Web 2.0: Impact on Online Users*

Abhijit Chavan

Research Associate
International Institute of information Technology, Pune India.
E-mail: abhijitc@isquareit.ac.in

Abstract

Web 2.0 has captured the imagination of consumers and businesses alike. But knowing how to leverage Web 2.0 concepts to fuel collaboration and innovation among employees, partners, and customers is another story. Web 2.0 can change an enterprise but recognizing how, and determining whether one should, is confusing. This paper aims to dispel some of the myths surrounding Web 2.0 and discusses its practical applications and its impact on online users by demonstrating HE goal oriented eLearning based on service oriented architecture (SOA). There is no doubt Web 2.0 impacts are seen in the workplace with blogs, wikis, and prediction markets cropping up. As the original spreadsheet changed business, Web 2.0 will also bring in changes for better and find its own niche, in the business world. Many organizations are already testing Web 2.0 concepts for enhancing their image for better positioning.

Keywords: Workflow-or-task based eLearning, HE Hybrid Discussion Form, HE 2.0, Blended ITIL Education Program.

Introduction

“Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.” - Tim O'Reilly

Tim O'Reilly was one of the first to use the term, “Web 2.0”. It is a web-based software system (WS) which is collaboratively updated on a continuous basis. This means that the software has more utility when more people use it and also remix it. Remixing is a key concept of Web 2.0. In music, remixing means taking established songs and editing them for adding your own elements to reach the full potential of the music or song. With Web 2.0, individual users add their own data and services to collaborative web software, remixing the Web 2.0 sites into increasingly useful tools and creating an exponential

*Acknowledgement: Based on the presentation made at the Infosys Tech Fest 2007, the research paper has been prepared under the guidance of Dr. Neeta Baporikar and Dr. Sanjeev Panandikar, Faculty, SOMT- IIT, Pune.
growth effect is what is seen across the information society. E.g. Digg\textsuperscript{3}. Unique properties of the web—rolling releases and nearly universal accessibility—gave birth to the Web 2.0 architecture.

**Scope**

Using Web 2.0, the research paper aims to demonstrate an example where the magnitude and the potential for users with respect to higher education is understood.

1. Higher Education (HE) and eLearning

Higher education is becoming more and more accessible, thanks to the developments in information technology and web based services, which gave birth to eLearning. eLearning is a recent trend in enterprise environments. “Workflow – or – task based eLearning” integrated into enterprise workflow or task management systems would make eLearning turn into a powerful tool for enterprise knowledge management: the seamless integration into the working environment allows getting actual information about potential learning goals of the user. Using up-to-date e-Learning technologies enables just-in-time delivery of goal-oriented, learner-oriented curricula thereby helping learners to solve their problems autonomously and competently.

“The architecture of participation is baked into the architecture of the software”- Business Week and The New York Times.

Web 2.0 has captured the imagination of consumers and businesses alike, but there is very little knowledge about how to leverage Web 2.0 concepts. Web 2.0 can change an enterprise but recognizing how, and determining whether one should, is confusing. This paper would dispel some of the myths surrounding Web 2.0 while showing its practical applications within educational environment. Then the enterprise—businesses and their practices—can embrace and extend Web 2.0 to Enterprise 2.0.

1.1 HE Hybrid Discussion Forum and Service Architecture

Creation of HE hybrid Discussion Forum is the example taken for demonstration purpose, which has the objectives of:

- Dissemination and exchange of knowledge in Higher Education
- Promoting professional and technical competence among students, academia, practicing engineers and managers
- Designing as a research prototype application to demonstrate the power of Web 2.0 technologies in delivering innovative solutions.

![HE Hybrid Discussion Forum - Services Architecture](Fig.1 HE Hybrid Discussion Forum – Services Architecture)

1.1.1 Stakeholders in HE Hybrid Discussion Forum (Fig. 2)

- Teachers and learners - To formulate actions that can be created, stored and exchanged
- Implementers, learning technologists - To build the learning system using their institutions existing technology
• Vendors and developers – To create systems that conforms to a service oriented paradigm to make the implementers easier

2. Adaptive approach of HE Goal-oriented eLearning

IT oriented organizations recognize that they need to create a comprehensive education plan to gain the knowledge required for their value additions and relative initiatives.

In the current paper, the main task was to develop a flexible architecture that allows for just-in-time learning in workflow environment (fig. 1) and prove the concept and feasibility of task-oriented proactive delivery of eLearning by designing reference architecture based on workflow management systems (WFMS)\(^5\), HE Goal-oriented eLearning and learning content management system (LCMS)\(^6\) (fig. 4)

WFMS contain two basic components: the first component is the Process Modeling (PM) component, which enables administrations and analysts to define processes and activities, to analyze and simulate them, and to assign them to people. The second component is the Process Execution (PE) component, sometimes called the run-time component. Normally, workflow participants deal only with the PE component using a web-based or desktop-based WFMS client. In the project used the

---

**Fig. 2** Specification of eLearning activities in HE Hybrid Discussion Forum

**1.2 Education Value Chain**\(^4\)

Any education which does not do value addition to the seeker would fail to achieve its objective. HE Hybrid Discussion Forum would help individual seeks to reach at higher levels on education value chain (fig.3)

**Fig. 3** Course Development Value Chain

**Fig. 4** Task-based e-Learning architecture of HE Hybrid discussion forum
Taskman system\textsuperscript{7} as the WFMS for the task-based learning.

LCMS [LCMS] is a multi-user software system designed to enable learning developers to create, store, reuse, manage, and deliver digital learning content from a central learning object repository (LO Repository), which is a part of the LCMS that manages storing and retrieval of learning objects (LO) as well as maintenance of the learning concept ontology. The LO repository provides access to LOs through both a Web Service (WS) interface (DB Service) and direct SQL queries to the database.

Incorporating an on-the-fly goal-oriented course generator extends the LCMS used in HE Hybrid Discussion Forum.

\textbf{2.1 Task-based eLearning}

The enterprise business processes have hard requirements from the task-based eLearning. The information delivered to workflow participants has to satisfy the current users’ information needs but not to overwhelm them. Considering this fact, task-based eLearning has to be highly adaptive and goal-oriented (fig. 5).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Fig5}
\caption{Task-based eLearning with HE Hybrid Discussion Forum: sequence diagram}
\end{figure}

\textbf{2.2 SOA-based middleware system}\textsuperscript{1}

SOA enabling task-based eLearning by implementing the following functionalities accessible through a web service interface:

1. Building a text index (TI) of the learning concept from the LO repository for a high-performance search of learning concepts.
2. Retreiving learning concepts based on the full text search in the index – Index Engine (IE);
3. Delivering filtered list of potential learning goals to the user based on the current task context. The working scenario of the presented system is depicted on fig. 4.

\textbf{2.3 HE Goal-Oriented eLearning}

Goal-oriented or targeted learning is something that one meets in everyday life. Using artificial intelligence (AI) terminology, let us call the person who deals with any kind of tasks an agent. Such agents often have to cope with previously unknown kinds of task. Facing a new task, an agent first makes mental inferences and checks whether user has enough knowledge to perform the task. If the inference fails (i.e., necessary knowledge is not present), a knowledge gap is identified. After the knowledge gap is identified, the learning goals “cover the knowledge gap in the context of the given task” arises (fig. 6).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Fig6}
\caption{Activity diagram: Triangular Activity Methodology – Before}
\end{figure}
Learning goals that arose earlier and had not been satisfied or have been satisfied only partially will influence the learning process even if the agent currently has a new learning goal (fig. 7)

**Activity analysis**

![Activity diagram](image)

Fig.7 Activity diagram: Triangular Activity Methodology – After

Moreover, learning goals tend to evolve during the learning process: they can be generalized, specialized, and - if they become obsolete - eliminated. The components comprising the architecture presented above (fig.4)

### 2.4 HE Hybrid Discussion Forum Task Workflows

a. **System Call:** At the moment when user creates a task in the WFMS, the WFMS automatically launches a learning goal query to HE forum, which receives the context information from the WFMS and starts with learning concept retrieval.

b. **Learning concept retrieval and filtering:** Then starts the learning concept retrieval in the LO repository of the LCMS. If learning concepts that are relevant to the task are found, they should be filtered using the information from the workflow context.

c. **Learning strategy identification:** After retrieving and filtering of the learning concept, learning strategy should be determined. Which learning strategy in learning process should be chosen depends on the learning goal itself, the role of the user and the learning history of the user.

Here we defined 4 following types of eLearning strategies:

i. **Overview:** Very short description giving the general impression about the subject to be learned. One can compare this with glossary description. On the basis of the overview one should be able to judge whether user needs to learn this subject deeper or not.

ii. **Cursorily:** If the learner decided to learn the subject but he/she does not need to get expert-level knowledge on it, the cursorily strategy should be chosen.

iii. **Detailed:** Provides expert-level knowledge on the subject.

iv. **Repeat:** Serves as reference material on the subject.

### 2.5 Goal achieved

HE Goal-oriented eLearning returns learning concepts and recommended learning strategy as potential learning goals to the WFMS. At the end, this generates potential learning goal visualization: receives potential learning goals delivered by system and selects one or more of them.

The LCMS generates learning course dependent on the selected potential learning goals (fig. 5) and delivers it to user, so that user can start learning.In order to enable potential learning goals search, the HE Goal-oriented eLearning system creates full text search index of the learning concept ontology (concept name, description).

After the request from the WFMS system arrives, the search of learning concepts in the text index using task context information is performed. The results of the search are filtered using learning history and
competence profile (delivered from the WFMS). The concepts left after filtering are returned to the WFMS together with their short descriptions and proposed learning strategy.

3. Positive effects of e-Learning and blended ITIL (Information Technology Infrastructure Library) training strategies

ITIL adoption is a culture change that requires different levels of education from awareness to in-depth training and certification for the entire community.

The challenge is to match the education rollout program to the adoption of Blended Learning System Structure (BLESS) project plan – such blended education programs (fig. 8) are key to keeping everyone focused on the organization’s objectives for a successful adoption.

Fig. 8 BLESS project architecture

Here, a blended education program is one that incorporates instructor led and eLearning options while accommodating different organizational needs to achieve the most effective knowledge transfer according to HE Hybrid Discussion Forum which based on Web 2.0 services (Fig. 9 and 10)

Fig. 9 Blended ITIL and e-Learning education program with HE 2.0 (Part A)

Fig. 10: Blended ITIL and e-Learning education program with HE 2.0 (Part B)

There are several reasons to consider using an HE 2.0 based e-Learning program:

1. eLearning is more cost-effective, costs go down with more students
2. eLearning provides consistent course material/delivery
3. eLearning allows students to learn at their own pace
4. eLearning is on-demand and saves time in scheduling and rolling out
5. eLearning minimizes both time and relative expenses for both student and instructor from workplace/home
6. eLearning meets the needs of entire organization, at the same time, not time zone.
7. eLearning can also produce higher results (advantages of e-Learning over traditional classroom instruction) include:
   a. Around 60% better, faster, and consistent learning curve and 56% greater gains in learning
   b. Up to 50% higher content retention
   c. 15-25% increase in retention and knowledge transfer
   d. Consistency of the presentation of material was 40% higher
   e. Training compression was up to 70% faster.

8. Students who receive on-going training are significantly more productive. Some of the positive implications on student of eLearning:
   ✓ Students as co-creators
   ✓ Sites setup for participation
   ✓ Personalized content and tool
   ✓ User Control over content
   ✓ Greater use of feeds and external content
   ✓ Less distinction between content and tools
   ✓ Automatically updating courses

2.6 Conclusions

At the early stage, introduction of service oriented reference architecture is quite useful for integrating eLearning into enterprise workflows. The system serving for dynamic identification of the participating user’s learning goals. We have reported about integrating a dynamic course generator into the LCMS that enables just-in-time delivery of the adaptive learning courses in the workflow context. We also hope that this research paper would generate not only academic discussion but also open up new vistas and propel further research into applications of Web 2.0 to the HE area. The picture at the end reflects what can be achieved with implementing HE 2.0.

References

4. Baldrige Education Criteria for performance excellence framework
7. FRODO Taskman. Url:http://www.dfki.de/frodo/taskman