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21st Century Education Reform in Facing the Challenges of the Times in the Era of Disruption

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ABSTRACT

Education is expected to prepare students to master 21st-century competencies to create quality resources capable of contributing to developing social and economic order by developing a curriculum that meets the demands of 21st-century competencies. This research aims to understand the 21st-century education reforms in facing the challenges of the times in the era of disruption. The research method used is qualitative with a literature study approach, collecting literature sources including books, journals, national seminar proceedings, and scientific articles, then analyzing the findings objectively and systematically through descriptive data analysis techniques. The results of the study show that the implementation of quality education in facing the challenges of the times for elementary students is not sufficient on the aspect of knowledge alone, thus it needs to be supplemented with other skills. As stated in the framework for 21st-century innovative learning initiated by the Partnership for 21st Century Learning, among others: education must collaborate, learning must have context, student-centered learning, and schools must be integrated with the community.

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1. INTRODUCTION

The beginning of the 21st century was marked by rapid information and communication technology advances that touched almost all aspects of human life. The increasingly integrated and narrowing factor of "space and time" makes the use of information and communication technology an inseparable part of daily life, thus affecting changes in the qualifications and competencies of human resources. In addition, this condition brings various risks and uncertainties that students must face, considering that the world they live in is now much more complex than before. Therefore, students must continue learning and be proactive towards change to prepare themselves to face increasingly dynamic global challenges. In this context, developing adaptation and problem-solving skills is essential for them to compete effectively at the international level. Furthermore, collaborating across cultures and technologies is also key to facing the era of globalization that continues to grow rapidly.

In this case, the Indonesian government strives to improve the quality of education at every level sustainably by adjusting the development of world education, which is increasingly dynamic and complex. One of the strategic steps taken is to adopt and implement the 21st-century innovative learning framework initiated by the Partnership for 21st Century Learning in 2011 to develop the national curriculum. The framework emphasizes the development of critical skills, creativity, communication, and collaboration that are essential to meet the challenges of globalization. In addition, the government also encourages the effective use of information technology in the learning process in order to create a learning environment that is more interactive and adaptive to changing times. This is expected to prepare Indonesia's young generation to become competent human resources and ready to compete at the international level (BNSP, 2010).

In line with this, as stated in the Regulation of the Minister of National Education Number 16 of 2007, the development of information technology media is one of the main foundations in designing the 21st-century curriculum in Indonesia. This regulation emphasizes that educators must have qualifications and competencies related to the mastery and use of information technology in the learning process. Through this policy, it is hoped that teachers can integrate various forms of information technology media to support learning innovation and adapt to global developments. Thus, the application of information technology-based media not only enriches teaching methods but also strengthens efforts to improve the quality of national education that is responsive to the challenges and needs of modern times (Dewi & Hamami, 2019).

This has important consequences for all parties involved in the education process in Indonesian schools, as it requires mastery of ICT literacy skills. Technology literacy and communication media are crucial not only for educators and students but also for students' parents so that they are all ready to face future educational development challenges. With this literacy ability, it is hoped that every element in the educational environment can actively and effectively participate in facing the dynamics and changes that continue to take place in the modern world of education.

More than that, it is hoped that education can play an important role in preparing for the mastery of competencies in the 21st century, so that educators and students have these abilities to create quality resources that can contribute to building a sustainable social and economic order. This is realized through developing a curriculum that aligns with the demands of 21st-century competencies and applying innovative and technology-based

learning methods. Through the implementation and development of 21st-century education strategies, it is hoped that educators and students can master various important skills and competencies, including effective communication, good collaboration, critical thinking and problem-solving, creativity and innovation, and increasingly complex ICT literacy. This requires thinking at a higher level or Higher Order Thinking Skills (HOTS), so that an educated and adaptive society can be formed to change times. Thus, the young generation is expected to be able to face the challenges of increasingly fierce global competition and sustainably increase the nation's competitiveness at the international level. In addition, education is also expected to instill ethical and social values that support the creation of an inclusive and advanced nation development (Arifin & Mu'id, 2024; Dewi & Hamami, 2019; Yuni et al., 2016).

Research related to the implementation of 21st-century Islamic education in facing future challenges has been conducted by several researchers previously. One is research conducted by Muhali, which focuses on innovative learning in the 21st century, especially how to create human resources that are literate in information, data, and technology through innovative learning. Muhali's study highlights the importance of digital literacy skills and mastery of information technology as an answer to the demands and competition in the current and future global job market. This learning innovation involves integrating technology in every aspect of the teaching and learning process, developing critical thinking skills, communication, collaboration, and problem-solving among students to adapt and become competitive resources in the increasingly dynamic era of globalization. This approach also emphasizes the importance of teachers and students to continue to hone their technology skills and data literacy, so that Islamic education is genuinely relevant and able to answer the challenges of life and the world of work in the 21st century (Djamdjuri et al., 2021; Kalalo et al., 2023; Latifah & Kartika, 2023; Muhali, 2019).

Research by Muhali (2019) generally concludes that in implementing innovative learning for the 21st century, educators can design learning activities by selecting strategies that comprehensively accommodate all necessary competencies of 21st-century students. These competencies include critical thinking, creativity, communication, collaboration, and ICT literacy. Muhali emphasizes that 21st-century learning is interactive, holistic, integrative, scientific, contextual, thematic, practical, collaborative, and student-centered. Therefore, educators can choose learning methods or models that align with these characteristics, ensuring that all essential skills are practiced thoroughly in the learning process. This approach prepares students to meet the complex demands of the global era by developing higher-order thinking skills and adaptability in various contexts.

Then, Prayogi & Estetika (2019) a similar study examined 21st-century skills and their relationship with educator competence. The study results show that 21st-century skills require educators to develop their abilities to actively realize active learning. One of them is educators' digital competence, which is closely related to the ability of educators to use information and communication technology based on pedagogical rules by realizing its implications for educational methodology.

The previous studies mentioned above provide insight into the development of education in the 21st century from a particular perspective or aspect. However, these studies generally do not specifically address how 21st-century education can be developed and realized as part of efforts to prepare for future world challenges. Based on these observations, further research is needed, focusing on actualizing the concept of 21st-century education in preparing for future global challenges. Therefore, this article will discuss in more depth how 21st-century

education can be implemented as a key strategy in dealing with the various dynamics and challenges of the modern world. This research uses a literature study method, where the author searches and compiles. It analyzes various information from relevant sources to understand the actualization of 21st-century education as an important capital in building readiness to face a global era full of change and competition.

2. METHODS

As explained by Arikunto, the literature study method is a method or procedure researchers use to obtain data by studying various literature sources such as books, journals, research reports, and other documents relevant to the problem being studied. In his book, Arikunto states that literature study research utilizes data that is available and ready to be used, not through direct observation in the field or experiments. “Research method is the way used by researchers in collecting their research data” (Arikunto, 2019). Using this approach, researchers can obtain valid and reliable information for solving research problems.

According to Arikunto, the stages in the literature study method include identifying specific problems, tracing and collecting various references related to the research topic, assessing and critically analyzing the content of these sources, and preparing a synthesis of the literature review results obtained to be used as a theoretical basis for research. Researchers must record and compile information systematically to support their arguments and research results.

The main characteristic of literature study research is that the data used is secondary and ready-to-use, and the primary interaction of the researcher is with written materials. “Literature study means that researchers obtain data or information by conducting studies on various library materials” (Arikunto, 2019). Thus, literature studies are critical to strengthening the theoretical foundation and supporting the analysis of scientific research, especially when researchers cannot collect primary data directly in the field.

In practice, the data obtained through literature studies can be analyzed descriptively, as also suggested by Anggito & Setiawan (2018), Fadli (2021), Moleong (2014), Nugrahani & Hum, (2014). The findings are presented systematically, objectively, and adjusted to the research needs. This descriptive data analysis technique is one of the main approaches in qualitative research and literature. Hence, the research results are easy to understand and have an impact on the development of knowledge.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1 Characteristics of Education and Competency Demands in the 21st Century

21st century education brings significant changes in the learning paradigm, especially compared to the 20th century, emphasizing mastering lower-order thinking skills (LOTS). LOTS, which includes the ability to "remember, understand, and apply" so far, has only produced students who can memorize and understand, but has not encouraged the competence to create or innovate from the knowledge gained. The challenges of the modern world require students to be able to integrate knowledge, think critically, and solve complex problems.

As explained in Bloom's taxonomy, revised by Anderson and Krathwohl, LOTS include knowing, understanding, and applying, while Higher Order Thinking Skills (HOTS) include analyzing, evaluating, and creating (Anderson & Krathwohl, 2001). Students who only master

LOTS tend to be stuck in memory and understanding activities only, so they are less able to adapt and create new solutions in dealing with real-world problems (Jamaluddin et al., 2019).

The emphasis on HOTS is in line with the Partnership for 21st Century Learning's Framework for 21st Century Learning (P21), which states that mastering critical thinking, creativity, communication, and collaboration skills is the primary foundation (Binkley et al., 2014; Trilling & Fadel, 2009). In addition, the Ministry of Education and Culture also emphasized that "HOTS-based assessments aim to encourage students to develop high-level thinking skills that include analysis, synthesis, and evaluation skills" (Fanami, 2018). Thus, the transformation from LOTS to HOTS is a must in 21st-century education so that learning is not only oriented to mastering knowledge, but also equips students as problem solvers, innovators, and lifelong learners who are ready to face global challenges (Lusiana & Andari, 2020).

One of the most important parts of education in the 21st century is to increase LOTS to HOTS or higher-level thinking skills. These skills include "analysing and creating," which can be passed on by continuing the skills on LOTS. These three words should be practiced in the classroom by today's teachers. The analogy often used to describe the LOTS and HOTS process is that the child is given fish, and the child is hooked; then, which child can survive better, whether directly fished or hooked. So the answer is the second child. Children will learn more when they are given a hook, not only catching and eating fish, but also practicing how to solve problems about bait, about ponds, or other lessons as a lesson in life (Anderson & Krathwohl, 2001; Elder & Paul, 2020).

The demands of 21st-century competencies require education to adjust all aspects, including the curriculum. One of the demands of the development of the 21st-century curriculum in schools is to change the learning approach to be student-centered from the previous educator-centered learning (Mu'minah, 2021; Tarihoran, 2019). This is by the thinking and learning skills children must have, as the demands of the future world are contained in the 21st-century innovative learning framework initiated by the Partnership for 21st-century Learning (Dewi & Hamami, 2019). **Figure 1** below illustrates the 21st-century Learning Framework. This diagram demonstrates that successful modern education relies not only on mastering core subjects and 21st-century themes but also on strengthening three primary skill domains: life and career skills, learning and innovation skills (the 4Cs: critical thinking, communication, collaboration, and creativity), and information, media, and technology skills.

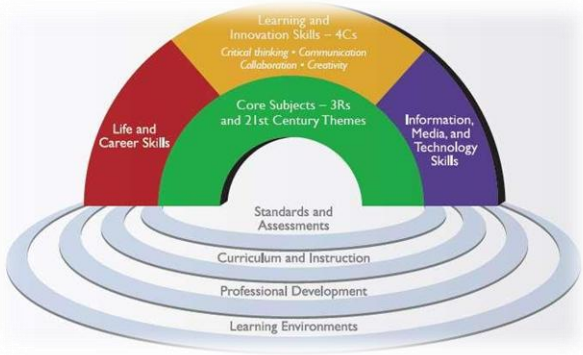

Figure 1. 21st Century Learning Framework

Through the drawing of the framework, it is shown that the competencies that must be mastered by students in the future are not enough in the aspect of knowledge alone, so they need to be equipped with the following skills (Sulthon, 2014):

1. Learning and innovation skills include critical thinking and problem-solving, creativity and innovation, and communication and collaboration.
2. Life and career skills include flexibility and adaptability, initiative and independence, social and cultural skills, productivity and accountability, and leadership and responsibility.
3. Information, media, and technology skills require students to be sensitive and capable of managing information, understanding media, and optimally utilizing information and communication technology (ICT).

In this regard, the government strives to improve the quality of education in Indonesia by utilizing a 21st-century learning framework as the primary foundation for developing the national education system. This effort includes developing national education standards, conducting periodic and ongoing curriculum reviews and revisions, enhancing the professional competence of human resources, and developing a learning environment that adheres to a 21st-century learning framework. An educator's ability to design a lesson plan is a key factor in determining students' achievement of comprehensive skills. Lesson plans should include activities that stimulate students to think critically in problem-solving and facilitate the development of collaboration and communication skills, as these aspects are essential elements that must be integrated into the learning process (Darmadi, 2019).

3.1.2 The Concept of 21st Century Education in Facing the Challenges of the Times in the Era of Disruption

In the 21st century, human resources are required to improve their quality continuously; one way is through professional management within relevant institutions. The challenges of this era require people to be able to make breakthroughs in their thinking and adapt concepts and actions to keep pace with current developments (Wijaya et al. 2016). Based on this, to solve educational problems and answer the challenges of the 21st century, it is necessary to study several possible educational concepts that can be applied in schools, especially related to developing what kind of learning is more suitable for the current and future eras.

Competency- and character-based curriculum

One of the keys to entering 21st-century education is to make the four pillars of education initiated by UNESCO establish the importance of lifelong learning as the foundation of *education*. The four pillars are (Sudin, 2014):

a. *Learning to know* (oriented towards logical and rational knowledge)

   This fundamental pillar is the key to *lifelong education* and learning. Learning to know means that it is important to master material or knowledge and foster a willingness to learn throughout life so that you are always ready to learn when facing new situations that require new skills.

b. *Learning to do* (oriented on how to solve a problem)

   This second pillar emphasizes a person's mastery to learn to work together in a team and live in various or unexpected circumstances.

c. *Learning to be* (oriented towards character formation)

   This third pillar emphasizes a person's mastery to be able to learn to actualize themselves as an independent individual with a personality who has personal responsibility to achieve common goals.

d. *Learning to live together*

   The fourth pillar is an understanding of the previous three pillars that allows the creation of an attitude of appreciation for others, history, traditions, and spiritual

values, then makes it the basis for a new spirit to be able to practice the conditions of mutual understanding and resolve conflicts of diversity and differences in a peaceful way.

Meanwhile, the draft of the 2013 curriculum, which in the national curriculum is known as a competency-based and character-based curriculum, has made the four pillars the primary reference in the development of learning models (Hidayat, 2013). Not only that, the learning process in the 2013 curriculum is carried out using a scientific approach by considering the development of knowledge, skills, and attitudes, as well as mastery of technology as an integrated part of 21st century education, including: problem-solving skills, critical thinking, collaboration, and communication skills as the foundation (Karim, 2017). The concept of 21st-century education needs to be grown through school culture by all those involved in the educational process, both in the family, school, and community, by considering the cultural roots of the community that upholds religious values, so elementary schools in Indonesia should be developed to help their students master the following competencies (Sudin, 2014). 21st-century education is closely linked to the development of competencies in Indonesian elementary schools, where an inclusive school culture is needed—one that involves families, schools, and the broader community while upholding religious and local cultural values. Indonesia's elementary education system has embraced these principles through various reforms, particularly under Kurikulum Merdeka, which emphasizes foundational skills and the systematic integration of 21st-century competencies such as collaboration, communication, critical thinking, creativity, digital literacy, and character education rooted in local culture and religious values (Fitriadi et al., 2024). The ability of humans to obtain meaningful religious experiences for life is related to carrying out their functions as creatures created by Allah.

Academic competence
The ability to follow the development of science and technology relevant to students' age and level of development is related to the concept of lifelong learning or lifelong education.

Economic competence
The ability to meet economic needs so students can live a decent life. An important part of this competency includes a business attitude and work ethic that supports personal productivity.

Personal social competence
Self-management skills (intrapersonal) in a heterogeneous society are related to the ability to live adaptively as citizens and citizens of a democratic international community.

3.1.3 21st Century Learning Models

Regarding the main principles of 21st-century learning, it is important to actualize the four principles in the implementation of education and learning that have been formulated by Nichols, which are as follows Karim (2017):

1. *Education should be collaborative*
   Education must emphasize fostering the ability of students to collaborate with others in the diversity and differences of cultural backgrounds and values that each person embraces, appreciate everyone's strengths and weaknesses, and take roles and adapt appropriately to others.

Likewise, schools and teachers should be able to collaborate with educational institutions and other teachers in various parts of the world to share knowledge and experience about learning practices and methods, which can then be used as considerations for a better learning process.

2. *Learning should have context*
   The importance of associating learning materials with students' daily lives so that learning becomes meaningful, namely, impacting students' lives both at school and outside of school. Educators are expected to help students find the value, meaning, and belief in what they are learning so that they can be applied in their daily lives through various learning methods that allow students to connect with the real *world*.

3. *Instruction should be student-centered*
   The importance of using a student-centered learning approach in the learning process is to position students as learning subjects who have interests and potential to be actively developed. The focus of learning is no longer only on listening and memorizing the subject matter given. However, more than that, it is how to grow students' ability to construct their knowledge and skills according to their capacity and level of thinking development, while being invited to contribute to solving real problems that occur in society.
   In this case, it does not mean that the control of learning is left to the students altogether; students still need the role of teachers as facilitators and supervisors who try to help students when they experience obstacles in the learning process.

4. *Schools should be integrated with society*
   It is important to prepare students to become responsible citizens, have sensitivity and empathy, and be socially concerned by involving them in various activities in the social environment of the community, such as education, health, environmental programs, and so on. One example is the procurement of community service activities, where students can learn to take roles and arrange certain activities in the social environment.

At least two things must be mastered in realizing 21st-century competency-based learning, which has been contained in the framework of the 2013 curriculum (K-13), which is designed to answer the challenges of the 21st century so that students can be prepared to become Indonesia's golden generation 2045, including learning approaches and models. Among the approaches offered, two main approaches in K-13 learning are closely related to the needs of 21st-century education, namely the inquiry and scientific approach (Mubarak, 2019). The explanation is as follows:

1. Inquiry approach
   An inquiry approach emphasizes students not only being informed but also finding out. In addition to the concept of knowledge, this approach also considers students' attitudes or skills in gaining knowledge in the learning objectives.

2. Scientific Approach
   Scientists use a scientific approach to criticize or test a phenomenon to create a new entity or discovery. By applying this approach, it is hoped that students can create products or innovate like scientists.

Gradually, there are five steps in implementing the scientific approach, which in Indonesia is known as 5M, while in English it is known as 5-ing. The five steps are observing*, questioning, experimenting, associating, and* communicating (Andrian & Rusman, 2019). These five steps are very closely related to the design of science (IPA), which is very scientific and positivistic. However, it does not mean it cannot collaborate with social learning and humanities approaches in its implementation. The 5M can be modified to various subject characteristics while emphasizing how teachers foster student productivity.

Teachers' mastery of these two approaches will enable them to redesign education in Indonesia, which is already acute in a *content-based* approach, namely an expository approach where teachers feed students receptively. The learning model with an inquiry and scientific approach can be realized in at least four learning models, namely: (1) *inquiry discovery learning*, which is learning that provides opportunities for students to find out about the theme that has been determined independently, (2) *problem-based learning*, which is learning that focuses on the problem-solving process, (3) *project-based learning* namely learning that focuses on making a project, (4) *cooperative learning* which is learning that provides opportunities for students to be able to work together in a team (Abidin et al., 2016). The learning model is not rigid but is open and can be modified according to the needs of teachers, students, and the characteristics of the subject matter (Muhali, 2019).

3.1.4 Technology-Based Learning

In this information age, educators must keep up with technological developments to provide quality education to students. This means that it is important for educators in the 21st century to have the ability to adapt to being lifelong learners. This includes having the skills to utilize the power of related technology for effective teaching in order to be able to equip adaptive skills for students as an effort to anticipate various changes in the future, while still being aware of various possible adverse side effects that mark every innovation (Karim, 2017).

Learning using IT (multimedia) devices is hoped to improve students' self-regulation in learning, such as attitudes, initiative, and the ability to learn independently. The proper and wise use of ICT can develop creativity, expand freedom, and allow flexibility for teachers and students, and more importantly, change the dimensions of the teaching and learning process.

In this regard, three things must be realized to improve the quality of learning through the use of ICT, including: (1) ensuring the availability of access to digital technology and the internet for both educators and students (2) the availability of quality materials and (3) knowledge and skills are needed in using digital tools and resources that must be mastered by educators for the realization of effective learning.

4. CONCLUSION

Implementing quality education to face future challenges requires more than just focusing on knowledge, but also complementing it with other skills by the innovative 21st-century learning framework developed by the Partnership for 21st Century Learning. The main principles of 21st-century learning as preparation for facing global challenges for elementary school students include: collaborative learning, contextual learning, student-centered learning, and integration of schools with the surrounding community.

In line with this principle, educators' ability to design lesson plans is crucial for students' success in mastering 21st-century skills comprehensively. Learning activities that encourage critical thinking in problem-solving and foster collaboration and communication should be integral to lesson plans. This ensures students are optimally prepared to face real-world challenges in a complex and dynamic world. Therefore, educators must thoroughly grasp scientific competencies and learning methodologies to implement effective, meaningful, innovative learning.

5. AUTHORS' NOTE

The author declares that there is no conflict of interest in the publication of this article. Furthermore, the author confirms that this article is free from plagiarism.

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