

EDUCATIONAL TRANSFORMATION IN THE ERA OF INDUSTRIAL REVOLUTION 4.0: PREPARING QUALITY AND COMPETITIVE GRADUATES IN THE 21ST CENTURY

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Abstract

In the Era of Industrial Revolution 4.0. The balance between knowledge and skills is needed as a foundation for qualified human resources in the dynamics of the era. This research was conducted with the aim of analyzing effective learning models and what factors must be considered so that universities in Indonesia today can produce competitive graduates in the era of the Industrial Revolution 4.0 who are equipped with 21st century abilities such as effective communication, teamwork, critical thinking, able to solve problems, able to find and develop their skills to face the demands and challenges of the 21st century. This research uses a descriptive qualitative approach with the information gathering process involving literature review as the research method. Education is focused on developing learners' talents through activities that influence the learning process by providing motivation, guidance, direction and encouragement to learners. Education should be multicompetency-based and flexible, with high sensitivity and willingness to make adjustments according to the demands of the industrial world, companies, and the world of work. In addition to using a revised learning model for the modern era, education also requires cohesive coordination from all its constituent parts.

Keywords: Transformative Education, Industrial Revolution, 21st Century Skills

Introduction

The 21st century is widely recognized as an age of unprecedented global transformation. Massive shifts occurred as agriculture transitioned to industry and eventually to a knowledge-based civilization. As Thomas Friedman points out in *The World Is Flat: A Brief History of the Twenty-First Century*, the 21st century skills of this new millennium will bring profound and unsettling changes to the most fundamental aspects of life. Every aspect of contemporary life from the economy, education and infrastructure to technology, communication and information is undergoing continuous change, most of which is geared towards making people's lives better (Achmadi et al., 2020).

Knowledge was positioned as the main spearhead of globalization. This makes the 21st century the "century of openness" or the "century of globalization". However, knowledge alone is not enough to actualize the Industrial Revolution 4.0. A balance between knowledge and skills is needed as a foundation for quality human resources in the dynamic times we live in. (Island et al., 2021) In answering the challenges of the 21st century, education is focused on training students' abilities through activities that direct the learning process by providing motivation, guidance, direction, and encouragement to students. Education must also have high sensitivity and have the courage to make changes in line with the needs of the industrial world, the business world, and the world of work; education must be multi-competency based and adaptive; have adequate facilities and infrastructure, and have 21st century skills, so that students have balanced hardskill and softskill abilities to face the challenges of the times (Indarta et al., 2021).

According to the Ministry of Education and Culture, students must be able to use skills to face 21st century challenges such as analyzing, using critical thinking skills, and working

together to find solutions. Meanwhile, the National Education Standards Agency (BSNP) provides an overview of the 21st century learning framework as follows: (a) critical and systemic thinking skills, especially in the context of problem solving (Critical-Thinking and Problem Solving Skills); (b) Communication and Collaboration Skills; (c) Critical-Thinking and Problem-Solving Skills; (d) ICT Literacy, or the ability to use ICT to improve performance and daily tasks; (e) Contextual Learning Skills, or the ability to engage in self-directed learning in a variety of settings; and (f) Information and Media Literacy Skills, or the ability to understand and utilize various communication media to convey ideas and engage in collaborative activities. (Wijaya et al., 2016).

In the era of Industrial Revolution 4.0, skill-based learning strategies should be used to modernize classroom teaching. Skills such as critical thinking, creativity, cooperation, and problem solving are emphasized in this method as they are essential in the technologically advanced world of the 21st century. Results of data analysis in the research conducted (Indarta et al., 2021) showed that 10 (ten) skills are most needed by students in the 21st century, namely 1) Social responsibility and accountability; 2) Technical and literate communication; 3) Professional ethics; 4) Adaptability; 5) Collaboration; 6) Complex problem solving; 7) Creativity and innovation; 8) Self-awareness; 9) Critical and logical thinking; and 10) Understanding of diversity.

Meanwhile, the Assessment and Teaching of 21st Century Skills (ATC21S) organizes 21st century skills into 4 categories, namely ways of thinking, ways of working, tools for working, skills for living in the world. Ways of thinking include being creative, being able to solve problems, making informed decisions, and reflecting on one's own thought processes. Ways of working include including the capacity for communication and teamwork Tools for working forms of cooperation that include information literacy and ICT literacy skills. Meanwhile, skills for living in the world include citizenship skills, life and career and personal and social responsibility (Zubaidah, 2020).

Thus, this research was conducted with the aim of analyzing the appropriate learning model so that universities in Indonesia today can produce competitive graduates in the era of the Industrial Revolution 4.0 who are equipped with 21st century abilities such as effective communication, teamwork, critical thinking, and being able to solve problems able to find and develop their skills to face the demands and challenges of the 21st century.

Research Method

This research used a descriptive qualitative approach with the information gathering process involving a literature review as a research method. Literature study is a research strategy that involves reading and analyzing relevant books, studies, and scientific articles from print and digital media. (Indarta et al., 2021) Literature study research, as explained by Zed in (Barus, 2019), includes the following characteristics: (1) This research deals with text or numerical data not with the field or eyewitnesses, events, people or other objects; (2) Data in the library generally comes from secondary data sources, meaning that researchers obtain data from second-hand, not first-hand in the field; (3) Data conditions in the library are not divided by space and time.

The data sources in this study were reviewed from various books, literature, research papers, scientific essays, theses, dissertations, and articles, both printed and electronic, on 21st century learning skills. This approach is used so that this paper can provide useful information based on data sources and provide an explanation of the importance of acquiring competent and quality graduate skills in the 21st century.

Result and Discussion

Changes in the 21st century classroom have been characterized by the introduction of new forms of literacy, such as computer literacy, information literacy and media literacy. Due

to the advances in technology and information that are rapidly developing in this century and affecting all areas of life, in the 21st century education must provide the next generation to face various global demands and challenges. Education is focused on training students' abilities through activities that direct the learning process by providing motivation, guidance, direction, and encouragement to students. Universities in Indonesia currently have challenges and demands to produce competitive graduates who are equipped with 21st century skills such as effective communication, teamwork, critical thinking, and problem solving. (Maulidah 2019).

Currently, education is being redesigned to help learners have a better future from a social, cultural, economic, and environmental perspective. Therefore, education needs strategies, techniques, and learning models that are truly effective in responding to this (Doringin, Tarigan, eta Prihanto 2020). Learning models that are oriented to train skills in facing the 21st century, according to Permenristekdikti number 44 of 2015, are group discussions, simulations, case studies, collaborative learning, project-based learning, problem-based learning, or other learning that can effectively facilitate the fulfillment of learning outcomes (Priyanti 2019). Meanwhile, Jogce, Weil & Calhoun in their book *Model of Teaching* suggest four groups of learning models, namely groups: 1). Information processing models, based on Piaget's cognitive development theory and designed to encourage the growth of learners' capacity to process information 2). Social interaction models, based on theories that emphasize good relationships between individuals and society, based on Max Wertheimer's Gestalt learning theory 3). The personalized teaching model emphasizes Humanistic theories of growth with the main goal being to help learners establish positive relationships with their surroundings 4). The behavioral system model seeks to optimize the system to shape behavior through sequencing learning tasks and shaping behavior by manipulating reinforcement (Barus 2019).

In addition, learning that can equip students with 4C skills (Critical Thinking, Communication, Collaboration, Creativity) for the 21st century in the era of the industrial revolution 4.0 can be implemented with 7 current learning models, namely 1. DL = Discovery Learning or discovery 2. IL = Inquiry Learning or investigation 3. PBL = Problem-Based Basic Learning 4. PjBL = Project-Based Learning 5. PBT / PBET = Production Based Training / Production 6. TEFA =Teaching Factories or industry-based learning 7. MBL = Model-Banded Learning (Arsanti et al. 2021)

Discovery learning is a learning method that allows students to gain knowledge and skills by discovering themselves or finding something from the surrounding environment. This method is very effective in improving 4C skills, namely critical, creative, communication, and collaboration skills because students are given the opportunity to explore, observe, and solve problems by collaborating with their friends independently (Barus 2019).

Inquiry Learning is a learning method that encourages students to acquire knowledge (inquiry) by exploring, discovering, and developing understanding through active questioning and observation. In the inquiry learning method, students are more actively involved in learning and are responsible for their own learning process. (Mitasari eta Rusdarti 2019)

Problem Basic Learning is an approach that provides learners with new knowledge to solve a problem, this approach is a participatory learning approach that could help to create an enjoyable learning environment because it starts with an important and relevant problem for learners, and allows learners to gain a more realistic learning experience (real) (Syamsidah eta Suryani 2018). PBL can help improve students' critical, creative, communication, and collaboration skills. Students learn to think critically and analyze problems, formulate and test hypotheses, make decisions, and make recommendations based on the information they find. In addition, PBL also develops collaboration skills, where students learn to work together in

groups, appreciate different perspectives and interests, and take responsibility for their group's learning and success.

Project Basic Learning is a learning model that used projects or activities as media. Learners explore, assess, interpret, and synthesize information to produce various forms of learning outcomes. PjBL used problems as the first step in collecting and integrating new knowledge based on learners' experience in real activities. (Priyanti 2019) Project-based learning method is very effective in improving students' critical, creative, communication, and collaboration skills. Students learn to plan and organize their own tasks, think critically in gathering and analyzing information, work together in groups, develop presentation and communication skills, and produce creative solutions to complex problems.

Production Based Training/Production is a conceptual framework used as a guideline in conducting learning that is systematically organized to achieve learning objectives that involve syntax, social systems, reaction principles and support systems. Participants learn to think critically and analyze problems, formulate and test hypotheses, make decisions, and make recommendations based on the information they find. In addition, PBL also develops collaboration skills, where students learn to work together in groups, respect different perspectives and interests, and take responsibility for their group's learning and success.

Teaching factory according to (Joice & Wells) is a production-based learning (PBL) concept that prioritizes the practical ability of students through exposure to real-world cases/products/needs (Brajawidagda, Sembiring, eta Neta 2019) The purpose of teaching factory is to provide students or trainees with practical experience that is useful and relevant to the career they want to pursue. In addition, teaching factory also helps students or trainees develop work skills that are useful in the future, such as technical skills, teamwork skills, and problem solving skills.

The Blended Learning model is a learning model that combines the characteristics of traditional learning and electronic learning or e-learning. MBL is a learning activity that combined face-to-face learning activities with online learning activities from the aspects of learning theories, approaches, and learning models to achieve learning objectives (Chief 2019). The purpose of blended learning is to provide flexibility in learning and enable students to learn in a more personalized and effective way. In blended learning, students can learn in a more independent way and choose the most suitable time and place to learn online, while also getting direct guidance and interaction with teachers and classmates in face-to-face classes.

A learning model is a strategy or plan that can be used to create an effective curriculum (learning plan). By using a good learning model, we will know the model that was designed by educators who are applied to students. then, we can see the advantages and disadvantages of students from the results of learning methods that educators used. Smaldino argues that teachers who design learning models must also consider students, because they have different characteristics (Khoerunnisa eta Aqwal 2020).

In line with the learning model, there are two factors that influence students' learning outcomes, namely internal and external factors. Internal factors are the abilities of learners, while external factors are the environment and the quality of teaching (Rachman 2018). The cooperation of learners is one of the success factors of education in the industrial revolution 4.0, Motivation is an internal drive that encourages a person to learn and achieve learning goals. Learners must have high learning motivation so that students can be more enthusiastic and successful in participating in the learning process (Harahap 2019).

Then to achieve a deep introduction to its constituent parts, education also needs to pay attention to the relationship between students, educators, educational interactions, educational curriculum, educational environment, and educational outcomes (Sulindawati 2018). Educators are external factors that have a significant influence on the success of students and also the main component in education which has a very strategic position and role. Educators must train and provide opportunities for students to reflect on their ideas, analytical

skills, improve critical and creative thinking skills, and have a spirit of initiative. Because educators have the main role of educating the nation's life, in the era of the industrial revolution 4.0 educators are required to be reflective and open to technological advances and willing to accept changes and develop their competence as teachers (Veronica 2022).

In the curriculum, not only is a series of knowledge that must be taught by educators (teachers) to students, but also all activities of the educational nature that are considered necessary because they have an influence on students in order to achieve educational goals (Los, d. g.) Curriculum policies that can develop the skills of students in the era of the industrial revolution 4.0 is a curriculum that is able to elaborate the abilities of students in the pedagogical dimension, life skills, the ability to live together (collaboration), technology, and critical and creative thinking. curriculum Must be improved and gradually to develop an educational curriculum that is able to direct and shape students ready to face the era of the industrial revolution. The curriculum should refer to learning on information technology, internet of things, big data and computerization, as well as entrepreneurship and internship. This needs to be a mandatory curriculum to produce skilled graduates in the aspects of data literacy, technological literacy and human literacy (Doringin, Tarigan, eta Prihanto 2020).

In the era of the Industrial Revolution 4.0, it is important for educational institutions to have facilities and infrastructure that support the development of 4C skills (Communication, Collaboration, Critical Thinking, and Creativity). Some of the tools and infrastructure needed are **Technology and Internet Access:** Ensuring good access to technology and the internet is an essential step to support 4C skills. More access to computer devices, laptops, tablets, and a stable internet connection will enable students to explore digital resources, collaborate online, and expand their connections, **Collaboration Spaces:** Establishing a dedicated space that enables students' collaboration is essential. Collaboration spaces can include flexible working desks, discussion areas, and interactive technology that allows students to work collectively and share their ideas. **Creativity Labs:** A creativity lab or art space equipped with the necessary equipment and materials will boost students' creativity. This space can contain art tools such as paper, paints, colored pencils, and also technological equipment such as 3D printers or programming machines. **Interactive Learning Media:** The use of interactive learning media such as videos, animations, educational games, and educational apps could enhance student understanding and enrich teaching methods. With the use of these media, students can sharpen their 4C skills through engaging and challenging activities. **Digital Library:** Having access to a resource-rich digital library can help students in developing their literacy and research skills. With access to e-books, journals and other educational resources, students can deepen their understanding of the topics being studied. **Extracurricular Activities:** Supporting extracurricular activities that promote 4C skills is also crucial. Activities such as debates, study groups, art clubs, orchestras, and science projects may provide students with opportunities to communicate, cooperate, think critically, and develop their creativity outside of the classroom environment. **Teacher Training:** Not only students need to develop 4C skills, but also teachers. Facilities and infrastructure that support teacher training and professional development are essential. This can include training programs, mentorship, and access to relevant learning resources. (Drs. Syahril, M.Pd. 2018)

Conclusion

The role of education is critical to ensuring the next generation that is equipped with the necessary knowledge and capabilities to succeed in the Fourth Industrial Revolution and beyond. Education is focused on developing learners' talents through activities that influence the learning process by providing motivation, guidance, direction and encouragement to learners. Education should be multicompetency-based and flexible, with high sensitivity and willingness to make adjustments according to the demands of the industrial world, companies,

and the world of work. In addition to using a revised learning model for the modern era, education also requires cohesive coordination from all its constituent parts.

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