USE OF START PAGES FOR BUILDING A MASHUP PERSONAL LEARNING ENVIRONMENT TO SUPPORT SELF-ORGANIZED LEARNERS

M. Ivanova

ABSTRACT. The paper explores the functionalities of eight start pages and considers their usefulness when used as a mashable platform for deployment of personal learning environments (PLE) for self-organized learners. The Web 2.0 effects and eLearning 2.0 strategies are examined from the point of view of how they influence the methods of gathering and capturing data, information and knowledge, and the learning process. Mashup technology is studied in order to see what kind of components can be used in PLE realization. A model of a PLE for self-organized learners is developed and it is used to prototype a personal learning and research environment in the start pages Netvibes, Pageflakes and iGoogle.

1. Introduction. Building a personal web that explicitly supports learning, professional, social and other activities via highly personalized windows

to the networked world is one of the key trends affecting the practice of teaching, learning, research, and creative expression [1].

Personal Learning Environments (PLE) laid the foundations of some main ideas: that learning is ongoing and tools must be sought to support it; that the role of the individual in self-organizing learning must be recognized; also that learning will take place in different contexts and situations and will not be offered by a single learning provider [2]. PLEs are considered as systems that help learners take control of and manage their own learning. This includes providing support for learners to set their own learning goals, manage their learning (content and process), communicate with others in the process of learning and thereby achieve learning goals [3].

In PLE building, a wide range of tools and applications are involved, but nowadays the use of Web 2.0 software is on the rise. Web 2.0 applications are service-oriented and allow creating, publishing, storing, sharing and remixing of data and information via blogs, wikis, audio/video recordings (podcasts/vidcasts), RSS syndication, social bookmarking systems, and social networks. Learners are greatly facilitated by the easy-to-use interfaces and mashup services provided. Mashup technology proposes possibilities for capturing and grabbing content from different sources, and it can also involve learners as active co-developers of web services [4], [5].

Web 2.0 applications called "start pages" are designed to provide a personalized place on the internet where users can mashup data, information and knowledge available anywhere, anytime, including mobile login. They can be used for building a PLE and for positioning the learner in the active role of someone who manages learning and utilizes technologies on his own.

In this paper the possibilities of start pages to support self-organized learners with building PLE are analyzed. The Web 2.0 effects and eLearning 2.0 strategies are explored from the point of view of how they influence the methods of gathering and capturing data, information and knowledge and the achievement of rich learning experience. Mashup technology is examined in order to see what kind of components can be used in PLE implementation. A model of a PLE in a start page is developed and it is used for PLE prototyping in the start pages Netvibes, Pageflakes and iGoogle.

2. Method. The prototype of a PLE is developed after performing several steps: (1) examination and analysis of Web 2.0 effects and their implication in eLearning, (2) exploring the possibilities of mashup technology and some well-known mashup applications in order to form a notion about the possible PLE

components, (3) searching, analyzing, testing and summarizing the features of start pages, (4) building a PLE model for self-organized learners.

3. Analyzing Web 2.0 Effects from a Self-Organized Learning Perspective. Web 2.0 comes with a new set of software applications that distinguish it from previous applications by several principles captured by O'Reilly [6]. These new web features have recently been explored by many educators and researchers due to the possibility of adopting them in the learning process [7], [8], [9]. In this section several Web 2.0 effects are analyzed for a better understanding of how they can be used to enhance self-organized learning. This will allow several statements to be made about the implications of Web 2.0 on PLE building based on the inherent technical features of Web 2.0.

3.1. eLearning based on Web 2.0 Technologies. eLearning has been the first area to benefit from Web 2.0 technologies and their potential to engage learners [10]. Involved learners seek online lessons and references, and now, in this Web 2.0 world, they also contribute generously, making choices to both consume and create resources. eLearning is called eLearning 2.0—a term used to refer to new ways of thinking about eLearning. Rather than being based on a model where the educator pushes learning content to the learner, the eLearning 2.0 models emphasize shared, remixed, repurposed, and distributed learning content. Furthermore, an important characteristic of eLearning 2.0 is the design of learning content in dfferent media formats and its usage for performing engaging learning activities [11].

This new way in production, sharing and transferring the information and knowledge through the collaborative framework and collective intelligence is a result of the new generation web development. Some arising Web 2.0 effects are explained below:

- *Data, information and knowledge on an epic scale.* This effect characterizes the methods for data, information and knowledge gathering and remixing—not only obtained from search engines, but also collected indirectly from users and aggregated as a side effect of the ordinary use of major web services and applications. Web 2.0 enables access to data on an unprecedented scale, such as pictures (e.g. Flickr), bookmarks (delicious), mapping data (Google Maps), but also indexed data, such as the Google search index. This content can be exploited for learning in various ways: for example, learners can use existing resources during their learning process as information sources (e.g. Wikipedia articles as starting points for learning about

concepts). Also, active knowledge construction is supported: learners can use the data as building blocks for creating new content (mixing or mashing-up content). It is now easier than ever to build tools that exploit data to enrich the learning experiences. Thus Web 2.0 services employ different measures for increasing learners' contribution and participation.

- *Network effect.* The Network effect is a term used to describe the increase in value to the existing users of a service in which there is some form of interaction with others, as more and more users start to use it. Social networking sites such as Facebook, Ning, MySpace, Twitter and Meemo allow the creation of groups, learning and professional networks of learners with common interests. Such social networking spaces afford interactions performed among participants not only during the university education, but also afterwards, preparing them for becoming self-organized and life-long learners [12].

- *Collective intelligence.* This effect reflects the knowledge embedded within societies or large groups of individuals. Collective intelligence can be explicit, in the form of knowledge gathered and recorded by many people, and implicit, resulting from the data generated by the activities of many users over time.

  What are the implications of this effect for self-organized learners? The learners form a community with common interests where they exchange ideas and learning resources, store and share those using, for example, different modules in start pages. Also, they use synchronous and asynchronous communication modules to discuss learning problems.

- *Long Tail.* This effect leads to the realization of significant profit out of selling small volumes of hard-to-find items to many customers, instead of only selling large volumes of a reduced number of popular items. The group of people that buy the hard-to-find or "non-hit" items is the customer demographic called the Long Tail [13]. In the physical world, the limited shelf space cuts the growth of the tail. However, in the digital world with its virtually unlimited space no barrier hinders the growth and thus a critical mass of demand even for niche-products can be reached. For learning, the interest of Web 2.0 services in enabling the Long Tail has an effect similar to that of creation and construction of content, but also making content public. This allows producing, publishing, receiving and giving feedback. The Long Tail effect influences the personalization in eLearning.

- *Snowflakes Effect.* The importance of personalized eLearning is reflected through the Snowflakes effect: as all snowflakes in a snowstorm are unique, so each person has specific characteristics and interests [14].

- *Openness.* The web proposes working with open standards, using open source software, open courseware, making use of free data, reusing data and working for creating innovative approaches. These open solutions can be reached using Web 2.0 services that allow access and dissemination of data through devices such as mobile phones, PDAs, game consoles, etc. By offering multiple sources of input, this effect increases the potential participation of the learners. From a pedagogical viewpoint, having additional means for active participation is advantageous. Being able to participate from everywhere using mobile devices will lead to less artificial learning situations, not in front of the computer but in the context of real life.

3.2. Self-organized learners in Web 2.0. A main characteristic of the autonomous or self-organized learners is that they are able to "learn how to learn" and possess a disposition to do so [15]. Studies show that learners rarely develop explicit learning strategies on their own. According to [16], disorientation and cognitive overload are the principal obstacles to self-regulated learning in technology-enhanced learning. This and similar studies [17] provide evidence that learners must learn to self-regulate their learning process since most do not possess this skill. Such learners have to analyze their own learning strategies and outcomes as well as support the learning of others. In the age of Web 2.0 learners are able to find very quickly how to make an effective contribution to and benefit from the processes of group work and collaborative working. The role of the educator is to support the learners with advice and directions on how to achieve their goals with new-generation technologies.

The changes in the web can be used to facilitate self-organized learners in their PLE building, where they can perform activities such as exploration, selecting and pooling content, interacting with peers, working in collaboration.

The following advantages of eLearning 2.0 strategies and Web 2.0 technologies can be used in supporting self-organized learners: the new generation of the web facilitate the active role of a learner at authoring content, applications and services; assist in self-organized knowledge and capturing, sharing and publishing information; support the performance of self-organized web-based learning activities; form a bottom-up and less control-oriented learning culture; facilitate an easy start and build self-organized learning environments; give greater leverage to "collective intelligence" in creating learning experiences; facilitate dynamic

multichannel learning, with multiple sensory inputs and many different sources of experience.

4. Examination of Mashup Technology and Applications.

The understanding of mashup approaches leads to building a technology of rich and flexible PLE for self-organized learners. Mashup technology allows content from more than one source to be used for creating a completely new service [18]. Typically mashups use APIs from at least one web site. The main concepts under a mashup are: (1) *Mixing the global with the local*: This concept involves making global information available to local social contexts and giving users the flexibility to find, organize, share and create information in a locally meaningful fashion that is globally accessible; (2) *New interfaces*: Web 2.0 involves finding unique ways of searching and accessing web content through new interfaces. Many of these new interfaces aggregate multiple RSS feeds around particular themes or are highly configurable by the user; (3) *Microcontent*: Microcontent is an indivisible object with unique URL including microinformation (metadata, data) with a given structure, focused on one or a few concepts, saved in standardized microformat (RSS/Atom), and it can be reused, referenced and remixed.

The potential uses of mashups are as wide and varied as the web. Some of the most common uses include mapping, video and photo, search, and data/information/knowledge aggregation.

Mapping mashups. Online mapping services allow learners to navigate most of the globe through a Web interface, viewing varying levels of resolution through maps, satellite imagery, or a combination of these. Mapping mashups overlay data on those maps with clickable markers showing specific points of interest. Applications can show groups of locations on a map, representing how proximity among the sites, topographical features, or other elements of the physical world bear on the subject at hand.

File/video/photo/podcasts mashups. Some sites, like ImageShack, Flickr and YouTube, propose file/video/image storage space that allows users to organize their collection of files/videos/images and share them. Through the use of API or generated embedded code or generated link the content can be used by other sites to create a mashup. Podcasting allows capturing and broadcasting of interviews, conference sessions, and lectures. The learners can produce and share content and thereby learn by doing rather than by simply reading or hearing.

Search engines. Many of the new search engines use the modular functionality of Web 2.0: mash together several services and add new features. There are several examples of new generation search engines. FundooWeb is a multi-

mashup, incorporating results from Yahoo!, Flickr, Yahoo! News, Yahoo! Answers, Amazon, and Yahoo! Maps images. Omgili is a discussion-based engine. In addition to standard search results, a list of links to members is provided who have answered questions relating to a given search term. Mnemomap uses multiple components to display search results. It possesses a section displaying relevant results from Mnemo, Yahoo, Flickr, and YouTube.

Data/information aggregators. Social bookmarking (like delicious) can be a great way to collect a set of resources related to learning activities and share them broadly or with a specific group of users. Bookmarks can supplement place-based learning events as well as collaborative team activities, and, like most social media tools, they can be distributed via an RSS feed for inclusion in blogs and other Web destinations.

Educational timelines. Timeline applications such as FriendFeeder and Dipity allow aggregation of data and information from other web-based applications. FriendFeeder collects information from social sites for news, bookmarking, bloging/microbloging, video, photos, music. Dipity allows the creation of a personal timeline, blog post timeline, events timeline, product history timeline, company history timeline, etc. Timelines can be created automatically by using existing accounts for Flickr, Twitter, Last.fm or any RSS feed, or manually.

Social networks. Social networking sites are the form of social environment for forming associations with other people. The more popular social networking sites also increasingly offer ways to aggregate other forms of social media into a more or less unified environment. Networks such as Ning and Facebook allow personalization of using applications through API, embedded code and reference links.

5. Exploration of Start Pages' Functional Characteristics for PLE building. A self-organized learning environment in Web 2.0 can be a technology-rich environment with social orientation in which learners are encouraged to make their own learning paths and perform their own learning activities, an environment which allows learners to capture, create and transfer knowledge and learn from each other virtually. The big challenge is how to implement such a learning environment which supports and facilitates the learning process and knowledge constructions.

There are many different new generation applications and tools which serve as a hub where a learner can easily start learning, capture ideas, share knowledge, and socialize. The most popular ones which are in the scope of this paper are start pages which are highly flexible, mashable web-based applications,

Table 1. Start pages' functional possibilities

Criteria		24eyes www.24eyes.com	Personalized Google homepage www.google.com/ig	Jimdo www.jimdo.com	Netvibes www.netvibes.com	Pageflakes www.pageflakes.com	Protopage http://protopage.com	Microsoft Personal Start Page www.start.com	SurfNinja www.surfninja.com
Information and knowledge capturing and sharing tools and services	Weblog	via RSS	via RSS, link	√	via RSS, link	via RSS, link	√	via RSS, link	√
	Wiki	via RSS	via RSS, link	via RSS, link	via RSS, link	via RSS, link	via RSS, link	via RSS, link	√
	Bookmarking	via RSS	delicious	delicious	delicious	delicious	bookmarks		delicious
	RSS Feeds	√	√	√	√	√	√	√	√
	Link Sharing	√	√	√	√	√	√	√	√
	Picture Sharing	via RSS	Flickr photos	√	Flickr photos	Flickr photos	√		√
	AV/ Podcast	via RSS	YouTube videos podcast	YouTube videos, sympfy music	YouTube videos, podcast	YouTube videos,	YouTube videos, podcasts		YouTube videos, podcast
Communication	Synchr.		chat		Skype				Skype
	Asynchr.	email tab to friend	email	email	email,	email	email	email	forum
Collaboration and social networking		share tags, invite friends to dashboard	add links to social networks and virtual spaces, widgets	guest book, add links to social networks and virtual spaces	Facebook, Meebo, feeds and modules can be shared with others or via the Netvibes Ecosystem	share pages, invite friends, collaborate on project, Facebook, Twitter	share tabs	Facebook, share tabs	√
Productive Tools and Services	Search	search the web	Google search	search engine	multiple searches	multiple searches	search the web	search on MSN	√
	Event/activities Planning			via widget	to-do list, notes, calendar, web storage	to-do list, notes, calendar	to-do list, sticky note, comment box, calendar	√	
Customization Tools		create and arrange RSS dashboard, look and feel	add panels and widgets	add widgets, look and feel templates	user-created widgets	add user-created modules	add widget, look and feel	add tabs, look and feel	add widgets
Creation the new educational widgets			√		√				

and can be adapted to any personal needs.

The eight start pages are examined in order to analyze their functional possibilities for a PLE deployment and for supporting self-organized learners. The result is summarized in Table 1.

The start pages such as iGoogle, Netvibes, Pageflakes and Protopage show the rich possibilities for building personalized learning environments with characteristics for planning learning activities: create a list of activities, use a simple text editor, access blogs and wikis; RSS syndicating information of rich

media sources; exploring and researching via search engines and using additional widgets, for example polls and analytical tools; collaboration and networking: sharing of information and knowledge, connecting to social networks; personalization of feel and look as well as using widgets, for example for quizzes and surveys. Other start pages can be used for different learning purposes, for example: 24eyses—working with RSS feeds or lists of RSS feeds; Jimdo for site creation and arrangement; SurfNinja for visual arranging of icons and access to favourite websites.

Start pages give possibilities for self-organization and management of learning and research combining many of the learning technologies and data sources for producing a rich learning experience according to learning needs and goals. A model of start pages' functional possibilities for capturing and analyzing data, information and knowledge and for learning, research and innovations is presented in Figure 1.
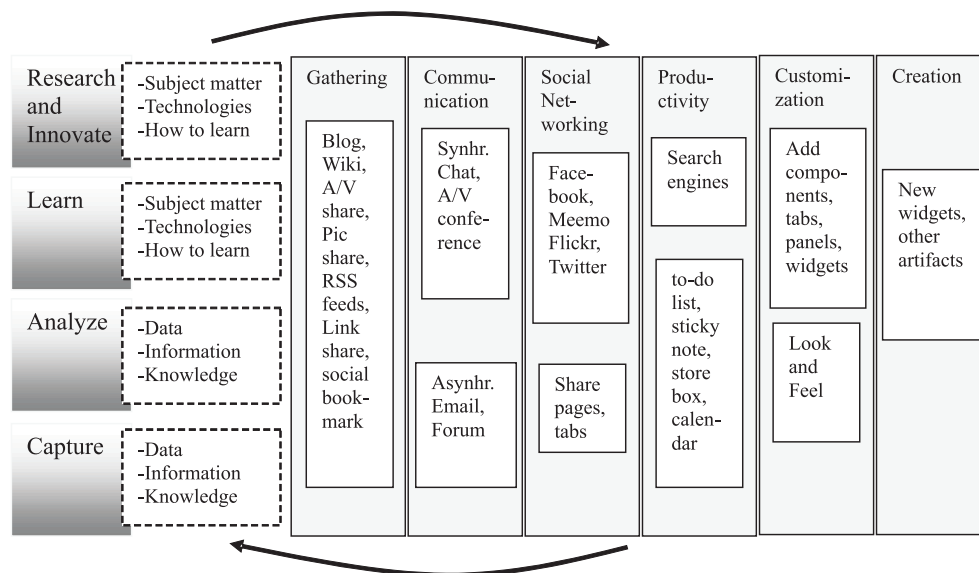

Fig. 1. Start pages' possibilities for a PLE building

The model in Figure 1 is used for the implementation of a PLE in Netvibes, Pageflakes and iGoogle. A prototype implemented with Netvibes is shown in Figure 2. The environments are arranged using embedded start page components as well as components for customer html code and widgets. Some tabs are shared for public usage by other learners.
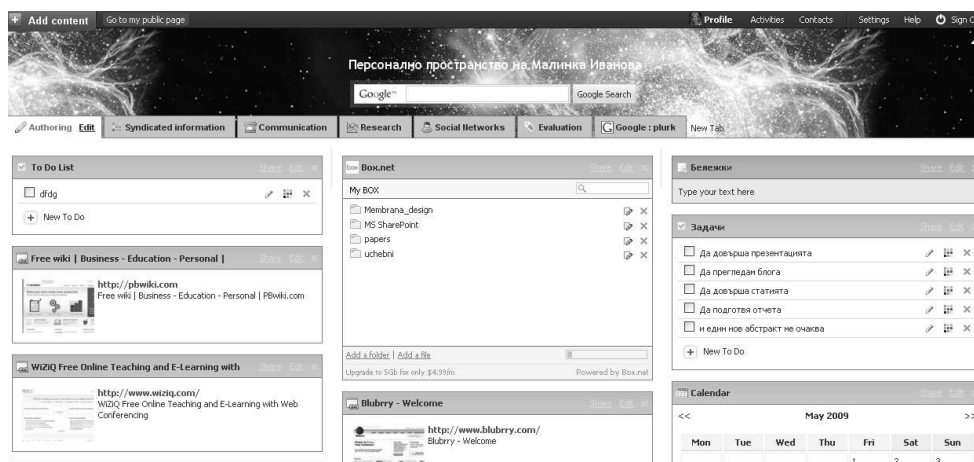
Fig. 2. Prototype of a PLE in Netvibes' start page

6. Conclusion. In this paper the tenets of Learning 2.0 are examined from the point of view of encouraging creation and delivering personalized, social and life-long learning through a web platform utilizing Web 2.0 effects and technologies. The functionalities of eight start pages are examined according to how they can be deployed as a personal learning environment for self-organized learners. The analysis shows that start pages are suitable for easy and fast unfolding of learning and knowledge construction environment with flexible, mashable and changeable components. To describe the complexity and richness of current technological solutions, a model of personal learning environment is developed, which is tested via created prototypes in the start pages Netvibes, Pageflakes and iGoogle. The self-organized learner has to cope with two main tasks – (1) study technology and functionality of a start page and (2) design environment and learning.

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College of Energetics and Electronics
Technical University of Sofia
Blvd Kl. Ohridski 8, Bl. 8
1000 Sofia, Bulgaria
e-mail: `m_ivanova@tu-sofia.bg`