

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Meeting the Needs of Fourth Industrial Revolution (4IR) in Entrepreneurial Education in Malaysia: The Government's Role

Hanim Kamaruddin, Rosilah Hassan, Norasmah Othman, Wan Mimi Diyana Wan Zaki and Sarmila Md Sum

Abstract

Entrepreneurship education holds great value for all students of science, technology, mission work, social work, healthcare, and education. It also serves as a great incubator for the types of creative, innovative ideas of our students and the global needs in the 21st century where combining entrepreneurship syllabus and exposure of the fourth industrial revolution is essential. This study explores the Fourth Industrial Revolution (4IR) as an opportunity to change models of innovation-driven entrepreneurship for the better, and create an environment that makes entrepreneurship more inclusive, while maximizing the Fourth Industrial Revolution's benefits to the society and minimizing the risks that come with it. The role of Malaysian government in enhancing entrepreneurial education must therefore recognize the fourth industrial evolution and its impacts that must be compatible with Malaysia's industry policy. Promotion of entrepreneurial experimentation within an appropriate entrepreneurial education ecosystem will provide entrepreneurs with smart government support that invests in entrepreneurial skills in Malaysia. This article assesses (i) fourth industrial revolution impact on entrepreneurial education; (ii) new expectations arising from impacts of fourth industrial evolution in Malaysia: method in teaching and learning; (iii) government's role in supporting entrepreneurship education and finally (iv) entrepreneurial education reforms in Malaysia.

Keywords: Malaysia, entrepreneur, education, government, 4IR

1. Introduction

Recognizing the importance of entrepreneurship education in inspiring entrepreneurship development and the economy, Malaysia Ministry of Higher Education (MOHE) has taken the initiative by making entrepreneurship subjects compulsory to all students at all universities [1]. The students are encouraged to take part in the entrepreneurship activities at their respective universities in order to develop the entrepreneurial attitudes and mind-set. The advancement in technology revolution is transforming method of educating through the usage of digital application that will eventually discard the traditional of concept time-honored classroom teaching.

The 4IR will experience a combination of technologies that distort the lines between the physical, digital and biological spheres. It is, indeed, built upon the Third Industrial Revolution known as the digital revolution since the 1950's as revealed by Smelser [2]. The Fourth Industrial Revolution can be referred as the current proliferation of technological advancements driven by connectivity, speed, breadth and depth of transformation. It is reinforced by the digital economy that emphasize some rapid advances in emergent innovation areas like artificial intelligence (AI), internet of things (IoT), robots, block chain, 3D printing and cloud computing that are transforming industries and societies across the world. AI is best described as a wide field of study with applications to many disciplines and various subfields.

With the emergence and availability of computers or machines, their capability to perform various tasks have grown and developed at a quick pace. Specialists and professionals have developed the power of computer systems to be applied in diverse working domains that focused on increasing speed and reducing its size with respect to time. Applications of AI has shown a growing and advanced applications in various fields such as gaming, natural language processing (NLP), expert system, vision system, speech recognition, handwriting recognition and intelligent robot.

The ten (10) major Fourth Industrial Revolution (4IR) technologies revealed at World Economic Forum in 2017 with potential to be the most influential over the next decade whereby their impacts are not limited to shaping industry and businesses worldwide but also in helping to secure and enhance the planet's sustainability. This suggests the importance of environmental sustainability technologies that will attribute to the broader social challenges of the 21st century. The fast emergence of 4IR and its impacts must therefore translate to new implementation in Education 4.0 that focuses on empowering education to adapt to new challenges in teaching and content that creates and motivates innovation in technology.

2. New expectations arising from impacts of 4IR in Malaysia

Nowadays, all graduates face a world transform by technology, in which the internet and social media create different opportunities and challenges for formal education systems. As students consider life after graduation, the universities are facing questions about their own destiny especially in ensuring graduates are fully employed. In the era of fourth industrial age, students require to acquire certain skills that are not exactly the same as the skills that were required in the previous era (third industrial revolution) where information technology was the key driver. The skills emphasis needs to be shifted towards imparting of complex, problem solving skills: creative skills and social skills including management, leadership, change management, collaboration, critical thinking, curiosity and risk taking, communication, marketing and sales [3]. Further, emotional intelligence, judgment, negotiation, decision making, cognitive flexibility, as well as knowledge production are also skills that are required for the new era entrepreneurship.

With this development, many changes need to occur in the education system. For example, changes need to be made in the curriculum of courses offered in universities and teaching methods used by the lecturers. However, the goal of higher education institution such as to ensure quality of learning via teaching, to enable the students to get the latest knowledge through exploratory research, and to sustain the development of societies by means of service will remain.

One of the main objectives of every higher institution is to educate the youth. Therefore, it is necessary to implement appropriate teaching strategies or method

and to organize work in a way that foster learning. This has implication on better learning experience and lifelong learning attitude. The changes that is expected to occur in the Malaysian Higher Education System are changes in teaching and learning methods. For instance, the implementation of massive open online courses (MOOCs) has been introduced in 2014. According to Mohamed Amin [4], teaching in the classroom can no longer remain conventional if universities want to produce competitive, innovative and creative graduates. He added, those born in the era of mobile computing, which he called Generation Z, are skilled in sharing information through social media and are interested in learning new things online. Therefore, educators need to create teaching and learning contents which can stimulate their learning experience.

The use of MOOCs in teaching and learning has also been identified as beneficial in the education system. Amongst the benefits that have been identified are:

- i. Will allow higher institutions to decrease the cost of creating and delivering programs without compromising quality.
- ii. can reach a much broader audience student – of all ages anywhere in the country via an internet connection will now be able to access high quality courses even if there are not currently enrolled at higher learning institutions.
- iii. Will allow higher learning institutions to quickly augment their programs with international courses content and/or add new courses which they could not previously provide.

Massive open online courses, or MOOCs, have been regarded as a dominant force in the transformation of pedagogy. Universiti Kebangsaan Malaysia (UKM) has launched its own version of MOOCs and actively used as one of the methods in teaching and learning. In 2016, a total of 122,021 students have registered for the UKM courses and as for 2018, UKM plans to add more courses uses MOOCs platform.

3. Malaysian government's role

The role of Malaysian government in preparing the future generation with entrepreneurial skills and mindsets has made some headway throughout the last decade with the establishment of the Higher Education Entrepreneurship Development Policy in 2010. This significant policy addressing six (6) core areas creates entrepreneurial values and cultures amongst students or graduates in the Higher Learning Institutions (HEI's) by alleviating the development of entrepreneurial programs into a more defined, holistic and well organized curriculum to produce graduates with heightened entrepreneurial attributes and thinking skills. The government envisages an increase in the number of entrepreneurs amongst the graduates to stimulate economic transformation towards a high-income nation. Hence, several marked achievements can be traced including:

1. Nineteen (19) Higher Education Institutions (HEIs) in Malaysia have introduced entrepreneurial education as a compulsory subject [5] that are Universiti Kebangsaan Malaysia, Universiti Teknologi MARA, Universiti Putra Malaysia, Universiti Malaya, Universiti Islam Antarabangsa, Universiti Sains Islam Malaysia, Universiti Malaysia Sabah, Universiti Malaysia Sarawak, Universiti

Malaysia Kelantan, Universiti Teknologi Malaysia, Universiti Teknologi Hussein Onn, Universiti Sains Malaysia, Universiti Malaysia Perlis, Universiti Malaysia Pahang, Universiti Utara Malaysia, Universiti Sultan Zainal Abidin, Universiti Perguruan Sultan Idris, Universiti Teknikal Melaka and Universiti Malaysia Terengganu.

2. Several thrusts in the Strategic Plan on Entrepreneurship Development in Higher Education (2013–2105) have been successful [6] which include establishing the Entrepreneurship Centre in every HEI, providing holistic and well-planned entrepreneurial education and programmes, enhancing the competency of HEI's entrepreneurship trainers and facilitators, and to increase the effect of the implementation of HEI's entrepreneurial education and development.
3. Various programs to stimulate entrepreneurial spirits and increase knowledge and skills such as 1Malaysia Entrepreneur (1MET), Program Usahawan Bimbing Usahawan, Business Design Workshop and Business Facilitator, Graduate Entrepreneur Scheme (SIS), Program Galakan Perniagaan and Program Pembudayaan Keusahawanan (INSKEN 2015), MSC Malaysia, Meet Your Experts (ER360), Majlis Amanah Rakyat, Small Medium Enterprise (SME) Corp Malaysia, Ministry of Domestic Trade, Cooperatives and Consumerism (KDNKK) and Perbadanan Nasional Berhad (PNS), Satu Daerah Satu Industri program (SDSI), Youth and Entrepreneurship Program (Business and Agriculture Business), Economic Transformation Program and Automotive Workshop Modernization or ATOM.
4. The establishment of Malaysian Global Innovation and Creativity Center (MAGIC), an entrepreneurial entity, formed by the Malaysian government in 2014 to develop dynamic entrepreneurs with high endurance equipped to take up challenges and make impact at regional and global stage.
5. The government provides micro-credit facilities through TEKUN Nasional and Amanah Ikhtiar Malaysia (AIM) to manage the micro-credit funds in tandem with entrepreneurship training to build women and youths' ability in finance, business plan preparation, marketing and promotion.
6. Women Entrepreneurship Incubator (I-KeuNITA) was introduced to harness women's skills training in micro enterprises providing intensive skills training and entrepreneurship assistance for low-income women in the field of sewing, beauty therapy, commercial cooking, crafts, childcare, and tour services. In addition, the Ministry of Women, Family and Community Development holds a Skills Training for Single Mothers (I-KIT) to encourage generation of income for single mothers [7].

Malaysia appears to be on the right track to ensure that transformation to a high-income nation by 2020 and beyond is attained. In that regard, the *Vision 2020* plan for the future of Malaysia between 2020 and 2050 needs to be put in place adapting to changes brought forth by 4IR. Hence, the universities having a serious role shall need to produce real future talents equipped with technological digital know how that must be supported with government's initiatives. It is invoked that future jobs require a new institutional approach that encourages universal skillset that complements significant changes that are coming quickly with a mix of both social skills and technical skills. A few examples of direction higher tertiary education employed in the US and UK universities towards that objective include:

- i. Tulane University where targeted curriculum focuses around mission based and cross disciplinary learning that blends science and technology studies with entrepreneurship studies. The Bioinnovation PhD Programme trains students across the university's science, engineering, medicine, law and business faculties and supplements that academic breadth with 'real-world' support of the US FDA and New Orleans Bioinnovation Center [8].
- ii. Cambridge University's Institute for Manufacturing offers a cross disciplinary collection of expertise in management, engineering, technology and policy relating to manufacturing.
- iii. Stanford 2025 and Georgia Tech have taken steps to ensure life-long learning through online education is readily available where increasingly, the 3–4 year undergraduate degrees is deemed outdated. Thus, continuous learning is necessary to suit changing jobs and technologies to rapidly meet with the needs of a new technological revolution.

In Malaysia, a number of initiatives have developed across the higher learning institutions including the usage of Massive Open Online Courses (MOOC) that is seen as a progress from campus-based university education towards an online education.

After analyzing the future needs of the job market taking into consideration the fusion of digital and biological impact of 4IR, the Malaysia's Higher Education Ministry has prepared a framework, known as Education 4.0 Framework, to ensure that the higher education institutions are equipped for the challenges and demands of the 4IR. This move is a critical step in allowing for promising and future directions to create initiatives in local academic world to best safeguard against the certainty of unprecedented future 4IR will create for students and future graduates.

Hence, the role of Malaysian government is intensified as it has to ensure that the demands of 4IR can be fulfilled by an education system that is able to produce graduates with efficiency in technological expertise and humanistic issues.

4. Entrepreneurial education reforms

The [9] (MEB) (Higher Education) has integrated factors to tackle the uncertainty of the 4IR to produce holistic, balanced entrepreneurial graduates who can adapt and cater to newly created jobs that are yet to exist. Thus, the Ministry recognizes that the education system needs to keep abreast with global trends such as disruptive technologies, the Internet of Things and the automation of work knowledge. Hence, the MEB is constructed on five aspirations which are access, quality, equity, unity and efficiency that is further strengthened by its foundation for a balanced student emphasizing on six primary attributes. These attributes include ethics and spirituality, leadership skills, national identity, language proficiency, thinking skills and knowledge that can be instilled entrepreneurial mindset of graduates that places equal value on technical training. In order to achieve these aspirations, the MEB lays out 10 SHIFTS (see **Figure 1**) that will stimulate performance towards achieving excellence in the higher education system through three (3) phases beginning from 2015, 2016–2020 and finally in 2021–2025. The first four Shifts aim for outcomes from main stakeholders in our HE education system while another six Shifts focus on enablers in the HE ecosystem namely financial stability, empowered government, innovation ecosystem, global prominence, globalized



Figure 1.
The 10 SHIFTS. Source: [9].

online learning and transformed HE delivery. The Higher Education Ministry expects the transformation to be gained in the long term, but impact and changes will be visible in the short term building on future excellence.

With the emergence of 4IR, Malaysia has taken a much-needed educational strategy to introduce new methods to produce students to meet the demands of the new Revolution that must be powered by character building, higher order of thinking, multiple intelligences and soft skills. Various initiatives were undertaken that include the application of iCGPA which assesses students on their participation in co-curricular, social and voluntary activities, 2u2i Programme and the CEO @ Faculty Programme. In a more micro level initiative, universities in Malaysia are encouraged to give emphasis on data analytic skills for students across disciplines on top of the entrepreneurial skills. This effort is to adhere to the rapid development of processing power and availability of big data that are seen becoming one of the distortions to the entrepreneurial strategy. Hence, besides entrepreneurial skills, students need to have the ability to manage and take advantage of the data to come out with the best information for business decision particularly on the trend of the market and the availability of the supplier. In UKM, apart from offering the subject of Fundamentals of Entrepreneurship and Innovation [10, 11], the university is also offering Management and Data Analytic as compulsory subject to all the students to address method for managing, mining and analyzing big dataset.

It is further envisaged that in order to meet the challenges of the 4IR, several factors are required to enhance the education system including entrepreneurial curriculum content that are:

- i. Application of Heutagogy which is “*the study of self-determined learning that attempts to challenge some ideas about teaching and learning that still prevail in teacher centered learning and the need for, as Bill Ford (1997) eloquently puts it ‘knowledge sharing’ rather than ‘knowledge hoarding’. In this respect heutagogy looks to the future in which knowing how to learn will be a fundamental skill given the pace of innovation and the changing structure of communities and workplaces*”.
- ii. Delivery of Higher Education that asserts gamification, and on demand learning methods such as inverted classroom and blended learning.
- iii. Curriculum Content which amplifies the need for balanced values of ethics and morality and knowledge and skills (**Figure 2**).
- iv. Translational research which encompasses transdisciplinary collaborations, crowd sourcing, web of co-laboratories, quadruple helix innovation, a symbiosis of learning, research and collaborations and guided by human based research ethics.

The MOHE has realized 4IR is opening vast opportunities to on-line or e-commerce businesses which includes the Business to business (B2B), Business to Customer (B2C) and even Customer to Customer (C2C) business activities. In order to equip the current entrepreneurship education content, collaboration with the world e-commerce giant Ali-Baba Group Ltd., for example, was initiated with MOHE to participate in the Global E-Commerce Talent (GET) training program that provides lecturers and students of higher education with competitive skills required in the global e-commerce industry. It is the intent of the MOHE that with the e-commerce skills provided, the higher education in Malaysia would be able to develop more entrepreneur talent with new business model that benefits from 4IR that creates a platform to heighten connectivity in the existing entrepreneurial eco-system.

Hence, it is suffice to state that presently educational system in Malaysia is bracing for new paradigm shift or at a lesser extent enhancing the existing methods to ensure that entrepreneurial learning content is aligned with impacts of 4IR. Although the Education 4.0 Framework that address the issues and challenges



Figure 2.
The 21st century curriculum for MyHE 4.0. Source: Datin Paduka and Tapsir [12].

of 4IR is yet to be realized, it is an evidence that the Malaysian government has quickly taken up the role to explore the impacts of 4IR to redesign the curriculum content at the higher learning institutions.

5. Conclusion

The business of higher education institutions remains unchanged in Malaysia since the establishment of the University of Malaya in 1949, however, students still assemble at a scheduled time and venue to listen to the wisdom and teachings by scholars. Given the fourth industrial revolution, a new form of university is emerging that implements teaching, research and service in an unconventional approach. This version of university education is interdisciplinary and multi-disciplinary where methods of learning and teaching is conducted in virtual classrooms. Hence, the experience of learning is highly enhanced with the usage of technology and data management. Hence, all stakeholders especially the government needs to ensure that all tools and initiatives are well placed in all educational institutions to meet all the impacts of 4IR and benefits a potential entrepreneur graduate may gain from the new revolution.

Acknowledgements

This research is funded by National Higher Education Research Institute (IPPTN) under CLMV Research Grant – Executing UKM Entrepreneurship Education syllabus on Cambodian University (Code GG-2016-004) and FRGS/1/2018/TK04/UKM/02/07.

Author details

Hanim Kamaruddin*, Rosilah Hassan, Norasmah Othman,
Wan Mimi Diyana Wan Zaki and Sarmila Md Sum
Universiti Kebangsaan Malaysia, UKM, 43600 Bangi, Selangor Darul Ehsan,
Malaysia

*Address all correspondence to: hanim@ukm.edu.my

IntechOpen

© 2020 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

References

- [1] Hardy Loh Rahim, Mohd Ali Bahari Abdul Kadir, Zanariah Zainal Abidin, Junainah Junid, Laila Mohd Kamaruddin, Noor Faizah Mohd Lajin, Siti Zahrah Buyong, and Adlan Ahmad Bakri, 2015. Entrepreneurship Education In Malaysia: A Critical Review, *Journal of Technology Management and Business* (ISSN: 2289-7224) Vol 02, No 02, 2015.
- [2] Smelser NJ. *Social Change in the Industrial Revolution: An Application of Theory to the British Cotton Industry*. Routledge; 2013
- [3] Naude W. *Entrepreneurship, Education and the Fourth Industrial Revolution in Africa*. IZA Institute of Labor Economics, Germany: Discussion paper series; 2017
- [4] Mohamed Amin Embi, 2016. 35 Kursus Massive Open Online Courses (MOOC) baharu untuk pembelajaran sesi akademik 2016/2017. http://www.ukm.my/news/Latest_News/new-teaching-and-learning-method-for-generation-z/. Accessed 24 Jan 2019.
- [5] Yussof B, Zainol FA & Ibrahim B 2015. Entrepreneurship Education in Malaysia's Public Institutions of Higher Learning—A Review of the Current Practices, *International Education Studies*. Volume 8, No. 1.
- [6] Shamsudin SFFAAM, Nawari NBC, Nasir NABM, Zakaria MNB. Policies and practices for entrepreneurial education: The Malaysian experience. *The Journal of Developing Areas*. 2016;50(5):307-316
- [7] Mutalib RA, Arshad R, Ismail NSA, Ahmad Z. Women and entrepreneurship: An overview of women entrepreneurship programs in Malaysia, *JGD* vol. 11. Special Issue on Social Entrepreneurship. 2015:15-28
- [8] R. May Lee, Kendall, M. and Simmons, T, 2017, <https://www.weforum.org/agenda/2017/10/to-train-tomorrow-s-leaders-universities-need-again-to-teach-universal-skillsets/>. Accessed 23 December 2017.
- [9] Malaysia Education Blueprint 2015-2025 (Higher Education), Ministry of Education, Malaysia
- [10] Hassan R, Zaki WMDW, Kamaruddin H, Othman N, Sarmila MS. Fostering entrepreneurship foundation. Nurturing Innovation and Creativity in UKM Students, 7th International Conference on Global Social Entrepreneurship. 2016:43-50
- [11] Rosilah Hassan, Wan Mimi Diyana Wan Zaki, Hanim Kamaruddin, Norasmah Othman, Sarmila Md Sum, Zulkifli Mohamad, 2017, Entrepreneurship Education in UKM: Essential Skills for first - Years Students, Leadership, innovation and entrepreneurship as driving forces of the global economy: Proceedings of the 2016 international conference on leadership, innovation and entrepreneurship (ICLIE), p 675-685.
- [12] Datin Paduka IR, Siti Hamisah Tapsir, 2017, Keynote Speaker in University Presidential forum 2017, <http://www.utm.my/upf/utm-university-presidents-forum-2017/>. Accessed 30 January 2019.