Chapter 2
Role of Big Data in Education: Challenges and Opportunities for the Digital Revolution in Malaysia

Simin Ghavifekr
https://orcid.org/0000-0003-3679-7472
Faculty of Education, University of Malaya, Malaysia

Seng Yue Wong
https://orcid.org/0000-0001-9278-4348
CITrA, University of Malaya, Malaysia

ABSTRACT

Big data has the variety of characteristics, such as real-time performance, timeliness short, and data mining analysis of large value generated. Application of big data in education can be reviewed in various aspects such as 1) providing students with appropriate teaching, 2) providing teaching support to teachers, and 3) providing information management for the administrations. This chapter can serve as a guide for the management of higher education institutions to recognize possible challenges in big data analytics and better prepare for them in future decision making.

INTRODUCTION

The Internet utilization is growing rapid. Apparently, there were 4.66 billion active internet users from the worldwide, which is accounted 59.5 percent of the global population, as updated since January 2021 (Johnson, 2021). Internet is a core pillar of the modern information society via the connection of billions of people worldwide. Of these internet users, 92.6 percent people accessed internet via mobile devices. Malaysia has a population of 32.57 million in January 2021. Of this total, there were 27.43 million internet users in Malaysia. The number of internet users in Malaysia has increased dramatically by 738,000 between 2020 and 2021. Internet penetration rate in Malaysia was 84.2% in January 2021 (Kemp, 2021). All these people produce tons and tons of data, passing over the information to other internet users, up to the average 2.5 quintillion data daily. Schools, colleges, HEIs and universities students have contributed

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the bigger half of these data via their daily active activities, such as searching for, processing and working with the information online. They left these digital breadcrumbs and become part of the big data. Big data consisted of a great variety of information, more voluminous than conventional data, involving both processed and raw data.

Simultaneously, technology integration and utilization in the current global society, has brought many changes and challenges in our life. The fast-expanding development on technology has affected all aspects of life including education system. In line with this development, the way students are learning and teachers are teaching, have been changed accordingly. The teaching and learning process is now underway by going beyond the physical presence of the teacher and the students, to be more globalized and lifelong teaching and learning. These fundamental changes have affected the way that teachers teach and students learn in many aspects, hence have resulted in developing inherent issues and challenges (Auer & Tsiatsos, 2020). In today's environment, it is virtually impossible to separate the use of modern technology from education. As much as ICT is just a tool to make everyday life easier, the technology is advancing so rapidly that many are wondering if computers will one day take over and replace human roles and ultimately lives. What would future jobs look like? Would manpower existing today be replaced? What would schools look like in the future? With distant education made possible through e-learning and the emergence of Artificial Intelligence (AI) technology in robotics and learning, there is a growing contention of whether physical schools as we know it today would be obsolete (Anealka, 2020). To deal with such a fundamental transformation in education system, application of big data analytics can help educators in decision making to enhance the quality of education in various aspects such as teaching-learning and management.

Big data analytics has great effect on education system because it improves the accuracy of the decision-making process. The development of big data and Fourth Industrial Revolution, give educators the possibility to introduce new ways to enhance the quality of education and teaching–learning processes (Lawrence et al., 2019; Murumba & Micheni, 2017). The year 2020 has caught the global community off-guard with the emergence of the COVID-19 pandemic which affected all aspects of human life, from the decline and shutdown of the biggest industry players to the adaptation of academic structures within all learning institutions around the globe (Favale et al., 2020). The stakeholders and the management of educational institutions were thrust into imminent change and having to navigate the use of e-learning as the sole mode of instruction to ensure continuity of academic activities (Demuyakor, 2020). In this regard, specifically, Higher Education Institutions (HEIs) are now faced with a tremendous challenge, with the COVID-19 crisis and trepidations of a worldwide recession. A large number would suffer from the aftershocks of the pandemic with the decline of student enrollment, especially those with international students. As such, this is the perfect time for HEIs to take charge and ensure a smooth transition. Nonetheless, big data incorporation into education enables the educators to gather information about the teaching and learning process as well as improving students' initial and continuous learning stages. Analyzing the massive data in education can help us to build better connections that lead to make effective decisions for the improvements of teaching and learning. This can portrait the importance of big date application in education (Olszak et al., 2018).

Similarly, in Malaysia the government aspiration is to provide a competitive education system in line with the global needs to be transformed in the line with the development of advanced technologies such as big data analytics, the IR 4.0, robotics, and the Internet of Things (IoT). Big data analytics create various opportunities for teachers and students' engagements in the new teaching and learning technology tools (Lawrence, Lim, & Abdullah, 2019). In the year 2014, Ministry of Education (MoE)