

Chapter 3

Web 3.0 and E-Learning: The Empowered Learner

Amit Chauhan
Florida State University, USA

ABSTRACT

The annals of the Web have been a defining moment in the evolution of education and e-Learning. The evolution of Web 1.0 almost three decades ago has been a precursor to Web 3.0 that has reshaped education and learning today. The evolution to Web 3.0 has been synonymous with “Semantic Web” or “Artificial Intelligence” (AI). AI makes it possible to deliver custom content to the learners based on their learning behavior and preferences. As a result of these developments, the learners have been empowered and have at their disposal a range of Web tools and technology powered by AI to pursue and accomplish their learning goals. This chapter traces the evolution and impact of Web 3.0 and AI on e-Learning and its role in empowering the learner and transforming the future of education and learning. This chapter will be of interest to educators and learners in exploring techniques that improve the quality of education and learning outcomes.

INTRODUCTION

The evolution of the Web 1.0 to Web 3.0 in the last three decades has had a tremendous impact on the growth and the future of education and e-Learning. Web 3.0 or the “*Semantic Web*” builds on Web 2.0 or the “*Social Web*” which is characterized by learner interaction and participation on the web. As the third generation of the web, Web 3.0 uses data from learner interaction on the web to generate and deliver customized content to the learners. Computer algorithms form the basis of Web 3.0 which makes it possible for machines, tools, and application to exhibit Artificial Intelligence (AI).

BACKGROUND

The evolution of Web 1.0 to Web 3.0 has divided the world into ‘*Digital Natives*’ and ‘*Digital Immigrants*’. ‘*Digital Immigrants*’ utilize traditional classroom pedagogy and communication methods in the classroom (Prenkys, 2001b). They went to school and graduated without *Google* or *Wikis* and have closely witnessed this epoch of technology revolution in education. In this sense, ‘*Digital Immigrants*’ primarily include educators, educational administrators, parents and life-long learners who have been forced to adopt technology for education and learning.

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How has the role of teachers transformed with the evolution of Web 3.0 and growth of AI? How can learners effectively use web tools for learning and education? What role will traditional institutions of learning play in this age of AI? What are the learning objectives and learning domains for Web 3.0? This chapter aims to explore current trends in the evolution of Web 3.0, and its overlap with the application and use of Artificial Intelligence (AI) in education and learning. This chapter will be of interest to educators and learners in exploring techniques that improve the quality of education and learning outcomes.

What is Artificial Intelligence?

The term Artificial Intelligence (AI) was first used by John McCarthy in 1955 for ascribing intelligence to machine and software. AI includes intelligent agents that are programmed with computer algorithms to maximize the potential and chances of success (Poole, Goebel, & Mackworth, 1998; Russell & Norvig, 2003). These intelligent agent or AI systems perform several tasks as computation; database query and retrieval; information search on the Internet; search engine functionality and features; and a current emerging trend – *Learning Analytics*. AI shares certain common features with Web 3.0 or the *semantic web* (Berners-Lee, 2001) which empower the learner. These features can be described as follows:

1. **Open and Cross-Platform:** AI and semantic web utilize several Application Programming Interface (APIs) that makes it possible to use them across different applications and Operating Systems (OS) platforms. Both AI and semantic web utilize Open-source Software (OSS) for developing, sharing, and customization of applications for global use and application. Since the Web 3.0 learners are a diverse lot in terms of geography, location, language and experience with technology, the availability and

use of open and cross-platform educational resources helps in maximizing learning outcomes.

2. **Data Mining:** AI and semantic web have built-in algorithms to analyze and interpret large volumes of data. This data can be used to analyze and predict learner behavior for a personalized learning experience.
3. **3D Virtualization:** Another commonality between Web 3.0 and the semantic web is the use of virtual and augmented reality learning tools and technology. These tools can be used to simulate learning processes which provide the learners visualize real-world scenarios for learning and cognition.
4. **Cloud Computing:** With cloud computing, learners have the ability to store, view, retrieve, exchange, and access computing services, files and applications over the Internet.

EVOLUTION OF THE WEB AND GROWTH OF E-LEARNING

The gradual transition of Web 1.0 to Web 3.0 over the last three decades has had a tremendous impact on education. One such impact has been the growth of eLearning. eLearning is defined as the use and application of computers and Internet to deliver information (Welsh, Wanberg, Brown & Simmering, 2003). To further analyze the impact of eLearning and how it has transformed education, it is important to look at the timeline of the web and Internet.

Web 1.0 is the first generation of the web and saw the advent and birth of the Internet. Learning in Web 1.0 was limited to four-walled classroom with limited participants and student participation. Web 1.0 did not support learner-content or learner-learner interaction on the web and was referred to as the “*Static Web*” (Berners-Lee, Hendler, & Lassila, 2001). eLearning did not become popular until the progression to Web 2.0 and Web 3.0. This

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