Application of Information Technology to Education in the Age of the Fourth Industrial Revolution

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Abstract

The purpose of this study is to clarify the readiness and challenges of learning information technology, and the challenges of education in this fourth era in applying information technology to learning insights. That's it. As a driver of information technology for learning insights in Indonesia, Indonesia's willingness to face the challenges of the era 4th has made us a credible player in the field of education management to improve human resource management through education and analysts. The challenges of the fourth growth area will soon improve. Therefore, Indonesia's current educational administration policy prioritizes the use of digital technology and progress in educational informatics for her four-year-olds at all levels of education, especially in higher education institutions. Solutions that can be implemented include setting appropriate curricula and educational guidelines, preparing human resources to use information and communication technologies, optimizing student skills and personal development, and preparing for digital learning facilities and infrastructure.

Keywords: Education, Learning, Information Technology,

1. Introduction

The formation of scientific institutions must be supported by creating an environment conducive to the development of knowledge and internal morale master and apply this knowledge [1]. In the light of the world's development and rapid social change, we must observe everything, both positive and negative [2]. This development led to scientific and technological dynamics that had many repercussions, such as the Industrial Revolution, Meiji Revolution, World War I, World War II, and terrorism. In a rapidly changing world, we need the power to expand our horizons and capabilities. Education systems must achieve all of this and provide a strong foundation for developing knowledge and skills and increasing the ability and enthusiasm of younger generations to continue learning after completing their education. This training is both interdisciplinary and scientific. As a result, this training is very broad [3]. Therefore, education management research continues to grow today with the very rapid development of information technology in this fourth industrial technology era [4]. The purpose of this study is to explain the challenges in the balance of education in Indonesia in the 4th era.
2. Literature Review

Industrial development is literally a situation of major socio-economic and cultural changes accompanied by major technological advances. The term Fourth Industrial Revolution was first identified in Germany in 2011 [5]. This fourth era is marked by strong links between the digital world and industrial production. The fourth era is the digital era where all machines are connected to the Internet. This situation brought about great changes in society. The generation born in the 1960s, 70s and 80s made great technological leaps in this century, enjoying not only incandescent, TL and LED lamps, but also Petromax and kerosene lamps [6]. This is the generation that once enjoyed the small sound of a typewriter. It is the latest generation that allows you to record radio sound with a tape recorder and easily download audio and music on your smartphone.

A generation that is always waiting for what the picture will be, even if the end result is contradictory and confusing [7]. Be honest and fair with what you see in your photos. Camera and photo editing in one app. The last generation waits for letters and money orders from the postman, the generation that obeys and fears their parents, the generation that listens and likes to communicate. A generation that imitates their teachers will follow, obey and respect them.

2.1 Technology-based Learning Innovation in The Digital Age

This Fourth Industrial Revolution has the potential to optimize economic levels and improve the lives of societies around the world [8]. Create affordable and competitive prices for everyone, improve efficiency and productivity, and increase materials in the global market. Supply chains and transaction costs are reduced, new markets are opened, and economic growth accelerated. The digital age is a term that describes an era in which everything is based on technology. Today, with the spread of the Internet from devices that smell of technology, the Internet has become the greatest source of energy in our lives. Thanks to the Internet, we can easily call up all the information in the world in seconds [9].

suggest that building learning increases our insight into advances in information technology. Additionally educational innovations in knowledge enhancement methods include teaching materials, delivery strategies, and organizational activities. We consider students' goals, barriers and characteristics to achieve effective and efficient learning. It is intended to contain formulations for managing effective outcomes and engaging learning [10]. This opinion is supported by, who refers to the learning method as inductive or inductive reasoning. We then used to classify teaching and learning models: Classic, independent, teacher-student interaction or group classes. Learn through a rapidly growing information technology institution in the 4th era.

In the context of comfortable learning conditions, they emphasized that learning activities do not always guarantee student learning [11]. This shows that no matter how well teachers are able to conceive and design their learning programs, they cannot optimally achieve their expected competencies if they are not supported by the selection and use of the correct methods. Therefore, the role of the digital society in the era of Industrial Revolution 4.0 is a challenge to build an information technology-based education that can meet the challenges of community needs in the era of Industrial Revolution 4.0.

2.2 Digital Equipment and Internet

The computers we use today not only appeared out of nowhere, they have undergone a long evolutionary process. The era of electrical calculators began in the 1940s with the discovery of electrical calculators using the Boolean algebra system. It wasn't until the 1980s that computers became commonplace in the developed world [12]. Computer network systems became popular by connecting computers at key locations to overcome problems during nuclear attack and avoid centralized information that could be easily destroyed during war. But in this digital age, it should permeate all parts of the Internet. It seems inseparable from human life.

2.3 Challenges of Teaching and Learning Based on Information Technology in the Age of Industrial Revolution 4.0

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General knowledge provides a solid foundation for becoming a human resource (HR) professionals who think, not just talk about religion. Feeling, realizing, acting, acting and doing good deeds according to their respective religions. General education aims to humanize the student, and it is not essential to justify as much as possible morally significant implementation processes. It must be reflected in the working learning atmosphere - the development of learning materials, the application of methods and strategies to the applied assessment. In the practice of general education, morality becomes the soul, atmosphere, educational interaction and their goals. General education aims to meaningfully and sustainably produce a moral workforce capable of responding to all life situations, in all circumstances, in all circumstances.

Today’s extremely rapid technological development is no longer a continuation of the Third Industrial Revolution, but a gateway to the arrival of Industrial Revolution 4.0 or Industry 4.0. define Industry 4.0 as cyber-physical systems. This means that technology is no longer just a 'tool' but an integral part of people's lives. Artificial intelligence, nanotechnology, biotechnology, self-driving cars, and 3D printing are examples of technological developments that are more prevalent today. Speed, reach/coverage, and influence are three reasons, explaining that current technological change is the arrival of Industrial Revolution 4.0, rather than the continuation of the Third Industrial Revolution [13].

The challenge in the world of education for Industry 4 is the fostering of the educational value that is developed. (Hart, Warburton, & Westera, 2019), developed applications of value education are:

1. Children are educated and trained by learning while working. A child's thinking is highly developed.
2. Nurture your child's personality with Indonesian personality to be a dynamic, confident, courageous, responsible and independent person.
3. Guidance will be given at every opportunity, not only during class hours, but also outside of class hours.
4. Examples of good deeds are adopted because they are successful in promoting good deeds.

This is what distinguishes humans from machines in the fourth era of industrial globalization" states that values education is fundamentally aimed at improving national morale. Values education teaches the values and morals that the younger generation should have.

States that moral education is an attempt to help students reach a level of development suitable for their preparation. Teacher role is to introduce students to a variety of real-world moral conflict issues [14]. Moral dilemmas are sufficient to promote moral development and help students respond to worthwhile content. must be broken. Values that have begun to erode as a result of Industrial Transformation 3 are:

a. Cultural Values
   are the values associated with culture, characteristics of the social environment and society. Education can help students systematically view sociocultural values by fostering a healthy balance between openness and skepticism.

b. Formal Juridical Values
   These are values that relate to political, legal and ideological aspects (Mardhiyana & Nasution, 2018). The socio-political values of educational materials are the way people behave and act socially or politically in their lives. It is the content of value that can be guided.

c. Religious Values
   Maintaining these values is the toughest challenge in dealing with the Industrial Revolution-4. The development of the times needs people's more creativity, because the roots of the times are irresistible. The Fourth Industrial Revolution will use the services of machines rather than humans. However, there is an important...
point that distinguishes machines from humans. In other words, human values that machines do not share. It is this transmission of values that needs to be strengthened in order to increase national dignity, especially in the world of education.

3. Research Methods
In keeping up with technological developments, the main obstacles faced by Indonesian education, especially in remote areas, are the various challenges to ensure that Indonesian education is evenly distributed and enjoyed by all stakeholders. Some of the problems in Indonesian education, especially in universities that produce innovative and productive generations, are the lack of innovative learning systems in universities [15]. Big data that adapts curricula and integrates data information technology (IT), operational technology (OT), internet of things (IoT), and physical, digital, and human objects to create a competitive university graduates who improve their skills related to analytics, especially in terms of data literacy, technical literacy and human literacy. There is no restructuring of institutional higher education policies to adapt and respond to the industrial revolution 4.0 when it comes to developing the necessary interdisciplinary knowledge and programs of study [16]. Additionally, like the distance learning system, cyber university programs began to be pursued, reducing the intensity of faculty-student meetings. Cyber Universities were later said to be the solution for children living in remote areas of the country to access quality higher education. R&D breakthroughs to support Industry 4.0 and R&D ecosystems to improve the quality and quantity of R&D in universities, R&D institutions, LPNK, industry and society are still lacking. Innovation breakthroughs and innovation system enhancements to boost industrial productivity and promote technology-based start-ups are still lacking.

4. Results and Discussion
The existence of challenges in the form of problems is accompanied by possible solutions to overcome existing problems. The educational community is now starting to get busy preparing a generation to compete in the industrial age 4.0, states that in the face of the Industrial Revolution 4.0, several preparations are required:

a) Preparing for more innovative learning systems. To produce competitive and qualified graduates, especially in terms of data literacy, technical literacy and humanity Literacy.

b) Restructuring higher education policies of institutions to adapt and respond to Industrial Revolution 4.0 by developing necessary interdisciplinary knowledge and learning programs.

c) Providing responsive, adaptable and reliable human resources to manage the industrial revolution 4.0.

d) Renewal and development of education, research and innovation infrastructure must also be undertaken to support the quality of education, research and innovation. Based on this opinion, in this dialogue, we summarized the solution 4 to the challenges of education in the era of the industrial revolution as follows.

4.1 Curriculum coherence and Learning strategies
Curriculum and education policy provisions can be considered one of them through graduate competence [17]. Seeing that education in Indonesia is still beset by various problems of surviving the industrial age is definitely a study that needs to find a solution. His findings show that the content-related relevance of education to community needs remains relatively low, and education is in fact used as an area of politicization by civil servants. This exacerbates the inability of Indonesian education to meet the challenges of the Fourth Age. Therefore, there is a need for solutions that can be implemented to ensure that Indonesia’s curriculum and educational policies meet current needs.

4.2 Information and communication technology human resources
All education systems are now poised to maximize the skills of millennials, which of course cannot be separated from the latest technological qualities. Solutions in the education
sector related to Age 4 challenges are therefore always related to preparing people and infrastructure as users of Information and Communication Technology [18]. Educators, who are expected to have Information and Communication Technology skills, can help children use existing technology and provide educational facilities for the whole community. Early Childhood Education Example: Educators who can use Information and Communication Technology devices are also expected to be able to guide children to use the devices according to their developmental stage, not the other way around.

4.3 Human Resources in optimizing skills and character

Another solution to meeting the challenges of fourth age education lies in student skills and character development. This is certainly inseparable from the educational goals of the Fourth Age. That is, to acquire competent educational graduates in the current era, to enable children to use information and communication technologies, as well as to develop their abilities in reading, writing, critical thinking, problem-solving, and communication. Cooperative and has a good personality [19]. Optimizing every student's skills can be done in a variety of fun learning ways, depending on the child's developmental stage. In the fourth era, learning is expected to provide students with more opportunities to be creative, problem solving, literacy and numeracy improvement, collaboration and critical thinking.

In addition to the student's cognitive abilities, the development of the student's character and values is also very important. This is what distinguishes humans from robots and machines. Several steps to understanding a student's personality, including:

1. Introduce students to their own country's values through civic education
2. Learning values education in children's immediate environment, especially family.
3. A child's thinking is highly developed.
4. We develop children's personalities with Indonesian personality so that they become dynamic, confident, courageous, responsible and independent individuals.
5. Classes are held not only during class hours, but also outside of class hours.
6. Examples of good deeds are adopted because they are successful in promoting good deeds.

There is a balance between a student's cognitive abilities and personality that must be the goal of education today. This requires the willingness of all involved to provide understanding, examples, and appreciation of values used in everyday life. Fourth Era Indonesia human Resource Readiness Solutions: To provide understanding and knowledge to all educators to use information and communication technology in learning, guide students to use information and communication technology, and promote the implementation of education in all regions of Indonesia [20]. We provide educators with ongoing training, mentoring, and assessment to develop responsive, reliable, and adaptable educators.

Prepares educators to create innovative learning that empowers children to be creative, problem-solve, improve literacy and numeracy, collaborate and think critically. Provide students with meaningful citizenship education as part of value education to create unique individuals [21]. Supportive curricula and policies, people and equipment, and the presence of infrastructure are interrelated. Good policies are no solution unless they are backed by talented people and the right infrastructure.

5. Conclusion

The willingness to take on the challenges of the 4th education era in Indonesia has produced reliable employees and analysts in the field of educational management, which is the driving force behind the promotion of information technology, and through education, has quickly improved the skills and abilities of Indonesian human resources. It’s what you’re trying to do. Technology-based education in Indonesia to meet the challenges of the fast-moving 4th era. Indonesia's education administration policy now encourages the use of advances in digital technology and educational computing during the Fourth Industrial Revolution era at all levels of education, especially in higher education. Possible solutions include:
1) Adequacy of Curriculum and Educational Policy
2) Human Resources' willingness to use information and communication technology to optimize student skills and develop student values (characters)
3) Preparing educational institutions and infrastructure.

References


