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Review of Literature on A Systematic and Scientific Process of Closing the Gap between Artificial and Multiple Intelligences

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ABSTRACT

The advancement of artificial intelligence has brought both opportunities and challenges to the business world, and its potentially disruptive impact has attracted the research interest of management scholars. This exploratory research applied a systematic literature review approach to explore the nexus between AI and competences to help both firms and individuals better address the disruptions from AI. After reviewing relevant publications from the Business Source Complete database for the past decade (2011-2020), we selected 65 debates and issues on AI and perspectives linked with competences. Furthermore, we synthesize two frameworks (RBV framework for firm-level; Key and STEM competences for individual-level) and an overview to gain a holistic understanding of the nexus between AI and competences. We found relatively little empirical evidence in the literature, the implementation of AI was still in its preliminary stages, and the frameworks we aggregated industry and yield richer insights.

Keywords: Review of literature, AI, MI, Scientific Process

INTRODUCTION:

Artificial Intelligence(AI) is indeed a buzzword today, regarded as an umbrella term; it consists of a range of fancy technologies and even be hyped with ³magic´ power(Helo & Hao, 2019). It inevitably arouses a broad concern about its potential diverse disruptive impacts on jobs, businesses, and societies. For example, Luo et al.(2019) reported that AI was as effective as proficient workers and even four times more effective than newcomers. And, it enables machines to handle an increasing number of cognitive tasks which used to be exclusively performed by humans(Brynjolfsson et al., 2019). According to World Economic Forum(2019), most AI systems are only excellent at particular takes a few decades to wait for the emergence of high-level. Nevertheless, AI has received a lot of interest from venture capitalists; shown in Figure 1, the investment in AI has surged since 2013, crossing diverse sectors and industries, especially in mobility and autonomous vehicles, suggesting the great potential and value embedded in AI.

In the 21st century artificial intelligence (AI) has become an important area of research in virtually all fields: engineering, science, education, medicine, business, accounting, finance, marketing, economics, stock market and law, among others (Halal (2003), Masnikosa (1998), Metaxiotis et al. (2003), Raynor (2000), Stefanuk and Zhozhikashvili (2002), Tay and Ho (1992) and Wongpinunwatana et al. (2000)). The field of AI has grown enormously to the extent that tracking proliferation of studies becomes a difficult task (Ambite and Knoblock (2001), Balazinski et al. (2002), Cristani (1999) and Goyache (2003)). Apart from the application of AI to the fields mentioned above, studies have been segregated into many areas with each of these springing up as individual fields of knowledge (Eiter et al. (2003), Finkelstein et al. (2003), Grunwald and Halpern (2003), Guestrin et al. (2003), Lin (2003), Stone et al. (2003) and Wilkins et al. (2003)).

REVIEW OF LITERATURE

This work grew out of the challenges that AI possesses in view of the rise and growing nature of information technology worldwide that has characterised business- and non-business organisational development (Barzilay et al. (2002), Baxter et al. (2001), Darwiche and Marquis (2002), Gao and Culberson (2002), Tennenholtz (2002) and Wiewwiora (2003)). The necessity for research in AI is being motivated by two factors that are (i) to give the new entrants into the AI field an understanding of the basic structure of the AI literature (Brooks (2001), Gamberger and Lavrac (2002), Kim (1995), Kim and Kim (1995), Patel-Schneider and Sebastiani (2003) and Zanuttini (2003)). As such, the literature discussed here answers the common query, “why must I study AI?” (ii) the upsurge of interest in AI that has prompted an increased interest and huge investments in AI facilities. Interested researchers

from all disciplines wish to be aware of the work of others in their field, and share the knowledge gleaned over the years (Rosati (1999), Kaminka et al. (2002), Bod (2002), Acid and De Campos (2003), Walsh and Wellman (2003), Kambhampati (2000) and Barber (2000)). By sharing AI knowledge, new techniques and approaches can be developed so that a greater understanding of the field can be gained. To these ends, this paper has also been written for researchers in AI so they can continue in their efforts aimed at developing this area of concentration through newly generated ideas. Consequently, they would be able to push forward the frontier of knowledge in AI.

Narli Serkan, Ozgen Kemal, Alkan Husenvin (2011) has worked on "In the Context of Multiple Intelligence Theory, Intelligent Data Analysis of Learning Styles was Based on Rough Set Theory", The present study aims to identify the relationship between individuals' multiple intelligence areas and their learning styles with mathematical clarity using the concept of rough sets which is used in areas such as artificial intelligence, data reduction, discovery of dependencies, prediction of data significance, and generating decision (control) algorithms based on data sets. Therefore, first multiple intelligence areas and learning styles of 243 mathematics prospective teachers studying at a state university were identified using the "Multiple Intelligence Inventory for Educators" developed by Armstrong and the "Learning Styles Scale" developed by Kolb. Second, the data was appropriated for rough set analysis and we identified potential learning styles that a student can have based on the learning style s/he already has.

Traditionally, intelligence has been defined on the basis of linguistic and logical-mathematical abilities (Richards & Rodgers, 2001). The first intelligence 7 quotient (IQ) test was developed by the French psychologist Alfred Binet in 1904 (Armstrong, 2000). The IQ test was founded on the notion that intelligence is a single, unchanged, inborn capacity. And the success in academic schooling could be predicted by students' IQ (Chang, 1998). As a result, the IQ test was widely adopted in schools in order to predict the academic success of a student. However, the single and narrow definition of intelligence was increasingly questioned by psychologists. Intelligence began to be believed to contain diverse cognitive abilities and intellectual abilities, rather than a single capacity determining the human performance in the tests (Armstrong, 2000). The famous theories based on different angles of human abilities include Two Factor Theory proposed by Spearman in 1904, Primary Mental Abilities advocated by Thurstone in 1938, Structure of Intellect Theory suggested by Guildford in 1959, Multiple Intelligences Theory adovated by Gardner in 1983, and Triarchic Theory argued by Sternberg in 1985 (Chang, 1998). Among the above theories, the theory of Multiple Intelligences has drawn the great attention of scholars and educators over the past two decades owing to its premise on individual difference of human beings and its rigid multi-dimensional theoretic foundation (Campbell, 1997; Silver, Strong & Perini, 1997). Criticizing the overemphasis on the linguistic and logical-mathematical abilities and the simplification of human intelligence by means of the psychometric approach, Howard Gardner (1983) postulated an alternative view of intelligence, proposing the other seven basic intelligences in his book Frames of Mind: The Theory of Multiple Intelligences. Gardner reviewed a wide range of human cognitive capacities, and tried to incorporate the skills valued in different cultural settings (Armstrong, 2000). In 1997, he added the eighth intelligence (naturalist) and then continued to discuss the ninth possible intelligence, i.e., spiritual intelligence (Gardner, 1999).

As mentioned in the chapter one of the present research, few studies have been conducted to investigate the correlation between MI and English proficiency. Not surprisingly, the discussion of the correlation between MI and English reading proficiency is extremely insufficient. Therefore, the researcher collected the peripheral studies relevant to the correlation between MI and English reading. Generally speaking, reading has been considered strongly related to linguistic intelligence because the symbols used in reading, the 26 letters of the English alphabets, are limited to this intelligence. Besides, people often contribute the achievements of poets, playwrights, novelists, hyperlexic savants to linguistic intelligence. Thus, there is a strong tendency to regard linguistic intelligence as a critical

influence on reading. However, as a matter of fact, the eight intelligences play important parts in processing reading activities in the brain (Armstrong, 2003). Armstrong (2003) pointed out reading is a whole-brain activity in his published 34 book the Multiple Intelligences of Reading and Writing: Making the Words Come Alive. He illustrated an example of speaking a printed word involving both the left and right hemispheres based on several relative brain scan researches (Coney, 1998; Coney & Evans, 2000; Fulbright et al., 1999; Geschwind, 1979; Simpson, Snyder, Gusnard & Raichle, 2001; Van Strien, Stolk & Zuiker, 1995). During the process of speaking a printed word, our left hemisphere will engage in several intelligences, including linguistic, spatial, musical, logical-mathematical, and bodily-kinesthetic responding to different areas of our brain, such as primary visual area, angular gyrus (the main place to associate multiple information and three different lobes), Wernicke's area (the place to help encode text semantically), Broca's area (the place to logically encode text grammatically) and motor cortex (the place to activate the muscles of the lips, tongue, and larynx to speak a word). On the other hand, our right hemisphere will engage in emotions, semantic decisions at the initial stage of deciding among possible words, as well as take information to comprehend texts. Furthermore, during the process of reading, human subcortical structures, such as cerebellum and limbic system, have been linked to bodily-kinesthetic functions and emotions respectively. Nevertheless, the brain study about reading is still at its initial stage; some people criticized that the brain scan research about reading had been conducted in an artificial lab and thus, more natural setting, such as home or school, are needed in the study (Ferguson, 2002).

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