

Transformation from manual to digital: Artificial Intelligence in batik education for 5.0 society

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Abstract. The problem of transformation from manual to digital in Indonesia and Malaysia faces many obstacles. The phenomenon of society maintaining traditions or manuals is still very dominant, but solutions must be implemented. Education at the tertiary level studying batik in Indonesia and Malaysia is still very manual, based on ideas, cultural influences and the skills of the maker. The existence of artificial intelligence is not yet optimal in Society 5.0 which is very human-centered and supported by continuously developing technology such as Artificial Intelligence. Technological advances including artificial intelligence have been widely used, but there is still little in the creation of batik patterns. The method in this paper is conceptual and review based. The future direction from manual to digital transformation is that the support of Artificial Intelligence technology is very helpful and makes it easier for hu-mans to create new batik which can enrich Indonesian and Malaysian batik higher education.

1 Introduction

1.1 The genesis of transformation

In the 21st century, the word transformation is discussed a lot. Various institutions around the world are also facing transformation challenges. The term transformation itself has been used widely and tends to be misused a lot. This condition is certainly very confusing for various parties, including educational institutions, communities, students, and Small and Medium Enterprises in Indonesia and Malaysia. There has been a high increase in scientific publications discussing the theme of transformation.

The transition from manual to digital processes, often referred to as the era of "techno capitalism," presents challenges. According to Burkert, resources for this digital transformation have become a supposed solution in times of crisis, particularly the pandemic. However, this comes at the cost of a global economic product that relies heavily on under-credited, unrecognized, and poorly paid labor [1]. Meanwhile,

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businesses worldwide face immense pressure to adapt and adopt technologies like the Industrial Internet of Things (IIoT). This pressure stems from the goal of achieving real-time or near real-time information sharing among industrial machines in the Industry 5.0 era [2]. This demand for transformation is impacting various business sectors, including batik production.

There is an increase in publications regarding transformation which are certainly very useful and provide new strength in both conceptual and empirical aspects. However, the concept of transformation is also ambivalent because it is built through social construction based on separate but also autonomous knowledge. Without being supported by strong knowledge about the core elements of transformation and the logic of how these elements are connected, underlying structural obstacles will be encountered [3].

For decades, the world has witnessed various changes related to the development of technological transformation, and world conditions have experienced uncertainty, volatility, complexity and ambiguity [4]. The euphoria of globalization in the last few decades has placed increasing pressure on various businesses and institutions to change [5].

Indonesia and Malaysia are productive batik producing countries in Southeast Asia. The historical existence of batik in these two allied countries in batik production has been closely intertwined for more than hundreds of years. It can be said that most batik skills still survive with the tools, materials and techniques that are maintained in both countries [6]. The desire to modernize batik products as a cultural heritage in Southeast Asia, through creative designs, color development and presentation of batik collections, has been carried out [7].

Several studies have explored the intersection of technology and batik creation. Tian, Hu, and Shi's research developed an automated system for creating batik patterns using fractal geometry. This system allows anyone to design personalized and consumer-preferred batik patterns [8]. Biranul Anas' research emphasizes the connection between batik motifs and traditional societal values. He argues that these motifs reflect elements of life, religious practices, culture, and the local environment [9]. Laksmi et al. explored the composition of batik motifs, concluding that proper placement can enhance aesthetics and emphasize local content in contemporary designs, ultimately attracting a broader, international market while still celebrating local culture [10]. Finally, Chen and Cheng's re-search tackles the challenge of digital preservation and innovation in batik patterns. They propose a method for extracting patterns and elements from existing batik cloths [11].

2 Method

This paper uses a literature review method, which was obtained from the collaboration of Indonesian and Malaysian researchers. This paper uses a descriptive - qualitative approach. The stages in this collaboration are: (1) problem identification; (2) problem limitation; (3) problem formulation; (4) literature review; (5) data analysis; (6) conclusion.

3 Background of Artificial Intelligence

Artificial intelligence (AI) is a concept that often baffles many people. The term AI was first coined in 1956 by John McCarthy with the aim of creating machines that could assist humans. As technology has advanced, the definition of AI has become broader. In 1968, AI was defined as the field focused on developing machines to perform tasks that require human intelligence. Initially, however, AI focused on creating knowledge-based expert systems.

People using computer networks have more and more needs as internet and information technology keep improving. The future of computer networks is clearly headed towards services that act more human-like and intelligent. These intelligent services are not just for personal life, but can be used in all areas of work. While introducing the concept of artificial intelligence (AI), the speaker high-lighted the benefits of AI and how it can be applied to computer networks.

4 Artificial Intelligence in Education as a Key Theme

The study revealed widespread adoption of AI in education, particularly by educational institutions. This adoption has taken various forms, evolving from basic computers and related technologies to online and web-based intelligent learning systems. More recently, the use of embedded computer systems, alongside other technologies, has led to the development of humanoid robots and web-based chatbots that can perform instructor tasks independently or collaborate with teachers [12].

The field of education has witnessed a surge in AI applications, surpassing the traditional notion of AI as a supercomputer. Here, AI encompasses computer systems embedded in smart chairs, classrooms, boards, and more. For instance, AI-powered robots, computers, and supporting equipment have facilitated the creation of robots that enhance learning experiences from as early as early childhood education [13].

5 AI Education in 5.0 Society

The text discusses the relationship between education and AI after its implementation, emphasizing the need for adaptable and relevant policies. It highlights the importance of strengthening AI capabilities in a way that aligns with the needs of key institutions like universities. This may require significant revisions to existing educational laws to accommodate AI applications.

The concept of Society 5.0 aims to address social issues through a new approach, emphasizing interconnectedness and technological convergence. This "super intelligent society" envisions seamless integration of big data, the Internet of Things (IoT), AI, and citizen services to create a robust digital and physical infra-structure for humanity. The goal is to establish a social foundation where every-one can develop their values in a safe and environmentally friendly way, anytime and anywhere, surpassing current limitations.

The text emphasizes the critical role of AI in higher education, particularly for universities and institutions. Universities are no longer solely focused on education, but

have become vital components of the sustainable development system as outlined by the Indonesian Minister of Education and Culture. Their mission has expanded beyond traditional functions, now encompassing keeping pace with technological advancements by incorporating innovative teaching methods like AI.

Educational reform initiatives are rapidly developing systems to meet humanity's need for AI. The Gutenberg Summit's November 2017 education and culture plan prioritizes three key areas: 1) improved use of AI in teaching and learning to build digital competencies and skills relevant to digital transformation; 2) providing education informed by data analysis and user insights; and 3) the Indonesian government's Merdeka Belajar initiative. This educational transformation mirrors the shift from manual to digital processes.

6 The Future of AI Transformation

The transition from manual to digital processes in higher education presents numerous challenges that could significantly reshape the future of learning. These challenges include: 1) **Automation**: AI might automate basic tasks like grading and classifying student work, potentially reducing human involvement. 2) **Accessibility**: While AI can personalize learning, internet limitations in remote areas can hinder access to these programs. 3) **Double-Edged Sword**: AI offers limitless support, enhancing educational principles, but may also weaken students' analytical, reasoning, and physical skills. 4) **Transparency**: AI systems with open comments and feedback capabilities could expose everyone's educational activities to a wider audience. 5) **Information Management**: AI can transform how people find and interact with information, offering significant convenience compared to traditional methods like physical library searches. 6) **Continuous Evaluation**: AI can identify areas for improvement in study programs, requiring ongoing human evaluation to address these gaps. 7) **Risk Reduction**: AI can potentially decrease the fear of learning through trial and error, although this method can also be valuable for self-assessment and correction. 8) **Precise Admissions**: AI-powered data analysis may lead to highly selective student admissions processes, worrying some parents accustomed to traditional, manual selection. 9) **Shifting Roles**: AI might transform the role of teachers from knowledge providers to facilitators, potentially impacting student perception and knowledge ownership. 10) **Location and Learning Style**: AI could change where students learn, who teaches them, and how they acquire basic knowledge, potentially diminishing the need for physical facilities like classrooms.

7 Conclusion

Many researchers have explored the impact of artificial intelligence (AI) on higher education. The consensus is that AI will significantly influence two key areas: Curriculum: AI will have a major impact on the curriculum in higher education. Its speed and accuracy will likely lead to a greater emphasis on providing students with opportunities to develop essential skills. Technical disciplines and liberal arts may become more sought-after areas of study, as they are less susceptible to disruption by AI.

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