Chapter 7

Self–Directed Learning in the Age of Open Source, Open Hardware and 3D Printing

James I Novak
University of Technology Sydney, Australia

ABSTRACT

This chapter investigates the role of online communities in the future of learning. It considers the paradigm shift from the "push" of more formal educational models, to the notion of "pull" whereby people actively pursue personalized learning experiences. Empowered by the internet and the ability to access information and connect to each other at any time, massive online communities are building vast pools of information around specialized topics such as 3D printing, coding and electronics. This chapter discusses the role of digital technologies in transforming educational models. It provides an argument that practice-led, self-directed research is changing the way people engage with learning. The argument is supported by examples of practice from online communities, university and school education, drawing together key considerations for the future of education that are particularly relevant for technology and educational researchers, teachers across disciplines and those developing higher-level curriculum directives.

INTRODUCTION

The Internet is a transformative force affecting the ways in which people interact with each other and their environment. Individuals are increasingly able to connect via online communities in real time, with Web 2.0 ushering in a new age of sharing: sharing of ideas, sharing of events, sharing of news, sharing of daily life. As a result, people learn about the world in new ways, not only consuming information, but creating their own content and constructing their own view of reality. Growing alongside Web 2.0 are technologies like 3D printing, coding and electronics which have taken on many of the qualities inherent to the Internet, increasingly being part of social communities in which people are able to both learn and contribute simultaneously, effectively removing the barriers between learners and practitioners. Through Web 2.0, this learning happens beyond the classroom, accessible 24/7 from anywhere with an Internet connection. This concept of self-directed learning is commonly referred to as Open Educational Resources (OER) (OECD, 2007; Ponti, 2014), and this chapter argues that learning of digital technologies is becoming more like an apprenticeship, where people first imitate and replicate the work of others, then create their own knowledge that they contribute back into the community.

Traditional education providers like schools, universities and community colleges are subject to top-down directives, such as the STEM agenda, to integrate technology into the classroom. However, due to the rapid pace of change in technology evolution, educational institutions are finding it difficult to plan and maintain structured courses. There is evidence of teachers and students learning digital technologies together based on the introduction of recent pedagogical class models aimed at empowering students, such as the flipped classroom. Teachers and students are also able to pursue self-directed learning through online means. This is arguably proving to be the most up-to-date source of information on such rapidly evolving topics, allowing people to learn the skills necessary to update their knowledge as developments occur, as well as study at their own pace and customize their experience. This chapter seeks to provide new knowledge on how people are learning digital technologies through the practice of digitally-enabled making and OER, focusing specifically on 3D printing, coding and electronics. The approach discussed suggests that through these methods, students are developing life-long learning skills not only in these specific domains, but higher value skills like collaborative teamwork, communication, creative thinking and problem solving. Statistics will be presented from leading online communities within these domains to contextualize and explain how knowledge is being built in new ways compared to more traditional encyclopedic bodies of knowledge. The outcomes support the argument that the relationship between bottom-up learning and top-down education is rapidly changing, and that educational institutions need to

Related Content

Identifying the Strengths and Concerns of OpenCourseware Design: An Exploratory Study
Chia-Yu Changand Huang-Yao Hong (2014). *International Journal of Online Pedagogy and Course Design (pp. 16-26).*
www.irma-international.org/article/identifying-the-strengths-and-concerns-of-opencourseware-design/106813

Digital Business Portfolios: Categories, Content, and Production
Eleanor J. Flanigan (2008). *Encyclopedia of Information Technology Curriculum Integration (pp. 221-227).*
www.irma-international.org/chapter/digital-business-portfolios/16707

Design of a Web-Based Sentence Analysis System to Support EFL Reading Instruction
Yea-Ru Tsaiand Yukon Chang (2015). *International Journal of Online Pedagogy and Course Design (pp. 11-22).*
www.irma-international.org/article/design-of-a-web-based-sentence-analysis-system-to-support-efl-reading-instruction/126976

The 5M Approach: Layers of Reflection
Edwin L. Blanton IIIand Migdalia Garcia (2022). *Research Anthology on Service Learning and Community Engagement Teaching Practices (pp. 821-839).*
www.irma-international.org/chapter/the-5m-approach/296339

Using Asynchronous Activities to Promote Sense of Community and Learning in an Online Course
Jesús Trespalaciosand Jennifer Rand (2015). *International Journal of Online Pedagogy and Course Design (pp. 1-13).*
www.irma-international.org/article/using-asynchronous-activities-to-promote-sense-of-community-and-learning-in-an-online-course/129963