Digital Era's Education and Aplication in Higher Education

by Muhammad Nashrullah

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Digital Era's Education and Aplication in Higher Education

Nisaul Barokati Seliro Wangi[1], M. Hafidh Nashrullah[2], Muh Barid Nizarudin Wajdi[3]

[1][2]Universitas Islam Darul Ulum Lamongan

[3]STAI Miftahul Ula Nganjuk

nisa@unisda.ac.id , hafidh@unisda.ac.id, baridnizar84@gmail.com

Abstract

In the current digital era, education is in the age of knowledge (knowledge age) with the acceleration of an extraordinary increase in knowledge. The accelerated increase in knowledge is supported by the application of digital media and technology called information super highway. Education is becoming increasingly important to ensure students have learning skills, innovation, creativity, entrepreneurship as well as technology and information media skills and can work, and survive using life skills. 21st Century skills are (1) life and career skills, (2) learning and innovation skills, and (3) Information media and technology skills. These three skills are summarized in a scheme called rainbow 21st century knowledge skills / rainbow knowledge-skills rainbow. The scheme was adapted by the non-profit organization P21, which developed a 21st century educational framework throughout the world through the website www.p21.org based in the state of Tuscon, USA. Teacher professionalism improvement starts from individuals taking teacher training or equivalent to undergraduate education. At this stage, they are equipped with knowledge and skills in the fields of scientific substance and pedagogical substance. Teaching education must have a large portion in terms of pedagogical practice, which involves the ability to master the material, teaching, and technology. Higher education must now be able to facilitate all of these things and have the obligation to organize education in the direction needed.

There have been many innovations in the administration of education, from those oriented to self-competence to the development of learning infrastructure. The digital age has become a secondary need of society so higher education must be able to adjust the learning process needed at this time. The general goal is to build motivation, involvement, and achievement in students. If this can be realized, then the internal motivation of the individual to become a professional graduate is no longer limited to wishful thinking

Keyword: Digital Era, Higher Education, Human Resources

INTRODUCTION

In the current digital era, education is in the age of knowledge (knowledge age) with the acceleration of an extraordinary increase in knowledge. The accelerated increase in knowledge is supported by the application of digital media and technology called information super highway (Gates, Myhrvold, Rinearson, & Domonkos, 1995). Education is

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increasingly important to ensure students have learning skills, innovation, creativity, entrepreneurship as well as technology and information media skills and can work, and survive by using life skills.

Five important elements that form the concepts and focus that will be implemented by the Ministry of Education and Culture to encourage economic growth and national competitiveness in the digital age, (1) Preparation of more innovative learning systems in higher education such as adjusting the learning curriculum, and increasing student ability in terms of data Technology (IT), Operational Technology (OT), Internet of Things (IoT), and Big Data Analytic, integrating physical, digital and human objects to produce competitive and skilled college graduates, especially in the aspects of data literacy, technological literacy and human literacy , (2) Reconstruction of higher education institutional policies that are adaptive and responsive to the industrial revolution 4.0 in developing the transdisciplinary science and study program needed. In addition, the Cyber University program has begun to be pursued, such as the distance learning lecture system, thereby reducing the intensity of lecturer and student meetings. This Cyber University is expected to be a solution for the children of the nation in remote areas to reach higher quality education, (3) Preparation of human resources, especially lecturers and researchers as well as responsive, adaptive and reliable engineers to face the industrial revolution 4.0. In addition, the rejuvenation of infrastructure and development of education, research and innovation infrastructure also needs to be done to sustain the quality of education, research, and innovation, (4) Breakthroughs in research and development that support the 4.0 Industrial Revolution and the research and development ecosystem to improve quality and quantity of research and development in Higher Education, Research and Development Institutions, LPNK, Industry, and Society, (5) Innovation breakthrough and strengthening of innovation systems to increase industrial productivity and increase technology-based startups.

This work in the knowledge age requires a new combination of skills, namely high-level thinking and complex communication (Trilling & Fadel, 2009). New skills to fill 21st century jobs can be illustrated in Figure 1 below. Figure 2 shows the type of work of the digital era.
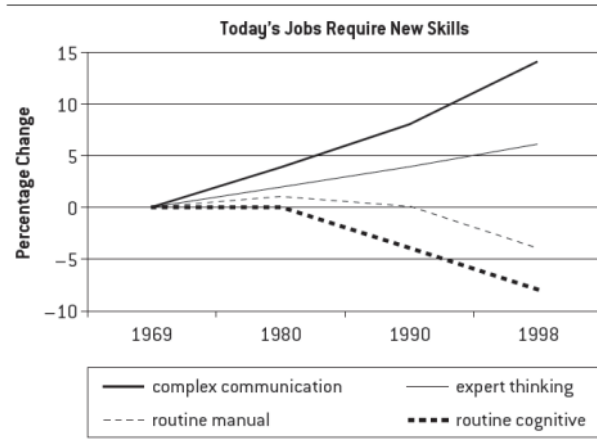
Figure 1: New skills for the Digital Age (21st century)
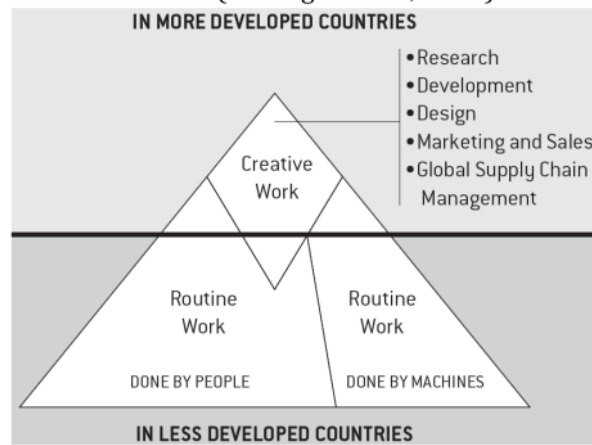Source: (Trilling & Fadel, 2009)

Figure 2: Digital era work (21st century)
Source: (Trilling & Fadel, 2009)

Skills in 21ST Century

21st Century skills are (1) life and career skills, (2) learning and innovation skills, and (3) Information media and technology skills. The three skills are summarized in a scheme called rainbow 21st century knowledge skills rainbow knowledge-skills rainbow (Trilling & Fadel, 2009). The scheme was adapted by the non-profit organization P21, which developed a 21st century educational framework throughout the world through the website www.p21.org based in the state of Tuscon, USA. As for the 21st century skill

concept and 3R core subject, the following is described. Figure 1 shows a 21st century rainbow of knowledge skills schemes.
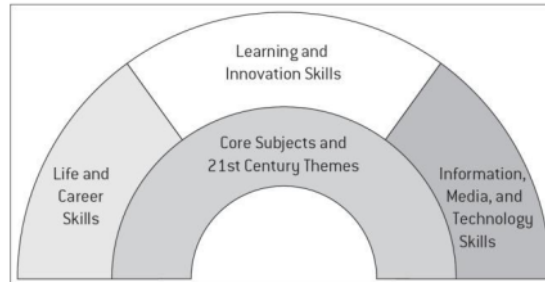

Figure 3: 21st Century Rainbow Skills-Knowledge
Source: (Trilling & Fadel, 2009)

The scheme developed by p21 is made clear with the addition of 3R core subject. in the context of education, 3R is an abbreviation of reading, writing and arithmetic, a strong "R" pronunciation is taken from each word. From the subject of reading and writing, modern educational ideas emerge, namely literacy which is used as learning to understand ideas through the medium of words. From the subject of arithmetic arises modern education related to numbers which means to understand numbers through mathematics. In education, there is no single term that is relevant to literacy and numeracy that can express the ability to make something (wrighting). The 3R, adapted from the 18th and 19th centuries, is equivalent to the literacy, numeracy and ICT functional skills found in today's modern education system. Furthermore, to clarify the function of 3R core subject in the context of 21st century skills, 3R is translated into life and career skills, learning and innovation skills and information media and technology skills.

A description of skills according to (Trilling & Fadel, 2009) is as follows:

1. Life and Career Skills Life and Career skills include (a) flexibility and adaptability/Flexibility and Adaptability, (b) initiative and self-management/Initiative and Self-Direction, (c) social and cultural interaction/Social and Cross Cultural Interaction, (d) productivity and accountability/Productivity and Accountability and (e) leadership and responsibility/Leadership and Responsibility.

Table 1. Life and Career Skills

Skills in 21st century	Description
Life and career skills	1. Flexibility and adaptability: Students are able to adapt to change and are flexible in learning and doing activities in groups.
	2. Have initiative and self-regulate: Students are able to

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	manage goals and time, work independently and become self-regulating students.
	3. Social and intercultural interactions: Students are able to interact and work effectively with diverse groups.
	4. Productivity and accountability: Students are able to manage projects and produce products.
	5. Leadership and responsibility: Students are able to lead their friends and be accountable to the wider community.

Source: (Trilling & Fadel, 2009)

2.   Learning and Innovation Skills Learning and innovation skills include (a) critical thinking and problem solving/Critical Thinking and Problem Solving, (b) communication and collaboration/Communication and Collaboration, (c) creativity and innovation/Creativity and Innovation.

Table 2 Learning Skills and Innovating 21st Century Skills

Skills in 21st century	Description
Learning and Innovation Skills	1. Critical thinking and problem solving: students are able to use various reasons (reasons) such as inductive or deductive for various situations; using systems thinking; make decisions and solve problems.
	2. Communication and collaboration: students are able to communicate clearly and collaborate with other group members.
	3. Creativity and innovation: students are able to think creatively, work creatively and create new innovations.

Source: (Trilling & Fadel, 2009)

Information Media and Technology Skills Information media and technology skills include (a) information literacy, (b) media literacy/media literacy and (c) ICT/Information and Communication Technology literacy.

Table 3. 21st Century Technology and Media Skills Information Skills

Skills in 21st century	Description
Technology and information media skills	1. Information literacy: students are able to access information effectively (information sources) and efficiently (time); evaluating information that will be used critically and competently; use and manage information accurately and effectively to solve problems.
	2. Media literacy: students are able to choose and develop media used to communicate.
	3. ICT Literacy: students are able to analyze information media; and creating appropriate media for communication.

Source: (Trilling & Fadel, 2009)

The Role Of Technology in Digital Era Development

Technological advances have shortened the production cycle and dramatically increased productivity. In the progress and pace of economic growth, computers that take, replace, or complement many jobs carried out by humans in various fields such as information processing and rule-based tasks, result in increased demand for high-level skills (Levy & Murnane, 2004). The ongoing process of industrialization has led to increasingly diverse types of positions and jobs and increasingly realized professionalization. The choice of a person's career is more determined by the ability, expertise and interests, not solely determined by a diploma. On that basis, one of the important roles of education is to help graduates make the decision to choose their career, since they are in school (Suryadi, 2012).

Based on the experience of industrialized countries, mastery of science and technology is not only determined by school factors because it is conservative and schools lack the ability to follow the very rapid development of science and technology. The mastery of science and technology is more caused by various types of positions and jobs in the industry that are more sensitive to new innovations. The development of science and technology is determined by the industry that allows employees to make adjustments and independent learning to utilize new technology in work, including through research and development activities.

In order to be able to support the mastery of science and technology, cooperation between industry and tertiary institutions needs to be deepened in its structure, both related to internships, procurement of education costs, as well as the implementation of research and development. Collaboration is useful for schools to be able to keep up with new technological developments because the industry is far more sensitive to the emergence of new technologies. Information and communication technology (ICT) plays an important role in society because it plays a role in several aspects such as social, cultural and economic to find information from the Internet. Given that all children are entitled to compulsory education, school is the right place to develop ICT competencies (Tondeur, Van Braak, & Valcke, 2007).

Development of Human Resources in the Digital Era

The shift of society from traditional structures to industrial structures will have implications for labor transition or labor qualifications, the shift is elaborated as follows (Suryadi, 2012):

1. Job type and job qualifications

Today in the world is marked by revolutionary changes in industry and technology coupled with various forms of transformation in the types of jobs and job qualifications. Changes occur in some types of jobs that exist now, while other types of work began to shrink and eventually disappear. The combination of types of work with the growing demands for knowledge and skills continues to occur and this results in a very rapid transformation. The development and reduction of these types of jobs at the micro level are largely determined by the policies of each company in utilizing new technologies in production systems, organizing work methods, business expansion, and market fluctuations in the goods produced.

The development of the employment structure in Indonesia is characterized by continued diminished employment opportunities in the agricultural sector and is slowly changing with increasing employment opportunities in the industrial sectors. Soon, high-tech industries will continue to develop, thereby reducing the growth of employment opportunities in the agricultural sector which is generally traditional in nature. This tendency will be increasingly apparent in line with the rapid growth of the service industry in various sectors that are able to create employment opportunities with more rapid growth.

Another effect of the development of high technology is the change in the composition of the workforce according to the type of position and level of expertise possessed by the workforce. Meanwhile, the proportion of unskilled workers, operators, craftsmen and so on in developing countries still seems dominant. However, the development of the utilization of new technology in the world of production requires workers who have higher abilities in intellectual abilities. In addition, the contribution of technicians will increase and slowly replace unskilled workers whose numbers continue to decline.

The growing need for technicians will naturally show the growing need for workers with higher education. This is especially true for people who are starting to move from the industrial era who are in need of more educated technicians. In industrial society, there is a tendency that the boundaries between technician workers and professional staff become blurred because professional staff are formed from experienced technicians. Thus, the development of human resources in the workplace such as in-office training will play a very important role in preparing skilled technicians to become professional workers as industrial drivers.

2. Types of knowledge and skills

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Changes in the occupational and occupational structure will result in a shift in the need for types of workers' knowledge and skills. In the age of knowledge (traditional age) types of work or subsistence that rely on motor skills will continue to change with types of work that are based on automation and information processing. The types of jobs in the technological era are expected to develop as follows:

a.   Mind workers

Mind worker is a job that relies more on human efforts in utilizing intellectual abilities and innovation power. In the industrial era, the types of conventional industrial work marked by repetition, fragmentation and dehumanization will be increasingly irrelevant to the era of high technology. On the other hand, high-tech industries create the types of large jobs that are described as one type of small jobs as part of the big jobs. These types of jobs more require skills, expertise, and creativity that are supported by the professional abilities of workers. The mind worker relies on the ability to think, the ability to abstract and articulation and aesthetics.

b.   The ability to learn independently (self training skills)

In addition, the need to develop self-learning skills (self-training skills) will develop so that they can participate in the decision-making process according to their level. Workers must have an understanding and knowledge of their purpose in doing something even though it is very small and fragmental. Workers are required to be able to integrate work units that are fragmental into a unified system. Thus, industrial workers are not required to be executors who only have a submissive nature, but workers who are able to show a creative, independent spirit, continue to learn, and do not make themselves as components of industrial machines.

c.   Complexity of expertise (multitasking)

Besides the two things above, the complexity of expertise and skills needed (multitasking) will also develop. In the era of high-tech industries, changes in the types of skills and expertise needed and changes in the level of complexity have been examined in a study conducted in Japan which suggests that relying on private sector participation, the government can serve the majority of the population to get an education, especially those who have limited funding to attend education.

Technological developments have changed the trend of work from technical to knowledge based. Technology, knowledge and innovation are now key factors in production. The most valuable asset of 21st century institutions, whether business or non-business, is to have knowledgeable and productive workers. The twenty-first century demands a new set of competencies, which include not only ICT skills but also soft skills

such as problem solving, analytical skills, group learning, working in a team-based environment, and effective communication (Hendarman & Tjakraatmadja, 2012).

Education should provide competencies and skills that enable people to participate in society and live successfully. Competencies and skills change from time to time. Successful people in the 19th and 20th centuries are people who have literacy, numeracy, scientific skills, and apply skills for mass production, their competencies will not be applicable in the 21st century. 21st century competencies and skills arise because of the information and technology revolution, consequently people become interconnected from before and offer opportunities for business and economic growth, the ability to access information, communicate, speak using and create new technologies is very important for workforce productivity (Wang, 2012).

Based on the change in the 21st century learning paradigm, it is necessary to identify the competency needs needed by the business / industrial world. Efforts to develop individual student competencies in the field of technology in accordance with the demands of the era of globalization (competition in cooperation and cooperation in competition) through the practice of learning through learning practices in educational institutions (technology) is now very important.

This is based on the following considerations: First, learning in technology education institutions is a form of interaction between learners and learning resources, both by design and by utilization which leads to the formation and development of certain competencies, as a form of synergy between the cognitive, affective and skill domains . Second, learning in technology education institutions is an effort to facilitate the formation and development of competencies as a representation of efforts to realize individual potential optimally with the dynamics of the needs of life in the community, both in the short, medium or long term. Third, learning in technology education institutions is an effort to facilitate the formation and development of individual competencies that function as an intervening between the formation of individual competencies as a prerequisite in the development of life skills needed in the context of life at the family and community level (industry). In other words, the essence of the learning function in technological education institutions is to facilitate the occurrence of initiatives and accustomed to learning actions that lead to the formation and development of learning how to learn (Mukhadis, 2013).

CONCLUSION

Teacher professionalism improvement starts from individuals taking teacher training or equivalent to undergraduate education. At this stage, they are equipped with knowledge and skills in the fields of scientific substance and pedagogical substance. Teaching

education must have a large portion in terms of pedagogical practice, which involves the ability to master the material, teaching, and technology. Higher education must now be able to facilitate all of these things and have the obligation to organize education in the direction needed.

There have been many innovations in the administration of education, from those oriented to self-competence to the development of learning infrastructure. The digital age has become a secondary need of society so higher education must be able to adjust the learning process needed at this time. The general goal is to build motivation, involvement, and achievement in students. If this can be realized, then the internal motivation of individuals to become professional graduates is no longer limited to wishful thinking.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10