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Grand Analysis of Government Strategic Policy Design in Field of Education in the Era of Industrial Revolution 4.0

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Abstract

This study aims to determine the grand design of government strategy policies in the field of education in the era of Industrial Revolution 4.0. The method used in this study was qualitative descriptive. The qualitative descriptive approach aims to describe social phenomena with a focus on solving relevant problems, both in the present and future. Qualitative descriptive research aims to describe existing phenomena in both natural and human-engineering. Data collection techniques generally consist of four main methods: observation, interviews, documentation, triangulation or a combination of various methods. The results of this study showed that the world, especially Indonesia, is currently entering a new industrial era marked by digitalization in various sectors of life. Experts call this phase the Industrial Revolution 4.0. The rapid development of digital technology is expected to facilitate and increase human productivity, effectiveness, and efficiency in performing daily activities. The industrial revolution can be understood as a major change that occurs quickly, fundamentally, and radically, affecting the way humans live. The industrial revolution 4.0 is predicted to bring various changes, both positive and negative, to humanity. Thus, Indonesia needs to anticipate early on. The Indonesian government has prepared plans and strategies to enter the digital era through the Making Indonesia 4.0. To support this initiative, reliable human resources (HR) that are ready to face challenges are needed. Therefore, the government has formulated a strategic policy in the field of education. One of these policies is the 2013 Curriculum (K13) and strengthening character education (PPK), which is designed to prepare the next generation to face Industrial Revolution 4.0.

Keywords: *Grand Design, Policy, Government Strategy, Education, Industrial Revolution 4.0.*

Introduction

Today, Indonesia, in particular, is entering a new industrial era marked by digitalization in various sectors of life. Experts call this period Industrial Revolution 4.0 (Suwardana, 2017). The Fourth Industrial Revolution describes the conditions of the 21st century, where massive changes occur in various fields through a combination of technologies that can erase the boundaries between the physical, digital, and biological worlds (Wurianto, 2018).

As time goes by and the era develops, human behavior experiences significant changes from one era to another. This change has also had an impact on the education system, both worldwide and in Indonesia. The education system can be interpreted as a strategy or method applied in the teaching and learning process, aiming for students to develop their potential actively (Jeste et al., 2010).

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Transformation in the world of education can be observed through shifts in various aspects, such as learning methods, teaching, curriculum, student development, learning methods, and tools and infrastructure used. All these are related to graduate competencies from time to time. In behaviorist learning theory, learning is defined as a change in behavior that can be observed directly through the interaction between stimulus and response, in accordance with mechanistic principles (Maher, 2016).

The trend towards digital learning has been accelerated by COVID-19 and, although physical classrooms have returned, considerations of flexibility and accessibility have ensured that a significant proportion of higher education is now delivered partly or fully online. Inevitably, such learning takes place in hyper-connected contexts characterized by digital clutter – key aspects of which include distraction, disorder and disconnection, which do not support, and can even undermine, effective learning (Pegrum & Palalas, 2021). Digital clutter refers to the difficulty of focusing on information overload (Palalas, 2018; Pegrum, 2019) and the challenge of resisting distractions from screens and media (Felisoni & Godoi, 2018; Whelan et al., 2020; Silalahi et al., 2022), along with the temptation to multitask ineffectively and inefficiently (Palalas, 2018; Wallace, 2006). Digital clutter refers to the Council of Europe's information clutter (Wardle & Derakhshan, 2017) .

Today's science and technology are developing increasingly over time (Marlina, 2015). In turn, the rapid development of science and technology triggered the birth of Industrial Revolution 4.0. However, in the era of Industrial Revolution 4.0, the majority of developed and developing countries in the world are at a high level of anxiety (Van Thao et al., 2021; Purba et al., 2025). This is in line with the emergence of Industrial Revolution 4.0, which is characterized by uncertainty. To date, no human has succeeded in precisely and accurately predicting what will happen in the future (Santika, 2020). Regardless of how the Industrial Revolution 4.0 will end, improvements to human resources (HR) can no longer be postponed.

Education is vital for humans. Through education, individuals are directed to become well-behaved (Sasongko and Sahono, 2016). According to Nkomo, et al. (2021), education is an effort made consciously and planned to create a learning atmosphere and process that allows students to actively develop their potential (Resmi et al., 2023). This aims to form spiritual religious strength, self-control skills, personality, intelligence, noble morals, and skills that are beneficial to individuals, society, the nation, and the state.

Education is a means to acquire knowledge and skills, which can be done either through formal or non-formal channels. The main focus of education is a series of learning processes that aim to improve the quality of human resources. With quality human resources, the opportunity to obtain a job becomes easier, which in turn can improve the welfare of the community (Widodo et al., 2024). Conversely, if the quality of human resources is low, people will face difficulties in finding work, and may even sbecome unemployed. According to a report from Jakarta, iNews.id, the population of Indonesia currently reaches 273 million, or 273,879,750 people, based on the Population Data for Semester II of 2021 released by the Ministry of Home Affairs on December 30, 2022 (Novianto, 2022).

Technology-mediated educational innovation in Latin American Higher Education institutions is the focus of the ETHE-LATAM call for papers launched in April 2021 by the International Journal of Educational Technology in Higher Education (ETHE). This call aims to discuss issues that affect the Latin American higher education community locally, regionally, or globally. The initiative is intended to encourage the dissemination of evidence-based educational innovations

that make a difference in their contexts and build new opportunities on technology-based paths (Useche, et al, 2022)

The Industrial Era 4.0 comes with a wave of rapid and inevitable changes, affecting lives all over the world, including countries. This revolution encouraged and forced everyone to continue to adapt, following the rhythm of increasingly dynamic and rapid changes. In an era where everything is digital and connected by technological advances, all aspects of human life are infected by the impact of this industrial revolution, both positive and negative. Almost every dimension of our lives interacts with technology.

Improving the quality of human resources (HR) is one of the ten priorities in implementing the Making Indonesia 4.0. HR is crucial in achieving the success of a program's implementation. In this effort, Indonesia plans to change the education curriculum by placing greater emphasis on Science, Technology, Engineering, Arts, and Mathematics(STEAM). This aims to align the national education curriculum with future industrial needs. In addition, Indonesia will also establish partnerships with industry players and foreign governments to improve the quality of vocational schools, while increasing labor mobility which will support the provision of quality HR.

The government must also anticipate the negative impacts of Industry 4.0 such as disruptive technologies. The emergence of disruptive technology will make major changes and slowly and gradually kill traditional businesses and markets. In addition, Industry 4.0 also has a negative impact on job creation. Based on this, researchers are interested in analyzing the grand design of government strategic policies in the field of education in the era of Industrial Revolution 4.0.

Research Methods

The method applied in this study is descriptive qualitative. The descriptive qualitative approach aims to describe social phenomena with a focus on solving relevant problems, both in the present and future. Qualitative descriptive research aims to describe and describe existing phenomena, both natural and human-engineered. This approach focuses on the characteristics, quality, and interrelationships between various activities (Sukmadinata, 2011). The social symptoms or phenomena discussed in this study are the development of Industrial Revolution 4.0, which is taking place in Indonesia and its impact on the education sector. The main focus of this study is government policies in the field of education that are designed to address the challenges and changes presented by the Industrial Revolution 4.0. In qualitative research, data collection techniques generally consist of four main methods: observation, interviews, documentation, triangulation or a combination of various methods (Sugiyono, 2011). In the context of this research, the methods chosen were documentation and literature studies. Literature research was conducted by searching for various written sources, including books, archives, magazines, articles, and journals, as well as other documents related to the government's strategic policies in the field of education in facing the era of the Industrial Revolution 4.0.

Results and Discussion

In the future, Indonesia will focus on five leading manufacturing sectors: food and beverage, textile and clothing, automotive, chemical, and electronics. These five sectors are designed to be the backbone and main drivers and are expected to have a significant impact on competitiveness and its contribution to the Indonesian economy. These sectors will lead to the implementation of Industry 4.0, create new jobs, and attract technology-based investment.

Government Policy in Facing the Era of Revolution 4.0 in the Education Sector .

Government policies in the education field are designed to ensure that all citizens have equal access to quality education. In addition, this policy aims to ensure that every individual has the skills and knowledge needed to achieve success. The government's policy regarding education 4.0 aims to prepare the next generation of the nation to be qualified and able to compete in the global era.

Some government policies to support Education 4.0 include:

1. Development of digital infrastructure, including providing Internet access to remote areas.

2. A technology literacy program aims to integrate technology into learning at an early age.

3. The push to encourage innovation in learning methods such as the development of more interactive and technology-based methods.

4. Reorientation of curriculum development focuses on learning based on Information and Communication Technology (ICT), the Internet of Things, big data, and computerization.

5. Improving human resources (HR) through vocational education and training programmes.

Utilizing Industrial Revolution 4.0, we can support students' learning patterns and mindsets, so that they can develop creative and innovative innovations (Baglama et al., 2020).

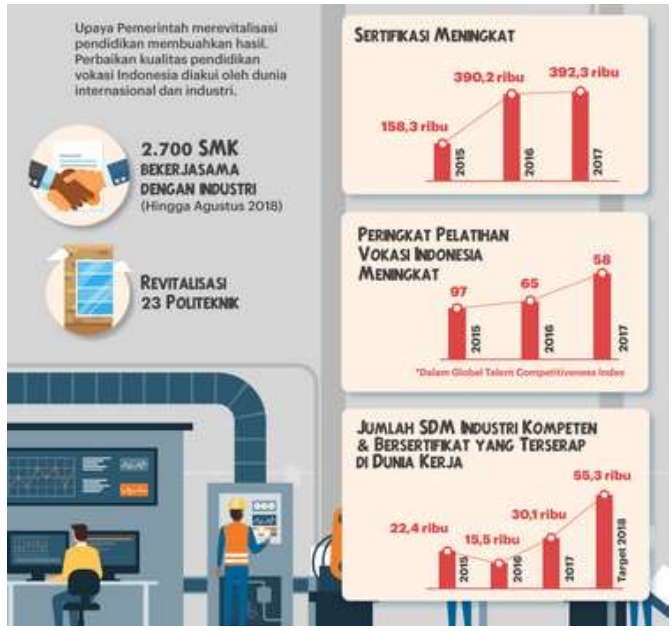

Figure 1. Welcoming the Industrial Era 4.0

Industrial Revolution 4.0, often referred to as the era of disruption, cannot be separated from the presence of innovative products. In the book entitled "Disruption," it is explained that disruption can be understood as a synonym for "innovation" or as a threat to established companies, or those known as incumbents. In this context, incumbents refer to pre-existing phenomena. Established companies are often unprepared for the changes that occur.

Today, the Industrial Revolution 4.0, which began in the 2000s, places automation as the dominant force and moves between physical and virtual production systems. It goes hand-in-hand and overlaps to a large extent with technological advances known as the Smart *Factory*, Industrial Internet of Things, Smart Industry, or Advanced *Manufacturing*.

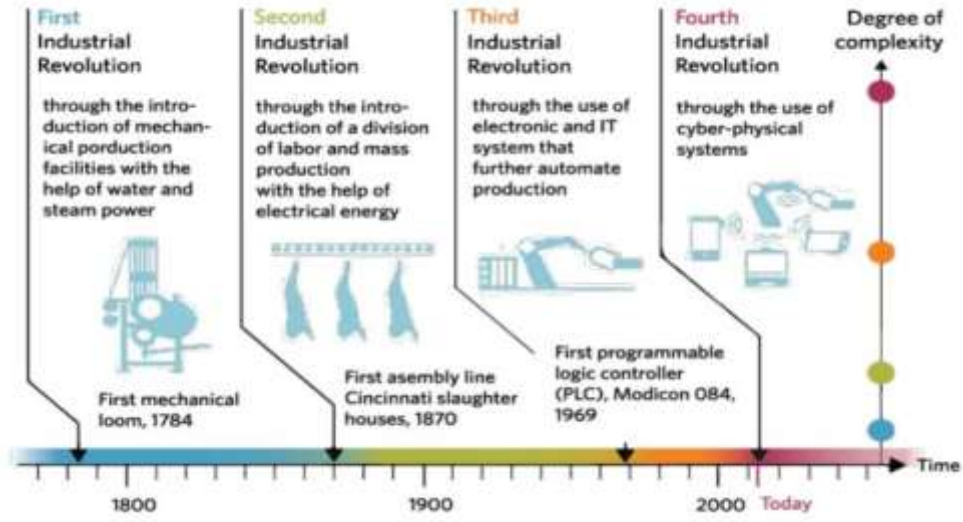

Figure 2. Four industrial revolutions, source (Wahlster, 2012)

Industry 4.0 is a combination of various advanced technologies, including: (a) information and communication technology, (b) cyber-physical systems, (c) network communications, (d) big data and cloud computing, (e) modeling, virtualization, and simulation, and (f) enhanced tools for human-computer interaction and collaboration.

Approximately 80% of innovation in the manufacturing sector relies on Information and Communication Technologies (ICT) (Wahlster, 2012). The process of digitization and extensive application of ICT enables the complete integration of all systems across the supply and value chains. It also facilitated data collection at various levels. All information is now digitized, and relevant systems, both within and between companies, are integrated at every stage of product creation and throughout its lifecycle.

Innovation itself can be interpreted as a creative activity that produces new ideas, concepts, products, or objects that benefit humans. From this explanation, we can conclude that innovation is a positive and creative effort to create something new and useful to life.

The development of science and technology is currently increasingly rapid in line with the progress of the times (Marlina, 2015). This progress, in turn, triggered the birth of the Industrial Revolution 4.0. However, in the era of the Industrial Revolution 4.0, many developed and developing countries are facing high levels of anxiety. This anxiety is in line with the turmoil and uncertainty that arose from the revolution. Until now, no one has succeeded in predicting exactly what will happen in the future (Santika, 2020). Although we do not know how the Industrial Revolution 4.0 will end, improvements in human resource (HR) management must be made immediately. If we assess the current situation, Indonesia is still lagging behind in

responding to the challenges posed by the Industrial Revolution 4.0 when compared with other countries.

Figure 3. 21st Century Learning (Trillling and Fadel, 2009)

When discussing human resources (HR), education is a major sector that requires attention, strengthening, and prioritizing in its handling. Through education, we can develop various skills, especially life skills, as well as the knowledge and attitudes that are important for every individual to live properly in this rapidly developing world (Wardani, 2012).

In the context of the industrial revolution 4.0 era, education needs to be directed to create graduates who are not only tough and reliable, but also have good character. Thus, high-quality human resources with high competitiveness can be produced. Education plays a role as an agent of change that is very important for the country in following the development of Industrial Revolution 4.0. The main function of education is to produce a high-quality next generation of the nation, ready to fill and accompany this development.

Education in this era demands a complete change in learning strategies, mindsets, and ways of acting from both teachers and students. Both must develop a spirit of creativity and innovation in various areas of life. In the future, teachers must be able to adapt, collaborate, and adjust to changes in times, including advances in digital technology, to support more effective and efficient learning. Thus, we can produce graduates who have the skills to face the challenges of the industrial revolution 4.0.

The basic skills developed in education include several important aspects. First, they are life skills *that* help students understand themselves and be responsible for their social environment. Second, learning and innovation skills enable students to continue to be creative, think critically, formulate solutions to complex problems, collaborate, and communicate effectively. Third, literacy skills equip students with knowledge and technology as tools for solving everyday challenges.

In this context, all parties must contribute positively, with the main role of the government as the person in charge of education. This is important to address the complex challenges that arise due to Industrial Revolution 4.0. The government must revitalize education through a series of policies. With the support of government regulations that direct education towards the era of

revolution 4.0, it is hoped that the output produced will be more ready to compete and compete in the world of work.

Improving understanding of expressing oneself in the field of media literacy is a must for educators in the era of the Industrial Revolution 4.0. For this reason, educators must possess several important competencies to face the challenges of this era. First, educational competencies include learning skills based on *the Internet of Things* (IOT). Second, competencies for technology commercialization include the ability to guide students to have a technology-based entrepreneurial attitude. Third, competencies in globalization, namely the ability to solve problems, can be applied even on a global scale. Fourth, competencies in future strategies, include the ability to predict future events and to plan appropriate strategies. Finally, counselor competencies involve the ability to handle psychological problems faced by students.

Curriculum 2013 (K13).

In Law No. 20 of 2003 it is stated that "the curriculum is a set of plans and arrangements regarding the objectives, content, and learning materials, as well as the methods used as guidelines for organizing learning activities to achieve certain educational goals." This is in accordance with the statement of Adriantoni and Fitrianis (2018), that the curriculum is a tool to achieve educational goals, as well as a guideline for implementing education. In line with this, the curriculum is defined as a set of activity plans. These activities were designed to implement educational goals (Owen et al., 2021; Herman et al., 2022).

Curriculum is at the heart of education. As Philippou and Priestley (2022) argue, we cannot understand pedagogy, assessment of learning, pupils, teachers or others who are part of the school environment without understanding the curriculum practices that constitute, shape, or influence them. The time to (re)focus and (re)focus on the curriculum is now. To borrow an idea from Baker (2015), many countries around the world, including for the purposes of this article, the UK, have become 'school societies' because there is a strong culture of education where there is greater access to primary, secondary and higher education than ever before. As such, what pupils learn and are expected to know through the school curriculum reflects and influences wider social, political and economic processes, such as the construction of personal and social identities, political affiliations and actions, and the labour market (Baker, 2015). Given its significance and influence, the curriculum is, perhaps inevitably, a source of contestation in which power relations are played out. In this regard, much has been said and written in the UK and, indeed, other countries for that matter, about the ways and extent to which the power of academics, researchers and teachers has been eroded vis-à-vis the construction and implementation of curricula by successive governments (Sinnemaa et al., 2020). Techno-bureaucratic curriculum policymakers continue to ignore the theoretical and empirical work of academics and teachers' perspectives during curriculum policy development. While policymakers may often ignore teachers in the curriculum process, we regard teachers as 'knowing experts' (Fricker, 2007) because of their lived experiences embodied in the translation and enactment of curriculum, and so our research centres their experiences and amplifies their voices (Maher et al., 2024)

All these steps need to be taken by the Indonesian government to produce quality and competitive educational processes and products on the global stage. Curriculum changes and improvements are common in various countries, as a form of responsiveness to developments that occur in local, national, and global contexts. These changes are the main reason for curriculum designers to adapt to the existing curriculum (Sam and Tuti, 2007). The ideal

curriculum is adaptive to changes in times and advances in science and technology. The goal is for the educational outcomes produced to meet the needs of users and the challenges of the times (Prastowo, 2018). Therefore, the curriculum must be updated and aligned with the relevance of the times' needs. The new paradigm in curriculum development needs to shift from *supply driven* (driven solely by educational institutions) to *demand-driven* (driven collaboratively between educational institutions and the world of work).

All participants, regardless of the alternative provision setting in which they taught, articulated a strong ideological commitment to a PE curriculum that was tailored to pupils' needs and preferences. For example, David said, 'some of our children have very complex needs. We need to consider these needs when planning activities and curricula. Some activities are not suitable for them. Similarly, Donald suggested that we sometimes have to think carefully about what to do [in PE]. In a hospital school, this depends on the child. Some cannot get out of bed, so I have to try and stimulate their minds through PE'.

Given what has been said here, it seems that physical education practitioners are using their power to disrupt standardized, normative and often taken-for-granted beliefs about and approaches to curriculum development and implementation. As Maher and Fitzgerald (2022) argue, 'one size does not fit all' when it comes to curriculum, and as they add, the organization of pedagogy and assessment in schools with alternative provision. However, it is worth noting that there are few concrete examples in the dataset of how these ideological commitments manifest themselves in practice. Furthermore, in this regard, we note Barber, B., Eccles, J., & Stone, M. (2001) concerns that learner-centred curricula, while they may intend and do challenge cultural assumptions of adults and teachers as monopolisers of expert knowledge, can be problematic if they fail to consider what is to be learned and why it is to be learned. Additionally, we raise concerns that needs-based approaches to education, which are prevalent in alternative provision and physical education, may reinforce and reproduce deficit beliefs and practices because they focus on what pupils cannot do, and thus their limitations, rather than emphasizing and capitalizing on learners' abilities (Maher et al., 2024)

Figure 4. 4C competency elements

(Source: explorationsinliteracyblog.wordpress.com)

In the 2013 curriculum, 4C competencies were integrated into every subject. It is expected that these competencies can be developed through various learning activities such as group discussions, presentations, and projects. These activities allowed students to apply their understanding while practicing critical thinking, creativity, communication, and collaboration.

The four Ks, which are an integral part of the 2013 curriculum, are very important provisions for the next generation of the nation in facing the challenges of Industrial Revolution 4.0. The most fundamental are moral and religious values that are always taught at home, school, and places of worship. This is because the fundamental difference between humans and robots lies in their characteristics and conscience. When human and machine intelligence are at a comparable level, humans have the ability to feel through conscience, whereas robots do not. Thus, routine, manual, and cognitive work will be gradually replaced by sophisticated machines. Therefore, graduates of education must be prepared with life skills *in* order to be able to create new opportunities or jobs. In fact, the learning pedagogy applied in the 2013 curriculum should shift from the elementary school level, from the concept of knowledge-based learning *to* project-based *learning*.

Maturity can be found in any or all domains of learning, whether cognitive, affective, or psychomotor. The figure also illustrates the various roles of the teacher as well as what the student experiences. The teacher can respond appropriately to the developmental stage of the student, thereby facilitating the student's movement from dependence to independence and from passive to active learning. The rate of movement and development through the stages of the continuum varies from learner to learner and from situation to situation. This continuum model is contextual to the groups. Learner development is indicated by a diagonal line that cuts through the model from the left to the right. This line traces upward toward the right side of the model, which represents the terminal end. Note that the area below the line represents the student's role, which becomes larger as the line moves up the model. Conversely, as the student's level of maturity and responsibility increased, the teacher's active role decreased.

In hospital schools, this depends on the child. Some can't get out of bed, so I have to try and stimulate their minds through PE'. Given what has been said here, it seems that PE practitioners are using their power to disrupt standardized, normative and often taken for granted beliefs about and approaches to curriculum development and delivery. As Maher and Fitzgerald (2022) argue, 'one size does not fit all' when it comes to curriculum, and as they add, the organisation of pedagogy and assessment in schools with alternative provision. However, it is worth noting that there are few concrete examples in the dataset of how these ideological commitments are manifested in practice. Furthermore, we note the concerns of Morley et al (2021) that learner-centred curricula, which may be intended and challenge the cultural assumptions of adults and teachers as monopolists of expert knowledge, can be problematic if they fail to consider what is to be learned and why it is to be learned. In addition, we raise concerns that needs-based approaches to education, common in alternative provision and physical education, can reinforce and reproduce deficit beliefs and practices because they focus on what pupils cannot do, and thus their limitations, rather than emphasizing and capitalizing on learners' abilities (Maher et al., 2024).

Strengthening Character Education

Historically, character education was introduced as a national movement in 2010. However, the impact of this movement was not sufficiently strong. Therefore, it is important to repeat

character education as a national movement through the Character Education Strengthening (PPK) program launched by the Ministry of Education and Culture in 2017.

The PPK movement not only continued the efforts that began in 2010, but is also an integral part of Nawacita. Strengthening character is a priority program for President Jokowi and Vice President Jusuf Kalla. In Nawacita, the government is committed to carrying out a revolution of the nation's character. As a manifestation of this commitment, the Ministry of Education and Culture implemented character strengthening for the next generation through the PPK movement which began in 2016.

Discipline is essentially a process for children to adapt to existing rules. Through discipline, children will be able to adapt to the rules to strengthen their mentality. According to Hasan in Anggraeni et al. (2021), discipline is characterized by the following attitude: a) arriving on time, b) being able to measure the time needed to complete something, c) using objects according to their function, d) taking and returning objects to their place, e) obeying the rules that exist in society, f) Orderly, and g) understanding the consequences of not being disciplined (Zulfiana, 2017).

Researchers have also observed the use of teaching materials containing character values carried out in accordance with the theory proposed by Sari and Faizin. All subjects in the school curriculum should be integrated with character education which can lead students to become students with character (Sari & Faizin, 2023). The results obtained were very encouraging, namely teaching materials containing character content are believed to be able to grow and change student characteristics.

Figure 5. PPK Model

In Presidential Decree No. 87 of 2017 concerning Strengthening Character Education, character education (PPK) is defined as a movement responsible for educational units to strengthen the character of students. This is done through harmonization between the heart, feelings, thinking,

and sports, and involves cooperation between educational units, families, and communities. All of this was part of the National Mental Revolution Movement (GNRM).

According to Alawiyah (2012), character education serves as a foundation for realizing the vision of national development, which aims to create a society with noble characters, morals, ethics, culture, and civilization, based on the philosophy of Pancasila (Carusi & Szkudlarek, 2020). Thus, character education has become an effort by the state to awaken, grow, and equip the next generation with good character, high literacy skills, and superior 21st century competencies. These include critical, analytical, creative, communicative, and collaborative thinking skills (Jeste et al., 2010).

The formation of human resource (HR) character is very important to face various national, regional, and global challenges. These challenges are related to the ability of the younger generation to succeed in cognitive, affective, and moral aspects (Tichnor-Wagner, 2021).

Conclusion

Based on the discussion above, it can be concluded that the world, especially Indonesia, is currently entering a new industrial era marked by digitalization in various sectors of life. Experts call this phase the industrial revolution 4.0. The rapid development of digital technology is expected to further facilitate and increase human productivity, effectiveness, and efficiency in carrying out daily activities. The industrial revolution can be understood as a major change that occurs quickly, fundamentally, and radically, which affects the way humans live. The industrial revolution 4.0 is predicted to bring various changes, both positive and negative impacts on humanity. By realizing this, Indonesia needs to anticipate early on. The Indonesian government has prepared plans and strategies to enter the digital era through the Making Indonesia 4.0 program. To support this initiative, reliable human resources (HR) are needed who are ready to face challenges. Therefore, the government formulated strategic policies in the field of education. One of these policies is the 2013 Curriculum (K13) and the strengthening of character education (PPK), which are designed to prepare future generations to face the Industrial Revolution 4.0.

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