# Interactive Effect of Information Systems and Instructional Systems Design on Digital Leadership Training Development

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## ABSTRACT

This paper explores the relationship between information systems (IS) and instructional systems design (ISD) to innovate an extended Baldridge Performance Indicator (BPI) model for developing massive open online courses (MOOCs). The project is part of an ongoing collaborative research project between the Universiti Sains Malaysia, Penang and RMIT University, Melbourne, Australia, to design and implement online digital leadership training modules for the Malaysian higher education leadership academy (AKEPT). To date, the education sector has been slow to adopt the BPI for academic performance recognition. This paper presents a work in progress that highlights the importance of designing effective training ePedagogies, which promote good digital leadership skills based on four MOOCs modules: vision, mission and values; digital workforce environment; digital workforce engagement; and ethical digital leadership behaviour. The extended BPI model will enable accurate measurement of visionary academic digital leadership, such as: (1) definition and application of key knowledge and concepts; (2) independence, self-determination, self-teaching and self-motivation; (3) problem-solving, thinking and computing skills; (4) strong ethical characteristics and values; (5) awareness of societal, health, safety, legal and cultural issues; and (6) recognition of the need to undertake life-long learning.

**Keywords:** information systems (IS), instructional systems design (ISD), digital leadership skills development, Malaysian Quality Framework (MQF), Baldrige performance indicator (BPI), extended-Baldridge performance indicator, massive open online courses (MOOCs).

## 1. INTRODUCTION

Educational researchers continue to work to define the characteristics of a 21st century digital leader. The so-called Education 4.0 exemplar, which some say was aligned with the fourth industrial revolution (Fisk, 2017), has disrupted building a meaningful leadership skills profile. It has been said that in the field of education, leadership was not necessarily constrained to specific academic roles or grades (Pont, Nusche, & Moorman, 2008); instead it represented a particular attitude or approach to solving problems. The same is true of leadership within government services. It has been argued that the best digital leaders are humble and collaborative, yet ambitious and creative; they have vision and possess a great understanding of user-centered digital service development and agile ways of working. This disposition is combined with an ability to inspire, trust and learn from the teams and specialists around them. Digital leadership is not just about recognizing the power of digital technology, it is about being able to put tangible plans into action.

These days, the importance of sound digital leadership is no more obvious than in massive open online courses (MOOCs). Ever since the advent of MOOCs, educational courseware developers have focused on how to build novel online education programs (e.g. Cousera, EdX and Udacity). These early MOOCs offered many advantages, such as massiveness in terms of training/educational reach, involving openness and connectedness in terms of global accessibility. Unsurprisingly, many educational institutions adopted this newfound digital instructional platform to disseminate knowledge. It soon became evident that MOOCs have lifelong pedagogical benefits that are attractive to many educationalists, including: being free to join; have open and flexible access; and offer enhanced student engagement.

Connectivism oriented MOOCs gained popularity because they were aligned with theories that supported the role of social and cultural context in an educational setting (Downes, 2012); they promoted autonomy, diversity, openness and interactivity (Rodriguez, 2012). With such connectivism-like MOOCs, ePedagogy moved from taking a traditional face-to-face classroom approach to a digitally distributed networked position (McKay, 2013). At the same time, this emerging ePedagogical development mirrored instructional design changes, which shifted teacher-centred classrooms towards student-centred pedagogies, where the learning became the responsibility of the students (Mascolo, 2009). As the educational research shows (McKay, 2018), instructional systems design (ISD) must involve increased interactivity to raise students' motivation towards their learning (Lehman & Conceição, 2010). Therefore, it is often assumed that effective courseware would automatically enhance communication, increase specialized knowledge and skill development.

This paper explores the relationship between information systems (IS) and instructional systems design (ISD) for shaping good digital leadership skills among Malaysian higher education (HE) academics through an extended Baldrige Performance Indicator (BPI) assessment model. It presents an IS research project in progress, with the Malaysian HE context as background. A description of the relationship between IS and ISD illustrates how instructional strategies for the MOOCs will be carried out (McKay, 2018). Then, the paper shows how an extended BPI model was used to develop a digital leadership training MOOCs program by mapping the learning outcomes to the Malaysian Qualification Framework (MQF). A short summary concludes the paper.

## 2. BACKGROUND TO THE STUDY

In January 2008, the Malaysian Ministry of Higher Education established the Higher Education Leadership Academy or colloquially called the *Akademi Kepimpinan Pengajian Tinggi* (AKEPT), in line with the objectives of the Malaysian National HE Strategies Plan. AKEPT was authorized to transform higher education in Malaysia, aiming to achieve world-leading quality in the area of human capital development. AKEPT was initially tasked with developing leadership in the top and middle-level management of Malaysian HE institutions to provide a series of training programs for university administrators and professors nationwide.

This initiative was designed for a Master Trainers course which involved 15-competency building areas (courses), according to Konting, Singh and Idris (2009). One of these training courses was called the Training of Trainers in Higher Education Learning and Teaching: Direction, Shape and Provision of HELTI. To certify the HELTI participants as Master Trainers, required the program outcomes were to be mapped against the MQF competencies shown in Figure-1. However, HELTI only covered five of the eight MFQ competencies; missing were: ethics, professionalism and humanities; lifelong learning and information management; and the entrepreneurship and managerial skills.

| | **HELTI Masters Training Course (2010)**<br><br>**Program Learning Outcomes** | **Eight MQF Training of Trainers Certification Competencies** (COPPA, 2018) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Knowledge** | **Practical Skills** | **Social Skills & Responsibilities** | **Ethics, Professionalism & Humanities** | **Communication, Leadership & Team Skills** | **Scientific Methods, Critical Thinking & Problem Solving Skills** | **Lifelong Learning & Information Management** | **Entrepreneurship & Managerial Skills** |
| 1. | Understand the concept of academic leadership and the roles of leaders | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| 2. | Relate the importance of team working and talent management in leadership | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| 3. | Develop the succession planning program for the organisation | ✓ | ✓ | | | ✓ | ✓ | | |

**Figure-1: HELTI training outcomes mapped to the MQF** (adapted from COPPA, 2018)

Most of the training modules in the HELTI Master Trainers' program were conducted in a traditional way through face-to-face classroom instructions. Thus far, MOOCs have never been used to deliver digital leadership skills training programs specifically designed for academics. Therefore, it is timely that such a project be conducted to promote 21st-century digital educational leadership skills. In Malaysia, this work is known as Education 4.0 (Fisk, 2017); we see it as the future of online learning ePedagogies (McKay, 2013) that respond to the needs of industry 4.0 (more commonly known as the fourth industrial revolution) in which people and machines align to enable new automation and data exchange possibilities. Such as: cyber-physical systems; the internet-of-things; cloud computing and cognitive computing.

Other than these Malaysian initiatives, no current research focuses on professional development for HE academics, which targets digital leadership skills training, using a MOOCs. Our study incorporates a customised BPI model adopting a prescriptive ISD approach to the MOOCs' modules according to McKay (2018) shown in Figure-2.

| **Digital Leadership MOOCs Program** | | | |
|---|---|---|---|
| **Module-1**<br>**Vision, Mission and Values** | **Module-2**<br>**Digital Workforce Environment** | **Module-3**<br>**Digital Workforce Engagement** | **Module-4**<br>**Ethical Digital Leadership Behaviour** |
| • Vision, mission and values<br>• Digital visionary leadership<br>• Customer-focus excellence<br>• Valuing workforce members and partners<br>• Organisational and personal learning<br>• Focus on success and the future<br>• Managing for digital innovation<br>• Management by facts<br>• Societal responsibility<br>• Focus on results and creating values<br>• Systems perspectives | • Effective and supportive digital workforce<br>• Recruitment, hiring, placement and retaining staff<br>• Organisation culture<br>• Competition and collaborative digital workforce<br>• Influence of social media and Web 2.0<br>• Health, security, and accessibility | • Digital workforce engagement<br>• Key factors in workforce engagement<br>• Organisation and personal performance<br>• Reward and recognition<br>• Safety and emergency preparedness | • Digital ethical leadership behaviour<br>• Ethical codes of conduct<br>• Moral values<br>• Trust |

**Figure-2: Extended BPI categories**

## 3. THE RELATIONSHIP BETWEEN IS AND ISD

IS have been defined variously over time. For instance, Davies (2009) thought the term referred to systems which both deliver information and services to an organisation and the organisational function which plans, develops, operates and manages the IS. Alter (2008) listed 20-alternative definitions based on views of computer-based information related to work carried out in organisations and associated with digital devices for transporting information to people. Alter listed IS social/organisational vs. technical/mathematical issues, commencing with the social systems that were identified earlier by Land (1985), through to definitions of IS as a group of interactive digital technology components that produce information (Kroenke, 2008).

Hedberg, Harper, and Bloch (1992) identified several problems of small educational IS. They showed how intricate implementing IS had become in purely educational settings. Instead, we propose these IS have a twofold distinction: to accommodate educational professionals and their student cohorts, and to serve the school-based administrative personnel.

ISD supports the educational technologists who design instructional strategies for implementation in digital classrooms, otherwise called online educational programs. Most ISD practiced today stems from the older and more traditional view of instructional design, which commenced well before the advent of Web 2.0 (when more powerful computing became available to the non-technical or general community of users). Figure-3 shows how few instructional models were suited to the digital environment (McKay, 2018).

| Total # | Evidential Examples – Prescriptive ID Models | | | | |
|---|---|---|---|---|---|
| | # found | Govt training | Instructional Systems Design (ISD) | ICT | Web 2.0 |
| 25 | 16 | 6 | 14 | 14 | 13 |
| Evidential Examples – Objective Taxonomies | | | | | |
| 3 | 3 | 1 | 2 | 3 | 3 |

**Figure-3 Prescriptive instructional design Models**
(McKay, 2018 p:5)

We are suggesting in this paper that there is a definable relationship between multimodal digital technology-enabled instruction and IS because of the efficiencies and effectiveness afforded to ISD through educational IS.

At the time of authoring this paper the research design and methodology are still in progress. Suffice to say that the research design will be a quantitative study that will investigate the interactive effect of instructional strategy and preference for instructional media on the Digital Leadership MOOCs learning performance outcomes. The methodology will involve HE academics working in Malaysia Universities and undertaking the Digital Leadership MOOCs Program. We plan to adopt a psychometric data analysis to review the responses to the pre- and post-test items.

Using the Rasch model (Bond & Fox, 2015) and the Item Response Theory (IRT) we will be able to determine the probability of an individual responding in a particular manner to the test-items. Our test-items will be developed using a Digital Skill Development Matrix (McKay, 2019) whereby the test-items will be derived from the tasks identified as necessary to successfully complete the Malaysian Qualification Agency (MQA) accreditation for a Master Training Trainer.

## 4. BPI IDEAL FOR ACADEMIC LEADERSHIP SKILLS TRAINING

The Baldrige Performance Indicator (BPI) is a corporate sector leader's guide to performance excellence that was created by the Malcolm Baldrige National Quality Improvement Act, signed by President Ronald Reagan on August 20, 1987. Still popular in business organisations (Mattin, 2013), this indicator provides a high-level organisational management view. However, digital technology has impacted the workplace leadership profile to extend the scope of the original BPI to focus on the multimodal digital nature of current leadership practise. The following describes each original Baldrige indicator:

- visionary leadership;
- organisational strategy;
- customer-focused;
- performance measurement, analysis and knowledge management;
- workforce engagement;
- organisational operations; and
- enhanced business results.

So far as **visionary leadership** is concerned, according to the BPI, senior leaders want to see the organisation's vision, mission and values. They need a clear understanding of the external or internal strategic organisational challenges (Vinyard, 2017-2018). Successful leaders clearly understand and define employee groups based on the organisational business needs. They need to align performance rewards and recognition.

In **organizational strategy**, leaders need to be cognizant of strategic objectives and action plans for running an organisation. They need to know the key strategic objectives of the organisation and how these objectives can be successfully achieved. They also need to be able to model the organisation from top to bottom. This means by taking such strategic actions to keep the organisation competitive. These strategic objectives then drive the action plans that are often described as key performance indicators that are used to track the achievement and effectiveness of the action plans.

The **customer-focused indicator** describes how great leaders can enable an organisational culture that affords high levels of customer engagement. An important leadership task is therefore to understand what products are offered to the customers, and the expected service levels necessary to improve customer engagement.

The **performance measurement, analysis and review** are key to the success of any organisation. Therefore, leaders must select their metrics linking to what is important to the success of the organisation. Without these linkages, the organization's strategic objectives will not be achieved. They must also have a strong ability to perform data analysis and make fact-based decisions. In this manner they can turn data into information and information into action (Vinyard, 2017 p32).

**Knowledge management skills** were originally included within the Baldrige performance measurement indicator. As such, leaders must know how to use organisational knowledge and share it within their organisation.

**Workforce engagement** related to the capability and capacity to properly plan and implement organisational strategies. They must ensure that the workforce is prepared for change (good or bad). Therefore, good leadership understands the relationships between the work

environment; workforce engagement; workforce motivation and business results. Moreover, leaders have three organisational responsibilities that include: to take responsibility for their own learning; ensure everyone in the organisation is willing to learn and stretch their own capabilities; and make sure that these cyclical processes result in organisational experiential learning.

The **Organisational operations** indicator refers to leadership knowing how to design and manage the operational business processes. They must know how to determine the key products, the work processes and how to improve organisational performance and reduce variability. Leaders should also know how to manage supply-chain business techniques and how to pursue opportunities for innovation.

Lastly, the **enhanced business results** indicator refers to the evaluation of business performance factors such as: levels of current performance; identifying trends; making comparisons on performance comparisons with that of other organisations and competitors; benchmarking; data integration, like tracking results that were important to the organisation; and whether results were useful for organisational decision making.

## 5. EXTENDED BPI TRAINING MOOCs

The indicators shown in Figure-1 extend the original BPI to include digital academic workplace environmental indicators that are divided into four training modules.

### 5.1 Mapping of Digital Leadership MOOCs Training Program learning outcomes with the Malaysian Qualification Framework (MQF)

The MQF underpins the Malaysian Government's MQA training accreditation authority. Consequently, their certification sets domains of learning outcomes that are significant for maintaining a quality Malaysian workforce, shown in Figure-4.

- knowledge;
- practical skills;
- social skills and responsibilities;
- communications, leadership and team skills;
- scientific methods, critical thinking and problem-solving skills;
- lifelong learning and information management; and
- entrepreneurship and managerial and skills.

| **Extended BPI Learning Outcomes Mapped to the MQF** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **MOOCs Digital Leadership Program Learning Outcomes** | | | | **Malaysian Qualification Framework (MQF) for workforce accreditation** | | | | | |
| **Module-1 Vision, mission and values** | **Module-2 Digital workforce environment** | **Module-3 Digital workforce engagement** | **Module-4 Ethical digital leadership behaviour** | **Knowledge** | **Practical skills** | **Social skills and responsibilities** | **Ethics, professionalism and humanities** | **Communication, leadership and team skills** | **Scientific methods, critical thinking and problem-solving skills** | **Lifelong learning and information management** | **Entrepreneurship and managerial skills** |
| 1. Definition and application of key knowledge and concepts. | | | | ✓ | ✓ | | | | ✓ | | |
| 2. Independence, self-determination, self-teaching and self-motivation. | | | | | | ✓ | | ✓ | | | ✓ |
| 3. Problem-solving, thinking and computing skills. | | | | | ✓ | | | ✓ | ✓ | | |
| 4. Strong ethical characteristics and values. | | | | | | | ✓ | ✓ | | | ✓ |
| 5. Awareness of societal, health, safety, legal and cultural issues. | | | | ✓ | ✓ | | ✓ | ✓ | | | |
| 6. Recognition of the need to undertake life-long learning. | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

**Figure-4: Mapping MOOCs training outcomes to the Malaysian Qualification Framework** (adapted from COPPA, 2018)

Figure-4 reveals the MOOCs' ePedagogy learning outcomes that are implemented in each of the eight MQF learning competencies (see Figure-1), to include the following interactive online activities to achieve the learning outcomes:

1. reading the articles on pdf files for MQF competencies: knowledge; social skills and responsibilities;
2. watching some video clips for MQF competencies: scientific methods, critical thinking, and problem solving;
3. activities on questions and answers for MQF competencies: practical skills; communication and leadership and team skills;
4. discussion on ethical issues and values for MQF competencies: ethics professionalism and humanities;
5. discussion on lifelong learning issues for MQF competencies: lifelong learning and information management; and
6. brainstorming sessions on entrepreneurship and managerial skills for MQF competencies.

## 6. SUMMARY

This paper discusses the rationale for adopting an extended Baldrige Performance Indicator model to design a Digital Leadership MOOCs Program for Malaysian HE academics. To initiate customising the BPI for academe the relationship between IS and ISD was used to underpin the instructional strategies. This work is still in progress at the time of writing this paper, therefore the research design and methodology are not yet finalized.

The BPI has been used extensively since 1988 for leadership training in business, manufacturing and healthcare, receiving Malcom Baldrige National Quality Awards, including 14-education sector awards since 2001. We recommend an extended version of the BPI as a specially designed MOOCs program for building digital leadership skills in HE administrators and academics in Malaysia. The four MOOCs modules are mapped to a digital leadership skill development matrix, for designing the instructional learning outcomes that underpin the ISD. Each MOOCs module covers the intellectual skills and cognitive strategy development expected in the digital leadership knowledge domain. This model will enable the creation of visionary digital leadership training that promotes clear and visible values among HE academics and administrators as they set the expected high quality standards in their educational institutions.

## 7. REFERENCES


Alter, S. (2008). Defining information systems as world systems: Implication for the IS field. *European Journal of Information Systems, 17*(5), 448-469.

Bond, T.G., & Fox, C.M. (2015). *Applying the Rasch Model: Fundamental measurement in the human services (3rd Edition)*. NY and London: Routledge.

COPPA 2nd Ed (2018). *Code of Practice for Programme Accreditation*, Agensi Kelayakan Malaysia (Malaysian Qualifications Agency - MQA).

Davies, P. B. (2009). *Business Information Systems*. New York, NY: Palgrave Macmillan.

Downes, S. (2012). Connectivism and connective knowledge: Essays on meaning and learning networks. Retrieved from https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Connective_Knowledge-19May2012.pdf

Fisk, P. (2017). Education 4.0: Changing the game of education. Retrieved from https://www.slideshare.net/geniusworks/changing-the-game-of-education.

Hedberg, J. G., Harper, B., & Bloch, D. (1992). Educational information systems: Problems of the small educational organisation. *The Australian Journal of Educational Technology*, *8*(2), 132-160.

Konting, M. M, Singh, E. K, & Idris, Z. (2009). *Transforming higher education in Malaysia: The AKEPT's teaching and learning initiatives.* Paper presented at the International Conference on Education and New Learning Technologies (EDULEARN09).

Kroenke, D.M. (2008). *Experiencing MIS*. Upper Saddle River, NJ: Pearson Prentice Hall.

Land, F. (1985). Is an information theory enough? *The Computer Journal, 28*(3), 211-215.

Lehman, R M, & Conceição, S C O. (2010). *Creating a Sense of presence in online teaching: How to "be there" for distance learners*. San Fransisco, CA: John Wiley.

Mascolo, M. F. (2009). Beyond student-centered and teacher-centered pedagogy: Teaching and learning as guided participation. *Pedagogy and Human Sciences, 1*(1), 3-27.

Mattin, D.C. (2013). *A national study comparing baldrige core values and concepts with AACN indicators of quality: Facilitating CCNE-baccalaureate colleges of nursing move toward more effective continuous performance improvement practices* (Order No. 3564187). Available from ProQuest Dissertations & Theses Global. (1403176890). Retrieved from https://search-proquest-com.ezproxy.lib.rmit.edu.au/docview/1403176890?accountid=13552

E.McKay (Ed.). (2013). *ePedagogy in Online Learning: New developments in Web-mediated human-computer interaction.* London: Idea Group Reference ISBN: 978-1-4666-369-1 (hard cover) ISBN: 978-1-4666-3650-7 (ebook).

McKay, E. (2019) *Digital literacy skill development: Prescriptive learning analytics assessment model*, paper presented at Australian Council for Education conference (ACER 2019): Preparing students for life in the 21st century: Identifying, developing and assessing what matters, ISBN 978-1-74286-554-6, 22-28.

McKay, E. (2018). Prescriptive training courseware: IS-design methodology. *Australasian Journal of Information Systems, 22*(2018). doi: http://dx.doi.org/10.3127/ajis.v22i0.1675

Pont, B., Nusche, D., & Moorman, H. (2008). *Improving School Leadership, Volume 1: Policy and Practice*. Paris: Organisation for Economic Co-operation and Development. Retrieved from https://www.oecd.org/education/school/44374889.pdf

Rodriguez, O. (2012). MOOCs and the AI-Stanford like courses: Two successful and distinct course formats for massive open online courses. *European Journal of Open, Distance and E-Learning*. Retrieved from http://www.eurodl.org/index.php?p=archives&year=2012&halfyear=2&article=516

Vinyard, J. (2017-2018). *Baldridge for Leaders: A leader's guide to performance excellence* (2nd ed.). Wisconsin: ASQ Quality Press.