



# Vocational Education Development Strategy in the Use of Artificial Intelligence in the Digital Era

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## ABSTRACT

Artificial intelligence (AI) is one of the products of technology snowballing in today's digital era. The utilization of AI can help answer the challenges in the digital era, such as efficiency and effectiveness in various fields, including vocational education in Indonesia. AI can improve the quality of vocational education through appropriate curriculum development, adaptive and interactive learning, accurate measurement and evaluation, and technology-based development of graduate skills and competencies. On the other hand, using AI in vocational education also faces several challenges, such as the availability of infrastructure and resources, concerns about data privacy and security, and the replacement of human labor by intelligent machines. Therefore, there is a need for a clear regulatory and ethical framework for the use of AI in vocational education. There is also a need for greater attention to developing human competencies that machines cannot replace, such as creativity, empathy, Collaboration, and complex problem-solving, which are more towards soft skills. Vocational education should focus on developing skills that can strengthen human excellence in the digital era while utilizing AI technology as an effective supporting tool to develop graduate competencies. The implementation of vocational policy in this digital era includes: strengthening educators (teachers) who are skilled in utilizing AI technology and even able to make AI technology products, improving vocational education facilities and infrastructure to be in line with technological developments, and developing partnership networks between vocational education institutions and the world of industry/the world of work both at home and abroad.

**Keywords:** *Artificial Intelligence, Vocational Education, Digital Era, Soft Skills.*

## 1. INTRODUCTION

Digital transformation has become significant mover growth \_ in increasing the quality of life. Digitization impact global, innovative, inclusive, and sustainable growth across a wide range of sector [1]. With the development of computing intelligence over several years, literacy computers have become Skill's primary driving force innovation industry. Besides it, this has been seen as a pusher growth economy in organizations [2]. The concept of the digital era is not only limited to factor manufacture but also solving social problems with the help of physical and virtual integration rooms. The digital era has drafted big data technology collected by

the Internet of Things (IoT) transformed by Artificial Intelligence (AI) to become something that can help the public so that life becomes more ok. The digital era will impact all aspects of life, starting from health, urban planning, transportation, agriculture, industry, and education.

This education in Indonesia is entering the 4.0 era, where the learning model is the trend of online learning that uses the Internet as a liaison between teachers and students. Development technology is also an opportunity for businesses in education, with many publicly established guidance studies online. Along with the development of the world of education, regulation Indonesian education also experienced change, that is,

since the 2014 system year exam national changed from a paper-based test become online based test system [3]. Then reception participants educate new from level school base until level college has high too done in a manner line, starting from registration until announcement acceptance. The role of the teacher or educators in the revolutionary era of Industry 4.0 need to Keep going improved, where educators not only emphasize their job in the transfer of knowledge but also emphasize educational character, morals, and exemplary. This knowledge transfer can be superseded by technology. However, application behavior, soft skills, and hard skills Can be replaced with tools and technology as sophisticated. The hope is that the digital era will not change teachers' role in teaching moral education and will be exemplary for the participant's teaching, moreover with rampant discovery and use of product Artificial Intelligence in the world of education.

Artificial intelligence (AI) can push the emergence of learning models new to education, precisely education vocation (read: school medium vocational) use support classroom learning and not No Possible in the future will facilitate learning practice digitally based. Besides that, AI is expected to speed up the implementation of digital technology where all supporters' education vocation will be digitally based. Educators can help quickly develop an application curriculum and focus on innovating and serving the development of soft skills participants educate by flow and policy education. At the same time, AI becomes a virtual world partner for educators in giving updated information to participant educate.

There will always be a teacher's role in education, but that role and what it implies may change due to AI. Assisting students in improving their learning and even serving as a substitute for in-person tutoring, AI can perform tasks such as grading and even serve as a substitute for in-person tutoring. However, AI can also be applied to various other forms of education. AI systems are equipped to provide insight, serve as a forum for students to ask questions and seek knowledge, and even take a teacher's position file for fundamental course material. AI will transform the teacher's position into that of a facilitator [4].

## 2. METHOD

Writing article, This method studies literature and interviews short with many power teachers at SMKN 4 Jakarta. Material reference in studies literature taken from various journals, proceedings, and articles discussing news about artificial intelligence, the era of the digitalization industry, utilization of technology in education vocational training, and the application of AI to education vocational. This study will discuss educational strategies for using AI (Artificial Intelligence) in digitalization. Result of study bibliography and interviews in article This is used to

provide suggestions and recommendations for using AI in vocational education.

## 3. LITERATURE REVIEW RESULTS

### 3.1 *Artificial Intelligence in the World of Education*

The world of education is always walking side by side with progressing technology own various types of breakthroughs, and always there are innovation latest to help educators finish no problem is capably resolved itself. One that can solve the problem is using technology artificial intelligence, generally known as artificial intelligence.

AI utilization or intelligence artificial in learning, AI is utilized in educational platforms. Visually the provision of hybrid learning that takes advantage of AI can be helpful to and provide feedback to students AI can also be used utilized in activity online learning can using Google Assistant Translate online uh also used in digital application library Where AI can categorize type books in the digital library database so that more easily track and search availability [5], for make it easy We in write, available voice typing that converts voice specifically on online platforms that can help We develop skills on the material Give recommendation sun for studied more in like as it is in the application study language that is message artificial besides For make it easy in the learning process, AI can also be used help educator assess after students do question online then will help corrected results job.

### 3.2 *Development Artificial Intelligence and Necessity Vocational Education Graduates*

Intelligence artificial in Language English is Artificial Intelligence, the so-called AIs. About Draft intelligence artificial, not yet. There is uniform opinion at home and abroad. But it is generally believed that artificial intelligence is about behaviour intelligence from imitation original, including perception, reasoning, learning, communication, and behaviour in environment complex surroundings. According to the strength function, artificial intelligence can share become three categories, namely " intelligence weak artificial, intelligence vital artificial, and intelligence super artificial [6].

Development intelligence was artificial through three stages. Stage First is mainly in the 1960s and is represented by an expression of knowledge like propositional logic, propositional and logical predicates, and algorithms search heuristics. Stage second in the 1970s. With the enhancement gradually ability devices, complex computing technology, semiconductors, and intelligence artificial in a manner gradually started to break through; the third stage started at the end 20th

century and began to enter the era of big data and intelligence cognitive ability. Study alone around the year 2006. With the development of fast mobile Internet, scenario application intelligence artificial has also started to increase, and significant breakthroughs have been achieved in algorithm learning deep, familiar sounds and visuals [6].

Increasing automation in production leads to a change in tasks and competencies. Vocational skilled workers must finish tasks with digital tools, operate facility production through interface machine people, develop professionalism with digital media assistance, system help, and structure cooperative work. The more Lots merge technology information and production processes, moderate classic going on can be observed. Decentralized intelligence in framework Industry 4.0 leads to the availability of highly relevant data with more processes high, which are analyzed, processed, and worked on by workers skilled for optimization of work processes and solutions to the problem. There is a challenge in context development towards the digitalization era, especially in sector production and mechatronics. This is related to work skills in Germany among them [17]:

1. Understanding of production and mechatronics: knowledge interface, interaction device software, and production process.
2. Understanding and describing general process complexity: process synchronization and making the product.
3. Optimization process reliability: use of varying production parameters, disruption problem.
4. Data processing, data analysis, and evaluation: processing order data, recording and utilizing production parameters.
5. Programming (code low)/task parameterization: usage device soft application.
6. Analysis and network processes: support data-driven work processes, and improve productivity and production area network.
7. Solving the problem: analysis and elimination of reason problem (read the picture direct, evaluate and solve the problem).
8. Task performance hybrid: combine traditional tasks and particular functionality of mechanical, electrical, and technological information [7].

Artificial intelligence (AI) improves distance learning, assists students, opens virtual lessons, and much more in education. Modern education will be integrated with numerous innovations, such as voice semantic recognition, picture recognition, Augmented Reality/Virtual Reality, machine learning, brain neuroscience, quantum computing, blockchain, and so on, as artificial intelligence technology advances. As a group, intelligent technologies are being regularly and quickly implemented in the educational sector. Many

artificial intelligence solutions are currently being used in academic contexts [8].

Speed application various digitalization depends on various factors such as their respective business models, conditions, framework economics, and strategy for introducing new technology, reception technology by employees, Draft, applied qualifications and the last related demands and objectives with implementation. Formation places future work that incorporates interaction between humans and machines will be crucial [9].

### 3.3 Impact Artificial Intelligence in Form Vocational Education Teaching

With the development of artificial intelligence technology, many artificial intelligence products are increasingly applied to industry education. Many countries have also formulated relevant policies for pushing the application of technological intelligence in education. Technology intelligence is artificial and has been used in various aspects of the education world, from pushing innovative education, helping the learning process teach, and managing life innovative campus to provide helpful information for the holder's interests. In the context 21st century, the usage of technology intelligence artificial in the world of education No can be denied again. Technology intelligence is much needed in the future to ensure the learning process and effective teaching among teachers and students and will be indispensable for progress system education [10].

The results of the current research by *Shu et al.* offer empirical evidence and confirm that an intelligent education model, which the Edu-Metaverse empowers, significantly enhances better learning outcomes for students compared to traditional education methods. The ecological teaching environment, multimodal course resources, and intelligent pedagogy, in the context of the Edu-Metaverse, all contribute to the improvement of students' learning outcomes on the one hand. On the other hand, they help to expand students' active participation in learning and to cultivate an intelligent individual with a better value orientation. [11].

No, there is material wear or wasted experiments, and neither can complicate machines/factories be broken. Practical and situational-related learning with the process can be simulated. At the same time, environment Study support learning and work collaboratively.

Using augmented reality (AR)/virtual reality (VR) in education, space imagination becomes not measurable, and the benefits are evident [12]. Classrooms are no again limited to space class small, the board writes, and PowerPoint, but the natural universe. Many companies, including internet giants Google and Facebook, have devoted themselves to researching How to implement AR/VR in education. To make realistic VR scenes, the

company "Alchemy VR" probably chose to work with many institutions such as Samsung, Google, Sony, BBC, the National Museum of Nature, and the Sydney Museum of Australia to produce content for VR education [13].

### 3.4 Challenges and Opportunities Intelligence Artificial for Vocational Education

With breakthrough and innovative technology intelligence sustainable manufacturing, demand for talent to manufacture intelligent, diverse, multilevel products will increase. However, speed education talent manufactures intelligence moment it's in college high and university still difficult to offset progress knowledge and technology in context generation new Artificial Intelligence (AI) [14].

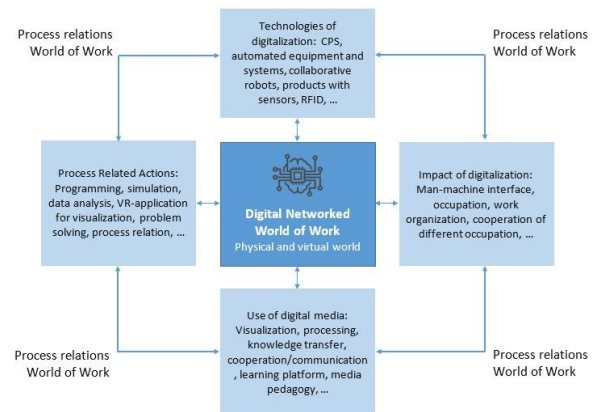
AI has achieved extraordinary success regularly in a very short time. Intelligence Artificial is a behavioral process intelligence man to machine; AI significantly increases performance in manufacturing and sector services that are different and appropriate in the field of education [15]. Dimitra Gratsiouni explored the nature of educational quality and proposed different teaching models. This article reviews and analyzes the teaching essence, quality, and ability under higher education background and puts forward the characteristics of good teaching. The teaching evaluation was discussed, and a series of standards for evaluating and evaluating teaching activities were proposed [16].

Technology AI-based is also considered an intelligent machine. Teachers must know how to use and interact with machine intelligence [17]. However thus, digitization is No only determined by development technology and change. Besides, no Enough only embed technology Industry 4.0 in the work process context, focusing on reflection education in shaping the learning process from training start and continuation. Farther Again, man-machine must be set to understand specialists and the whole process chain, organization, business processes, and change interface. With this, object education vocations greatly expanded Because digitization itself and the changes it triggers must be seen in a manner multidimensional (see Figure 1).

AI creates a revolution in science and technology around the world, no will There is every industry or different sector that will keep going touched by tools so-called sophisticated Artificial Intelligence (AI). This is the main challenge for vocational education, such as:

1. Work and study with us in virtual systems (simulation, process visualization, Virtual Reality (VR) applications).
2. Work with and at the factory bright and in the process with Intelligence Build (system expert, system diagnostics, system management knowledge, Maintenance smart).

3. Management combined task and organization process structure (task combined, job mix).
4. Work with and handle data (compilation, analysis, transfer, data security).
5. Appearance interfaces the new Man-Machine.
6. Learning interdisciplinary and working the same network along chain mark add (draft education work in various domains, work the same environment different study).
7. Environmental learning is real and virtual (digital media, system management learning, tools help to learn, factory learning).
8. Handling complexity and situation, no problem can be predicted, and thinking in a system network (understanding systems and processes, knowledge based on experience) [18].



**Figure 1.** Digitalization as object education and training vocational in context-related processes [18].

To set up an efficient and evolving digital ecosystem, many methods and technologies derived from artificial intelligence have been studied and developed, namely the multi-expert system paradigm, the principle of multi-agent systems, and semantic Web ontologies. In addition, big data techniques allow the processing of massive data related to the information systems of different actors of the ecosystem but also exploit the potential of the data web and social networks to extract relevant information in real-time and build a solid knowledge base for the multi-expert system that represents the core of the ecosystem [19], and along with AI advances in several decade futures, adaptive programs like This Possibility Big will increase and develop.

ChatGPT, artificial intelligence (AI) based chatbot program OpenAI become the hottest topic in the world of technology lately. Most recently, Microsoft founder Bill Gates predicted that ChatGPT could become a teacher in 18 months. Stage early on, the AI chatbot will help teachers increase learning in reading and writing. Gates believes AI chatbots like ChatGPT can give affordable solutions for parents who aren't capable of paying human tutors. He was sure too that AI - the powered chatbot

would be an excellent virtual teacher like a human teacher or tutor. The moment This is called Already; there are several promising initiatives related to the role of AI chatbots in education. One of them is the project *Khanmigo* developed by Khan Academy. In the demonstration video, *Khanmigo* will be a virtual teacher who guides students in studying topic-specific topics, not simply answering appropriate questions. Project *Khanmigo* got it to function as the coach wrote [20].

The rapid development of artificial intelligence has created various opportunities for the development of online vocational education. According to Wang et al. The integration of artificial intelligence into vocational education should follow the laws of education and learning and better assist "teaching", "learning", and "management" to create a precise, interactive, and safe online learning environment so that significant data analysis can be used easily [21]. As an educator, you should have a high curiosity and desire to develop so that the application of artificial intelligence in teaching and learning allows people to perform demand analysis, sensitive information processing, intelligent use of personalized and customized teaching and learning, and evaluation of the benefits of AI applications, which can help teachers create more exciting and practical teaching activities, help learners learn faster and in a more targeted way, and make learning more interactive, attractive, and practical so that people can learn voluntarily and actively to improve job performance ability and acquire more knowledge.

### ***3.5 Vocational Education Strategy Toward the Development of Artificial Intelligence***

Reception technology in context education is relevant in determining teachers' intention to use tool-deep digital aid practice to teach them.[5]. The acceptance process is what it is evaluation for teachers who teach in vocational education added with an entry of Artificial Intelligence as an application developing technology moment this. There is more AI that is more potent and more AI weak. "Intelligence "artificial" refers to a programmed computer that thinks and acts like a human and can even develop a heart conscience". Intelligence Artificial Weak is directed to finish tasks specific that has been determined before - and only in fields like this [18].

### ***3.6 Develop Draft as well as Structure Learning Vocational***

Vocational education must combine intelligence fabrication and concept techniques related other in teaching and management processes learning. At the same time, orientation schools, training programs for talent and construction professionals, content courses, criteria assessment, and other aspects must be improved. For example, in part, big non-computer majors at school

vocational, eye lesson technology information have more class hours little, and only There is A little eye lesson data processing, programming, or artificial intelligence. Arrangements like That are Not conducive to increasing literacy information among students and must be changed.

Appropriate adjustments with the demands of developing technology in this digital era. At the same time, reduce the hours of lessons on eye skills that can be replaced by application intelligence artificial in the future, like accountancy computerized monitoring environment, and so on. But vocationally, technology needs adaptation method application technology appropriate latest with need industry so that happens to learn with a curriculum that links and matches with industry. Curriculum independence, to begin with, implemented in Indonesia, start to describe matter; however, it needs realization as well as strict application in the future.

### ***3.7 Use Intelligence Artificial for Education Teaching and Management***

Intelligent manufacturing (IM) is the system of intelligent integrated machines composed of humans from machines intelligent and intelligent experts who can do activity intelligent in the manufacturing process, analysis, reasoning, judgment, conception, and decision [23].

In context Artificial Intelligence, educators can spare more time and notice differences between individual students, so they can give service personalized learning in a manner more accurate to students; educators can focus more on attitude education and student morale so that address times can change better wise and precise target. Educators can adapt methods and methods teaching appropriately, optimize method evaluation teaching, add source Power teaching, reduce repetitive work in preparing the lesson, improve efficiency teaching, and "teach the student by their talent them". At the same time, method learning and methods of teaching students will be reconstructed to various levels. There are many once innovative online learning platforms based on big data.

Educators can fully track the whole learning process of students. They can analyze intelligently based on monitoring data, which helps evaluate student processes more effectively and comprehensively. The change brought about by Artificial Intelligence on top of teaching needs facility device complicated network and system device soft related for support, and teachers in need education vocational Keep going increase Skills information, deepen and strengthen literacy information.

### **3.8 Develop Collaboration between the world of industry/world of work with Vocational Education**

In the era of artificial intelligence, educational vocation must coordinate development with relevant industries, deepen implementation production and education leads to progress technology, and expand opportunities for companies to participate. Support and guide the company to participate in deep education reform and teaching in education vocational, and participating in planning professional schools, development book text, designing teaching, setting curriculum, and training apprenticeship with various methods to promote integration need the company to train talent. Push use company for lead school, introduce the school to in school, and integrate school with school for attract and build a training base productive production. Apply fully system modern apprenticeship and systems apprenticeship new company, and promote a close relationship between work school and recruitment company.

With promotion application intelligence intensive artificial, if skills acquired by talent skilled in education vocational No improved appropriate time, job repeated in class middle and lower will face danger replaced by intelligent robots in various level. Because it is necessary development skills across a wide range of applying field learning, student learning can be involved directly and operating independently. Because that is, education vocational must Keep going to increase system education lifetime alive, open road knowledge that is "meaningful" for "charging" improvement Skills student education vocational. Learning meaning This drip focus on related soft skills ethics, way as well as must rule obeyed as well as complex skills in the form of competency-based technical creativity and technology.

### **3.9 Increase Ability Literacy**

In the development of artificial intelligence, simple and repetitive work will be replaceable, and many more people will be released from practical repetitive and non-repetitive tasks and diverted to more creative and innovative work. Jobs need work same and communication between humans. Because that is, education vocational must notice an enhancement of students' literacy, planting level ideology and morals, and quality comprehensive humanities. Based on this, students pushed For Study initiative and creativity, promoted formation thinking across borders, and more understanding of knowledge position relevant professionals and skills appropriate intelligence in the era of artificial intelligence.

## **4. CONCLUSION**

In the digital era, with the development of rapid technology, education vocational needs support national strategy and development of social as well as development economy. Vocational education must face the challenges and opportunities that intelligence brings artificial and artificial active transformation and development. Vocational education must develop skills to strengthen man's superiority in the digital era while utilizing AI technology to effectively support and develop competent graduates. Form implementation policy vocation in this digital era includes: strengthening the power of skilled educators (teachers). Utilize AI technology, make product AI technology, improve facilities and infrastructure education vocation to match with development technology, and develop network partnership between institution education vocation and the world of industry/world of work good inside and abroad. The key is the will to adapt and be wise in using technology. Intelligence artificial No For scared for education vocational but as an expected challenge can be adapted so that quality learning vocational will the more ok.

## **AUTHORS' CONTRIBUTIONS**

MY: Conceptualization, Methodology, Writing-draft initial, Editing, Literature Review, Supervision. RM: Formal analysis, Literature Review, Visualization, interviews with SMK teachers, Visualization. MA: Methodology, Formal analysis, Writing-draft beginning, Writing-review, Interview with high school teachers.

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