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RISE

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ARTIFICIAL INTELLIGENCE (AI): Embracing the Future

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ABOUT THE MAGAZINE

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research and Innovation) with aims to highlight a research and innovation on multidisciplinary expert of fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and stride to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that is accepted by all expertise.

ABOUT UiTM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. The Office of the Deputy Vice-Chancellor (Research and Innovation) also known as PTNCPI *(Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi))* serves as a *Pusat Tanggungjawab* (PTJ) for navigating the research and innovation agenda of the university to achieve UiTM's goals.The PTNCPI office strives to mobilize faculty and campuses, fostering collaboration among researchers, with the aim of transforming the University into a Globally Renowned University by 2025

A BIBLIOMETRIC SNAPSHOT on Artificial Intelligence in Education

The term “Artificial Intelligence” (AI) was coined by John McCarthy in 1956 during the Dartmouth Conference. Since then, numerous researchers, scientists, and innovators have contributed to the advancement and popularization of AI in almost all aspects of human life. Likewise, the education sector has leveraged the advancement of computer technology since the mid-1900s. The developments in computers and related computing technologies have led to a rise in the use of computers in different parts of the education sector, such as the development of computer aided instruction and learning in classroom interactions.

Later developments in computers and computer-related technologies, including networking, the internet, the world wide web, and increased capabilities processing, computing, and task-oriented programs and software packages, have led to the increased application of computers in different ways in the education sector. Computer and information communication technologies have continued to evolve over the years, leading to the development of AI. According to Coppin, AI relates to the ability of machines to adapt to new situations, deal with emerging situations, solve problems, answer questions, devise plans, and perform various other functions that require some level of intelligence that is typically evident in human beings.

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To gain quick insights into the patterns, trends, and relationships of AI research in education, a brief bibliometric analysis was conducted by extracting relevant publications from Scopus Elsevier from 1986 to 2022. Out of more than 4,000 AI-related publications in Scopus that were collected from various sources such as conferences, journals, book chapters etc., only 167 or about 4% of publications were related to AI in education as illustrated in Figure 1. Generally, we can classify the trend into three (3) stages starting with infant stages where a very small number of yearly publications was observed between the 1980s to the early 2000s, followed by a moderate cyclic stage from mid-2000 until 2018. From 2019 onwards, there was exponential growth in this area, which can be associated with the focus of the researchers in mitigating the education practice that was impacted by the pandemic by deploying AI applications.

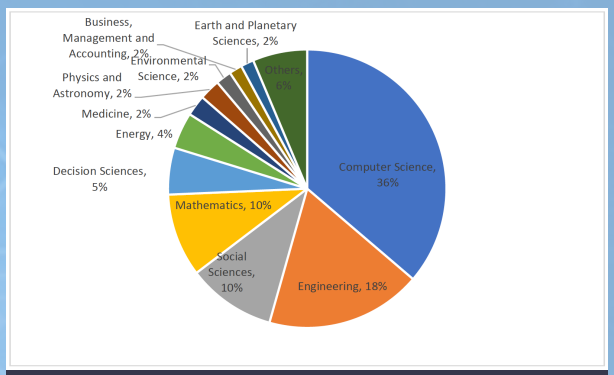

Figure 2: Analysis of Documents by Subject Area

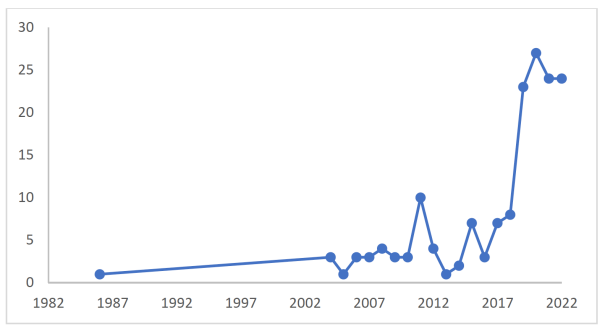

Figure 1: Analysis of Yearly Documents Published on AI in Education from 1986 until 2022

As far as the documents by subject area analysis is concerned, the current findings show that the highest number of published documents are classified under the Computer Science field (36%), followed by Engineering (18%) and Social Sciences and Mathematics at 10% respectively as shown in Figure 2.

Figure 3 reveals the world's top 10 countries that are leading research in this field. China tops the list with a contribution of about 20%, followed by USA at 9.6% and Indonesia at 6%. Malaysia is listed at fifth place with a 4% contribution.

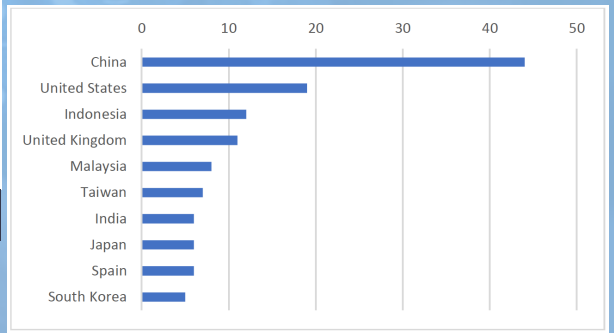

Figure 3: Analysis of Documents by Country

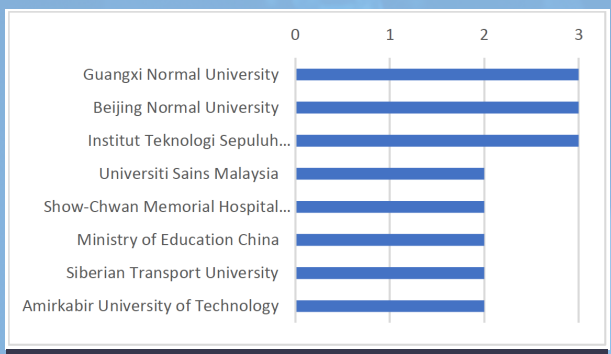

Figure 4: Analysis of Documents by Affiliation

It is interesting to observe that the number of publications among top 10 affiliations are not significantly different with only one document less among the top three (3 publications) compared to the rest in the list (2 publications from fourth to tenth position) as shown in Figure 4. There is also one representative from Malaysia in the list, which is Universiti Sains Malaysia with two publications in total related to AI in education.

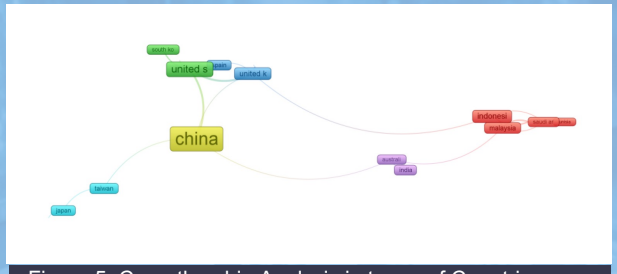

Figure 5: Co-authorship Analysis in terms of Countries (scale is with number of documents)

To obtain an insight on the co-authorship relationship among countries, the VOSviewer software was used to analyze the network as shown in Figure 5. The closer the two countries are, the stronger and greater their connections. A total of 24 countries with at least two documents are presented. China was found to have highest associations in terms of documents at 44 and the link strength of 8. Despite the lower document number, however, USA has the strongest link of 11 while United Kingdom has the highest citation with 387 in total.

When performing the co-occurrence analysis, different keywords used for AI in education were considered with the minimum occurrence in the keywords of all documents set to 10. Out of 1,775 keywords, only 17 met the threshold. These 17 keywords can be clustered into four groups of different colors as presented in Figure 6.

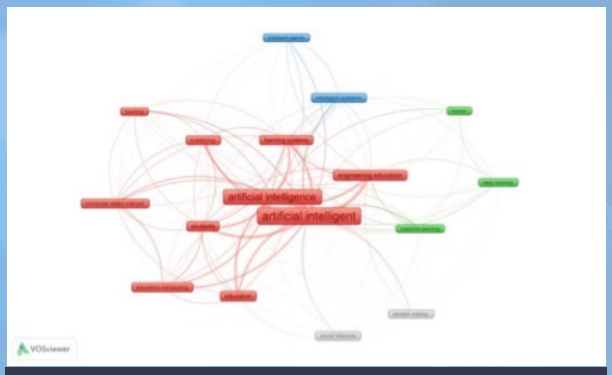

Figure 6: Co-occurrence Analysis of All Keywords

In conclusion, this brief bibliometric survey on AI in education extracted from the Scopus database provides a better understanding of the general trend of research in this area. From the 167 documents obtained from the “Artificial Intelligence” AND “Education” keyword search, it is evident that there is a huge opportunity to explore this area. There is also a big gap between the subject area of Computer Sciences to other subjects, which means that the opportunity for cross-discipline research has yet to be fully executed. Because China is now in the lead when it comes to research in this field, it would be beneficial for other countries to interact and engage with China to advance their research capabilities in this demanding area. While quite a number of keywords may have been explored to some extent by now, there is still potential for further investigation to apply AI techniques to enhance other aspects of education such as effective assessment, ethical education, socio-emotional learning, multicultural education, and many more to complement the entire process of teaching and learning process that is expected in the future.