel is the best way for them. A structured approach to this information gathering enables one to leave undesired or unnecessary information aside, and only focus on “quality sources” which are preferred or desired. While individual PLE can exist and be efficient at some point, the true value of PLE comes from the existing interactions between individual learners who can form a network of readers and contributors with a highly loose network structure.

One of the commonly accepted ways of representing the PLE is through visual diagrams also called mappings. They enable the learner to easily “map” different areas of learning, segmented through different streams of information, that can be further dissolved to different sources of information, thus easily documenting the structure of data and information which are acquired by the learner.

### 3.1. Characteristics and functions of PLE

Avoiding a “holy” debate which is held around the PLE regarding what the distinguishing characteristics of Personal Learning Environments are that should uniquely define the PLE, one of the first views on the PLE model we consider today was created by Scott Wilson in 2005, followed by Stephen Downes.

According to the work of I. Buchem, G. Attwell and R. Torres we can easily define the necessary characteristics of the framework which can be considered as PLE :

- Support to open interoperability standards of Web 2.0 to receive and share materials from different data and sources
- Grouping tools to blocks and fundamental groups of elements
- Learner centered – supports establishing the rules and learning strategies, based on learners’ individual preferences and learning needs,
- Controllable and managed – the learner chooses the level of aggregation, different formal and informal sources,
- Establishing knowledge management – annotations, archiving, searching, filtering,
- Different roles with peers (learner, teacher, expert...)

### 3.2. Advantages and disadvantages

One of the key advantages that the PLE offers is its fully open framework which enables one to connect to any source of information, and have the learner receive lots of quality information from all over the world quite quickly. The span of information sources is limited only by the learner’s desire to seek new sources, and his ability to fluently understand different languages. As stated by S. Downes, in this manner the learning in the PLE is about developing capacities (not competencies, skills, etc.) and the outcome of personal learning is engendered through empowerment (S. Downes, 2010).

The main issue that, however, remains is how to control the quality level in order to cut through the received information and distinguish only the quality one.

While the learner can start just by googling the term and searching for authors in the field to gain quick results, it could easily turn into unstructured learning which in the end will fail to deliver the desired outcomes. Because of this it is really important for a learner to approach to establishing the PLE in a structured manner.

### 3.3. Establishing the Personal Learning Environment

The only real requirement for a PLE to function is full and constant access to the Internet in order to acquire data and information defined inside the PLE structure. While there are certain possibilities to establish a PLE that uses the Internet in a limited manner (timely limited access, dial up, and firewall closed access), the nature of Web 2.0 with such vivid dynamics of information flow makes this almost impossible. In addition to the Internet access, the next required thing is to prepare and document goals and areas of interest before the learner starts receiving information.

Simple steps to start an individual PLE can be identified in three simple steps:

- 1. Identify three things which you are required/would like to learn.** In order to avoid information overload and efficiently gather the information, it is important for a learner to specify the areas or terms which he would like to learn. Due to the danger of “walking off the path” in an information jungle it is of good advantage to have the learner identify maximum three items or areas for which he would like to develop a PLE.
- 2. Identify three sources which are acceptable for learner.** Based on technologies and the connection available, as well as on learning habits, the learner should identify up to three sources of information for each area. The decision is often influenced by the platforms already provided to the learner (company, university, closed club, etc.) or the learner is supposed to establish them on his own. In this step it is important that the learner should not make any concrete steps in establishing sources or access just to identify the sources (e.g. RSS feed, Facebook, Twitter, Slide Share, Netvibes, and Wikipedia, etc.).
- 3. Document defined PLE.** Documenting the PLE is one of the most crucial parts in establishing the PLE, due to the fact that this will allow the learner to see the information flow in a structured manner, and easily decide if it should be redefined or adjusted. This can be written in hand, or done through sophisticated visual tools (Mind Manager, Visio, PowerPoint etc), and while the form itself is not so much important, detailing the flow of information is the key element. The lack of documenting could either establish a PLE which would flood the learner with too much information, or it would reduce their chances to correctly add new sources of information, which would in the long run limit their knowledge environment.

#### 4. Research

Research objectives:

1. Determining what tools that students use in their everyday life they perceive as learning tools.
2. Identifying the key elements of a student's personal learning environment and fundamental groups of elements that the student's personal learning environment consists of.
3. Determining the average student's learning environment.

Main research questions:

1. What are the elements that students perceive as part of their PLE?
2. What are the fundamental groups of elements of a student's PLE?
3. What are the key elements of a student's PLE?
4. What does an average student's personal learning environment at the FOS look like?

##### 4.1. Research method

Students were given an assignment as part of their “E-learning” module at the Faculty of Organizational Sciences (FOS). For the assignment, each student was required to design his personal learning environment in the form of a mapping activity. The students had to submit a document in which they had to draw their PLE diagram. In other words, they had to map all elements they perceive as part of their learning environment according to examples that were given during the lectures and in the guidelines. One example of students' PLE is presented in Figure 1.

Guidelines were developed to assist students in understanding the concepts of the personal learning environment and to provide examples of PLE diagrams. In the examples of PLE diagrams students were able to see what elements can constitute a PLE. For example, some people identified the following as elements of their PLE: Web 2.0 tools such as Wikipedia – for acquiring information, YouTube and SlideShare for sharing videos and presentations and Facebook - for social networking. Other people identified colleagues or television as traditional sources for gathering information.

A classical survey was not the first choice, we chose mapping because we wanted to find out not only what elements they actually use, but which ones they perceive as part of their learning environment. Clark et al. cite that the mapping system has a lot of advantages because the phenomenographic approach “is about ‘variation in the ways people see, experience, think about, understand and conceptualize the phenomena they encounter’ and points to the ‘layering’ of the individual’s awareness as they are called to situate phenomena according to these different ‘ways of experiencing’ their technological world” .

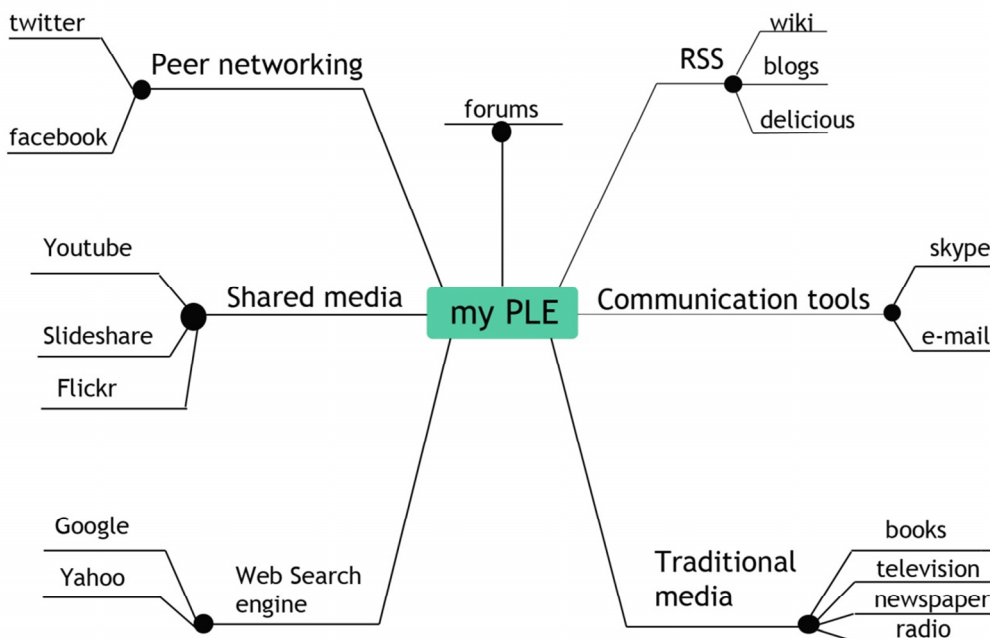


Figure 1: Example of students' PLE

#### 4.2. Data Analysis

For further analysis the SPSS statistical software was used. Because of the diagram form, data had to be put in the form suitable for the SPSS. Every element in the diagram was transformed into a YES/NO question. The example of the question design: I use “particular PLE element” for learning. YES/NO.

Example: I use blogs for learning. YES/NO

The collected data were analyzed using percentages and frequency counts for determining the extent to which particular elements, tools or applications are used for learning.

#### 4.3. Results

The research was conducted at the Faculty of Organizational Sciences, during the “E-learning” module, in the winter semester 2011/2012. The participants were all students of the final (4) year of study at the Information systems and technologies programme that elected the “E-learning” module. There were 52 students, 23 male students (44.2%) and 29 female students (55.8%).

The identification of elements that students perceive as part of their PLE is shown in Table 1. Some students already grouped elements according to their purpose, for example: For Internet search I use..., for communication I use ..., or Traditional tools, Internet tools, etc. According to their grouping system and literature review, we identified fundamental groups of elements.

Table 1: Students' PLE: elements and groups of elements

PLE elements	Grouping - phase one	Grouping phase two
WordPress	Blogs	Web 2.0 tools and applications
Blogger		
Technorati		
Wikipedia	Wiki	
Shared Media	Shared Media	
You Tube		
Flickr		
Slide Share		
Podcasts		
Shared Workspaces	Shared Workspaces	
Google Docs		
Drop Box		
Facebook	Social Networking and Microblogging services	
LinkedIn		
Google+		
MySpace		
Twitter		
Social Gropus	Social Gropus	
RSS	Bookmarking	
StumbleUpon		
Tagging	Tagging	
Web-based aggregators	Web-based aggregators	
Google Reader		
Netvibes		
Web Search Engines	Web Search Engines	
Google		
Google Scholar		
Yahoo		
Forums	Forums	
Email	Online Communication	
Skype		
MSNMessenger		
moodle	LMS	
Other Learning Portals: W3School, Lynda, TED, The Learning Network	Other Learning resources	
Online articles		
TV/Radio	TV/Radio	Traditional learning resources
Books	Books	
Faculty (teachers/assistants)	People (communication)	
Family and Fiends		
Colleagues		

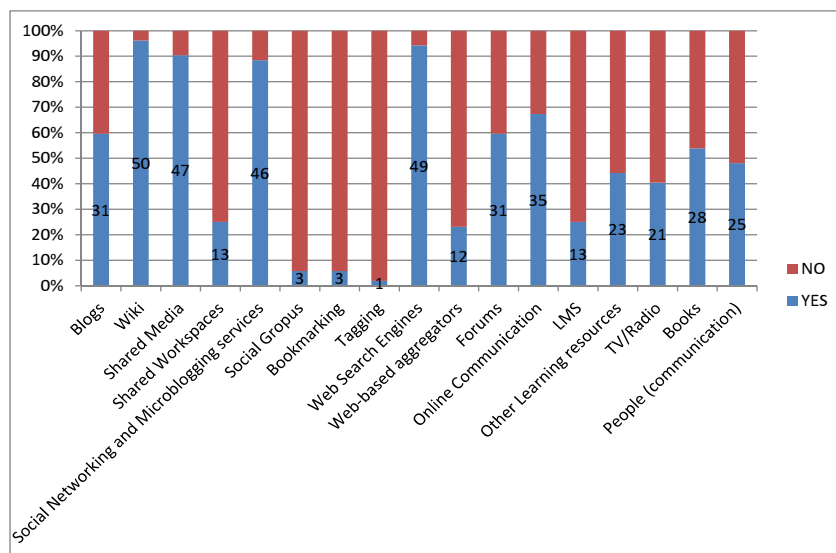


Figure 2: Students' learning tools

After listing all the elements that students perceive as part of their learning environment, we used frequency counts to identify what are the elements that are mostly used among students (Figure 2). As key elements we identified: Blogs, Wiki, Shared Media, Social Networking and Microblogging services, Web Search Engines, Forums, Online communication and Books, because in more than 50% of the cases students identified them as elements they use for learning.

More than 80% of students use:

1. Wiki – 96.2% of students use Wikipedia.
2. Web Search Engines – 94.2% of students use Web Search Engines: 88.5% use Google, 25% use Yahoo and 15.4% use Google Scholar.
3. Shared Media – 90.4% of students use Shared Media: 84.6% use YouTube, 11.5% use Slide Share, 9.6% use Flickr and 3.8% use Podcasts.
4. Social Networking and Microblogging services – 88.5% of students use Social Networking or Microblogging services: 76.9% use Facebook, 28.8% use Twitter, 13.5% use Google+, 7.7% use LinkedIn and 5.8% use MySpace.

Regarding the question of an average students' personal learning environment, we concluded that in 75% of cases a students' PLE include the following elements: Wikipedia, Google, YouTube and Facebook, and an interesting fact is that all of them belong to a group of Web 2.0 tools and applications.

## Conclusion

Throughout this research we concluded that a majority of students have not utilised PLE for achieving maximum results in their everyday life (informal learning process) even though they have somehow established a PLE in certain unstructured form.

After the concluded research we have received a positive feedback from students in that they plan to use the PLE as a method of supporting their own learning, and that they recognise the value of structuring their PLE.

It would be interesting to conduct further research on faculties which do not have Information Technologies as a major subject area, in order to measure whether there is any impact on accepting and utilising a PLE in the orientation of students towards technology subjects. It would be interesting to analyze the results if the use of PLE and Web 2.0 applications and tools is structured through formal learning at the Faculty. Furthermore, it would be interesting to conduct this research at universities in other regions or countries to explore how the culture of students, either regional or national, influences the usage and utilisation of PLE.

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