Chapter 13
Emerging Trends in Software Project Execution:
Engineering and Big Data Management for Vocational Education

Manu Mishra
https://orcid.org/0009-0003-4312-1646
HCL Technologies, USA

Padma Rama Divya Achanta
https://orcid.org/0009-0009-1596-6928
CDW, USA

Nitin Grover
https://orcid.org/0009-0009-6042-0836
Independent Researcher, USA

Ravi Chourasia
https://orcid.org/0009-0004-9328-9647
Capital One Services,USA

Shalini Sivasamy
https://orcid.org/0009-0004-1473-6948
Webster Bank, USA

ABSTRACT

The rapid evolution of software engineering and big data management has significantly influenced vocational education, equipping learners with industry-relevant skills. This chapter explores emerging trends in software project execution, emphasizing agile methodologies, DevOps practices, and AI-driven automation. Additionally, it delves into the role of big data in decision-making, cloud computing, and scalable data architectures tailored for vocational training. The integration of these technologies enhances hands-on learning, fosters innovation, and bridges the skill gap between academia and industry. By examining case studies and best practices, this chapter provides a roadmap for effectively incorporating modern software engineering principles and big data strategies into vocational education.

DOI: 10.4018/979-8-3373-1142-5.ch013

INTRODUCTION

The fields of software project execution and big data management are undergoing rapid transformations, driven by technological advancements and the growing demands of modern industries. The traditional methods of software development and data management are being replaced by agile frameworks, cloud-based architectures, and AI-driven automation. As industries adopt these innovations, vocational education must evolve to equip learners with the skills necessary to thrive in a competitive job market. By integrating emerging trends in software engineering and big data, vocational training institutions can provide students with hands-on experience, industry-relevant knowledge, and a strong foundation for career success. This chapter explores the key developments in software project execution and big data management and their impact on vocational education.

1.1 Overview of Software Project Execution and Big Data Management

Software project execution refers to the methodologies, tools, and frameworks used to develop, deploy, and maintain software solutions efficiently. Traditional waterfall models have given way to agile and DevOps approaches, which emphasize continuous integration, iterative development, and rapid feedback loops. The increasing reliance on cloud computing, containerization, and microservices has further revolutionized software engineering, enabling scalable and flexible project execution. Additionally, AI-driven automation tools are streamlining testing, debugging, and deployment processes, reducing human effort while enhancing accuracy and efficiency.

Big data management, on the other hand, focuses on the collection, storage, processing, and analysis of massive datasets to derive meaningful insights. Organizations leverage big data analytics to improve decision-making, optimize operations, and enhance customer experiences. With advancements in cloud computing, edge computing, and distributed databases, managing vast amounts of structured and unstructured data has become more efficient. Emerging technologies such as AI, machine learning, and blockchain are also transforming how data is processed and secured. Given the increasing importance of data-driven strategies in various industries, vocational education must incorporate big data management principles into its curriculum to prepare students for real-world challenges.

1.2 Importance of Emerging Trends in Vocational Education

Vocational education plays a crucial role in equipping students with practical skills and industry-specific knowledge that are directly applicable to their careers. With the rise of Industry 4.0, traditional vocational training approaches are no longer sufficient. Emerging trends such as AI-driven coding assistance, cloud-based development environments, and DevOps practices have redefined how software is developed and deployed. Similarly, big data analytics is becoming an essential skill for professionals in diverse fields, from healthcare and finance to manufacturing and marketing.

By incorporating these trends into vocational education, institutions can ensure that graduates are prepared to meet industry demands. Hands-on training with real-world projects, access to cloud-based tools, and exposure to data-driven decision-making models enhance students' technical proficiency. Moreover, integrating AI and automation into learning modules can streamline training processes, allowing students to experiment with cutting-edge technologies in a controlled environment. This shift is essential for keeping vocational education relevant and aligned with the rapidly evolving technological landscape.