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Design of Realistic Mathematics Education Digital (RMED) in Era Society 5.0

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ABSTRAK

Era society 5.0 merupakan era dimana teknologi menjadi bagian dari manusia, pada era ini pendidikan ditransformasikan menjadi digital. Penelitian ini merupakan penelitian kualitatif deskriptif. Tujuan dari penelitian ini adalah untuk mendeskripsikan bagaimana desain RMED pada era society 5.0. pengumpulan data dilakukan melalui studi pustaka, wawancara mendalam dengan guru dan siswa. Data yang diperoleh kemudian dianalisis dengan pendekatan kualitatif. Hasil kajian menunjukkan perlu adanya penelitian dan pengembangan lebih lanjut terkait RMED di era society 5.0

Kata Kunci: *design, RME, digital, society 5.0*

ABSTRACT

The era of society 5.0 is an era where technology becomes part of humans, in this era education is transformed into digital. This research is a descriptive qualitative research. The purpose of this study is to describe how the RMED design is in the era of society 5.0. data collection was done through literature study, in-depth interviews with teachers and students. The data obtained were then analyzed with a qualitative approach. The results of the study indicate that there is a need for further research and development related to RMED in the era of society 5.0

Keywords: design, RME, digital, society 5.0

INTRODUCTION

Beginning with society 1.0, which is defined as a hunter-gatherer stage of human development, we have now passed the agrarian and industrial stages, Society 2.0 and 3.0, and are moving beyond the information age, Society 4.0. Entering society 5.0, where Big Data collected via the internet will be converted by artificial intelligence into a new type of intelligence that will reach every corner of society. Our education has now entered the era of society 5.0, which offers a balanced society. Where the Internet is used for more than just information, but also for daily living; an era in which all technology is integrated into humans, and technological advancements can reduce future human and economic gaps.

In many countries, digital transformation will create new values and become a pillar of industrial policy. In anticipation of such a global trend, the Cabinet of Japan adopted "Society 5.0" as a core concept in the 5th Basic Plan of Science and Technology in January 2016. It was identified as one of Japan's growth strategies. Society 5.0 is also a key component of the "Future Investment Strategy 2017: Reforms to Achieve Society 5.0." (Fukuyama, M., 2018)

In line with these conditions, where global education demands are concerned, Indonesia remains far from average. To increase its global competitiveness, Indonesia must make immediate improvements, including analyzing learning methods and the readiness of

Indonesian Human Resources to face the era of the Industrial Revolution 4.0 and prepare to enter the Society 5.0 (Özdemir, 2018).

So, in order to meet these challenges, all parties must prepare and improve in making improvements and changes with the goal of improving educational quality. Because education is a system, change must begin systemically. In the Industrial Revolution era, Indonesia must prepare superior human resources. 4.0 to 5.0 through educational interventions such as curriculum, educators and education personnel, infrastructure, funding, education management, and education development strategy (Chesser, 2013) .

The dynamics of educational transformation have evolved rapidly in tandem with the advancement of technology. This is possible due to the existence of systems and learning methods that are supported by digital world technology. This progression is distinguished by the determination of the globalization era (Khasanah & Hernia, 2018). With the birth of society 5.0, it is expected that technology in the field of education will be developed that does not alter the role of teachers or instructors in teaching moral and exemplary education to students.

Of course, the concept of learning in the 5.0 era corresponds to the competencies that are expected to exist in the twenty-first century. To give students a place to explore the concepts of knowledge and creativity. Learning models such as discovery learning, project-based learning, problem-based learning, and inquiry learning are available to educators. These various models encourage students to develop their creativity and critical thinking skills.

The most important learning outcome, according to Helmiati (2012), is that students have the strength and ability to learn in order to further develop themselves. They will not only gain knowledge and metacognitive competence, but will also improve their abilities. In this era of society 5.0, learning models such as Realistic Mathematics Education (RME), which focuses on learning for students, are an alternative choice of learning methods. This is due to the fact that this model focuses on learning competencies that prepare students to face the challenges of the Society 5.0 era (Webb et al, 2011).

With the passage of time, Indonesia is faced with the challenge of developing technology through the use of digitalization. Since 1971, when Don Rawitsch, Bill Heinemann, and Paul Dillenberger released The Oregon Trail, a digital educational game containing various learning materials for History and Mathematics, educational technology (edutech) has been known. It is currently evolving with the digital era, where people are leaving the boundaries of space to receive education.

The digital era has an impact on the pattern of community needs, including education. The evolution of the digital world has an impact on how students learn by optimizing the use of digital libraries in meeting their curiosity about teaching materials.

Essentially, the learning method will be similar to the previous one, namely the application of analysis and understanding, but RME-D the difference lies in technological support, which will allow students to explore the material more deeply.

METHODS

This research is a descriptive qualitative research. The purpose of this study is to describe how the RMED design is in the era of society 5.0. data collection was done through literature study, in-depth interviews with teachers and students. The data obtained were then analyzed with a qualitative approach.

RESULTS AND DISCUSSION

Society 5.0

Society 5.0 is a society in which various needs are differentiated and met by providing the necessary products and services in sufficient quantities to those who need them when they

need them, and in which everyone can receive high-quality services and live a comfortable and full life spirit. Society 5.0 aspires to be a people-centered society in which economic development and societal challenges are met, and people can enjoy a high quality of life that is fully active and comfortable (Skobelev & Borovik, 2017).

The Japanese Cabinet Office defines Society 5.0 as a human-centered society that balances economic progress with social problem solving via a system that integrates virtual and physical space 4.0. The fusion of cyberspace and the real world (physical space) to produce quality data, and from there to create new values and solutions to problems, is critical to its realization (Suherman et al, 2020).

Society 5.0 realization seeks to create a society capable of addressing various social challenges by incorporating innovations from the fourth industrial revolution (e.g., IoT, big data, artificial intelligence (AI), robotics, and sharing economy) into every industry and social life. The concept of society 5.0 is here to solve problems in societies around the world, where economic capitalism, economic growth, and technological development have not been able to create a society that can grow and develop independently and enjoy life to the fullest, so the concept of society 5.0 is the answer to these problems with the goal of justice, equity, and prosperity working together to create a supersmart society (Sumarno, 2019).

Educational challenges in this era are very complex, including: (1)The implications of the Industrial Revolution 4.0 to 5.0; (2)environmental problems; (3)advances in information technology; (4)convergence of science and technology; (5)knowledge-based economy; (6)the rise of creative and cultural industries; (7)shifts in world economic power; (8)the influence and impact of technology; (9)quality, investment, and transformation in the education sector. These challenges must be met immediately in order to produce a superior generation as demanded by the competencies that students must possess in the future, such as: (a) communication skills, (b) the ability to think clearly and critically, (c) the ability to consider the moral aspect of a problem, (d) intelligence according to their talents and interests, (e) a sense of responsibility towards the environment, and (f) the ability to be a responsible citizen.

The balance of business and economic development with the social environment is the fundamental principle in society 5.0. The problems caused by the industrial revolution 4.0 (reduced socialization between communities, employment, and other industrialization effects) will be reduced and well integrated with technology in the era of society 5.0. (Faruqi, 2019). Technology should be used not only to celebrate personal and business life, but also to make life more popular among people.

Education in the 5.0 era is, of course, linked to changes in the learning system in that era. This revolutionary era is closely related to 21st century skills associated with rapidly developing technological advances. This also has a connection with the learning system, which clearly refers to the concept of ever-advancing technology. According to Trilling and Fadel (2009), 21st century skills are divided into three categories: (1) life and career skills, (2) learning and innovation skills, and (3) information media and technology skills. These skills can serve as a guide for learning in the 5.0 era, allowing the learning system to align with the 5.0 revolution concept.

The Japanese revolution concept is more encouraging of the role of humans in overcoming paradigms of the progress of the industrial revolution 4.0. This means that in the age of society 5.0, humans will be expected to be more capable of solving complex problems, thinking critically, and being creative.

Digital Learning

Digital Learning is a modern digital learning system that employs technology, both software and hardware, to facilitate an engaging and interactive teaching and learning process. Text, modules, job sheets packaged in software, mobile learning, images, videos, and

animations adapted to the IQF standard can all be found in the Digital Learning Method and can be accessed anywhere and at any time online. It is hoped that by utilizing the Digital Learning System (DLS), students' enthusiasm and motivation for learning will increase (Kistofer et al, 2019).

According to (Anis et al, 2022), digital learning is a tool that allows students to hone skills in accordance with the times and is designed to provide opportunities for students to develop critical reasoning and problem solving through collaboration and communication. According to Pramesti (2018), digital learning can be defined as a digital processing system that encourages active learning, knowledge construction, inquiry, and exploration in students while also allowing for remote communication and data sharing between teachers and/or students in different physical classroom locations. According to Pinatih (2020) digital learning allows students to access broader sources of information by using search engines such as Google and YouTube.

According to Pramesti (2018), digital learning can be defined as a digital processing system that promotes active learning, knowledge construction, inquiry, and exploration in students while also allowing for remote communication and data sharing between teachers and students in different locations. Meanwhile, Digital Learning is also known as Multimedia Learning, according to Parwati & Pramartha (2021) Meanwhile, according to Faruqi (2019), digital learning is a subset of distance education, which is defined as the delivery of formal instruction in which students and educators are separated by time and geography. Furthermore, Trilling and Fadel (2009) defines digital learning as a learning system in which there is no physical interaction between teachers and learners and face-to-face interaction is done virtually.

Sumarno (2019) defines digital learning as "a computer-based technology used to convey a story to students in the form of text, graphics, animation, audio, or video." Based on the opinions expressed above, it is possible to conclude that digital learning is a learning system in which there is no physical interaction between teachers and students and face-to-face interaction is done virtually.

According to Helmiati (2012), digital learning has four characteristics, which are as follows: 1) Learning that combines a variety of delivery methods, learning models, learning methods, and technologically based learning media. 2) As an alternative to traditional or face-to-face learning, independent learning, and online learning. 3) An effective combination of teaching and delivery methods, learning models, and learning methods supports learning. 4) Both educators and students' parents play an important role, with educators serving as facilitators and parents as supporters. While Kistofer et al (2019) stated the characteristics of digital learning, they are as follows: 1) shifting from teacher-centered to student-centered where students become active and interactive learners; 2) increased interaction between students and teachers, students and students, student capacities, and resources outside students that integrate an integrated formative and summative assessment mechanism for students and teachers.

According to Pinatih (2020), the benefits of digital learning, specifically digital technology, have a positive impact that is felt in the digital era, including: 1) the information needed will be faster and easier to access; 2) the growth of innovation in various fields that are oriented toward digital technology that can make work easier; 3) the emergence of digital-based mass media; and (4) improving the quality of human resources through the utilization and development of technology. According to Pramesti (2018), the benefits of digital learning include: 1) easier knowledge sharing; 2) more interactive and fun learning; 3) a clearer and more interesting presentation of information; 4) development of greater interest in learning; 5) ease of information storage; 6) more interactive learning; and 7) easier and faster access to information.

RME

According to experts, the RME approach is one that uses students' real-world experiences as a starting point for learning (Suparni, 2020; Hasbi et al, 2019). Meanwhile, RME is a mathematics learning model based on students' reality and experience, according to (Ningsih, 2017). As the name implies, the RME approach focuses on the use of real-world and realistic situations to help students imagine something when learning mathematics. Experts also recommend using the real world context, such as the research conducted by (Pebriana, 2017), which found that using the real world makes it easier for students to absorb the knowledge conveyed.

The philosophical foundation of the RME Approach is viewing mathematics as a human activity (Freudenthal, 1983). According to Treffers (1987), viewing mathematics as a human activity means viewing mathematics as a series of activities that must be connected to the real world, close to students, and socially relevant in order for it to become a human value.

RME is a mathematical learning approach that was developed in the Netherlands about 30 years ago by the Freudenthal Institute (Streefland, 1991; Gravemeijer, 1994). Fundamental changes are centered on transforming mechanistic mathematics learning into realistic ones (Streefland, 1991; Kwon, 2022). Freudenthal's perspective on mathematics informs RME. According to Freudenthal (1983), there are two important points to consider: mathematics as a reality and mathematics as a human activity. According to (Streefland, 1991), the main principles in realistic teaching and learning are Constructing and Concertizing, Levels and models, Reflection and special assignment, Social context and interaction.

Treffers (1987), de Lange (1987), Streefland (1991) and Gravemeijer (1994) divide the RME learning process into five characteristics, namely: Construction and Concreteization, Level and Models, Reflection and Special Assessment, Social Context and Interaction, Structuring and Linkage. Contextual Problem Submission, Understanding Contextual Problems, Study Group Discussions, Sharing Classical Solutions, and Implementation of Formal Mathematical Knowledge on New Contextual Problems are the steps or syntax of learning in the RME Approach.

Design RME-D

RME-D is a hybrid of two learning approaches: RME and Digital Learning. The offered design is an RME syntax that is used in digital learning. The learning in question is digital learning, which is supported by computers and the internet.

RME-D can be implemented using various available platforms such as Zoom Meeting and Google Meet for face-to-face meetings. Educators can also create digital teaching materials using platforms like macromedia flash, canva, geogebra, or power point. Platforms that are currently popular, such as YouTube, Instagram, and Tik Tok, can be used as digital learning media by teachers using the RME approach.

Several studies on RME-D have been conducted, such as the research of Siregar and Hasratudin (2022) on the effect of macromedia flash assisted rme approach on students' mathematics problem-solving ability based on gender-based, which concluded that the RME approach assisted by Macromedia Flash has a positive and significant effect on students' mathematical problem solving abilities compared to the control. Sari et al (2022) research on RME-based blended learning and self-regulated learning in improving mathematical literacy concluded that RME-based blended learning, conventional learning, and SRL all contribute to students' improved mathematical literacy. Jayanti et al (2021) study on geometry learning through elearning assisted RME concludes that more research and development on e-learning-assisted RME is needed.

CONCLUSIONS

The results of the study indicate that there is a need for further research and development related to RMED in the era of society 5.0.

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