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The Physics Learning Innovation in Welcoming Society Era 5.0

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ABSTRACT

The world of education is currently developing digitalization that supports science and technology. The development of technology is now in the era of society 5.0 which is a follow-up solution to the industrial revolution 4.0. The era of society 5.0 is a learning innovation that has changed from basic literacy to digital literacy. This study aims to analyze physics learning innovations in class XI IPA MAN 2 Kota Palu in welcoming the era of society 5.0. The research method uses descriptive qualitative. Data analysis techniques are carried out with a review of the literature. The data collection method is carried out by observation, dissemination of questionnaires, documentation, teacher interviews, and student interviews. The research instrument consists of an observation sheet, a questionnaire, and an interview sheet. The results showed that during the era of society 5.0, teachers and students were required to be quick in making decisions and solutions when learning physics. Teachers must dig up information and look for new innovations so that students can think forward and follow the development of safe zaccording to the era of society 5.0. The teacher acts as a tutor or teacher, facilitator, and inspirer of students until the achievement of learning objectives. Based on the results of the study, it can be concluded that teachers must have the ability to have the ability in digital literacy and train students to be able to think critically and creatively in learning physics in the era of society 5.0.

Keywords: *Innovation, Learning physics and* Era Society 5.0

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INTRODUCTION

Not finished with the hustle and bustle of the industrial revolution era 4.0 Indonesia was surprised by a new concept, namely society 5.0. This era is an era when people must be able to solve social problems caused by inventions in the industrial era 4.0, namely artificial intelligence, internet of things, robot technology, to big data which can certainly replace the needs of human labor (Holroyd, 2022). The era of society 5.0 aims to create a technology-centered human being so that people can enjoy a high quality of life, be active and comfortable. This era is here to be able to solve the problems of the world's society, where economic growth, capitalism, and technological developments have not been able to create a society that grows and develops freely and enjoys life to the fullest.

Facingthis era, educators, both teachers and lecturers, must present learning content that teaches students or students to have 4C skills, namely critical thingking and problem solving, communication, collaboration, and creativity and innovation.(Prayogi, 2020). The role of education is very influential to shape and direct students or students to have these competencies in facing reality in the 21st century (Putri et al., 2021).

The development of the world of education has entered the era of society 5.0 where the form of human life has been based on technology and information. Graduates of science majors in sma /MA are currently expected to become qualified human beings, master technological developments and be able to compete globally. This becomes important for all people as well as the future of a nation and a country. Digital literacy needs to be developed in the world of education to build a better national character and

better prepared to face the industrial era 4.0 and the era of society 5.0 (Roblek et al., 2016). The purpose of this study is to find out the innovation of physics learning in welcoming the era of society 5.0 students majoring in science MAN 2 Kota Palu through digital literacy.

LITERATURE REVIEW

Educational Innovation

Invention is the discovery of something completely new, meaning that the result of human creation, the object or thing encountered really did not exist before, then it was held with the result of a new creation. For example, the invention of learning theory, educational theory, techniques for making goods from plastic, clothing fashion, and so on. Of course, the emergence of ideas or creativity based on the results of observations, experiences, from things that already exist, but the form that it discovers is completely new. Innovation is a result of thinking in the form of ideas, goods, events, methods that are perceived or observed as a new thing for a person or group of people (society), be it in the form of invention or discovery (Kusnadi, 2017).

Innovation is interpreted as an idea, idea, practice or object / object that is realized and accepted as a new thing by a person or group to adopt. Innovation is essentially the result of a brilliant thought that is characterized by a new thing, it can be in the form of certain practices or in the form of a product of a thought process and technological process that is applied through certain stages. This is intended to solve problems that arise and improve a certain situation or certain processes that occur in society (Nawangsari, 2010).

Educationis an effort to develop the quality of human self in all aspects. In a broad sense, Soyomukti says pendidikan is life (Fatimah, 2017). Education is any learning experience that takes place in any environment and throughout life. Education is any life situation that affects the growth of an individual. Lifelong education means that education is part of one's own life. Learning experiences can take place in any environment and throughout life. Consciously or unconsciously education is always directed towards achieving certain goals. In a broad sense, educational goals are contained in any learning experience and are not determined by individual outsiders. The goal of education is growth, the number of educational goals is unlimited. The purpose of education is the same as thatof tuj uan hidup (Mudyahardjo, 2008).

In the systems approach, education is a whole of human work formed ona onen-component component that is functionally interconnectedin order to achieve the expected educational goals. Education is a process of transforming inputs into outputs (Sawitri et al., 2019).

Physics Learning

Learningactivities will boil down to two main activities. First, how to carry out behavior change actions through learning activities. Secondly, how people carry out the act of conveying knowledge through learning. Thus the meaning of learning is an external condition of learning activities which, among others, is carried out by a teacher in conditioning for learning (Indriawati et al., 2021). However, the implementation of this learning word is often synonymous with the word teaching (Imanuddin, 2020).

Physics is a process and a product. Process means the procedure for finding physical products (facts, concepts, principles, theories or laws) carried out through scientific steps (Indrawati, 2011). Physics consists of concepts. Concepts basically categorize something into a non-verbal presentation, so concepts tend to be abstract so that mental imagery abilities are necessary. Learning that is faced to students is learning that exposes students to problems in students' daily lives, so that student learning is more meaningful (Suci & Taufina, 2020).

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Society 1.0 to **Society 5.0**

At the time *of Society 1.0* humans began to know about forming a colony into a society. Man meets his needs by hunting for food and moving around to survive. Humans make various simple weapons or utensils and use natural forces such as fire to cook and protect themselves (Subekti, 2020).

At the time *of Society 2.0* , it was called the agricultural era, commonly also called the Agliculture era. Humans began to focus on developing science, especially agricultural science, because by farming humans no longer need to hunt and move around to get a place to live that has a source of food. In this era, humans began to settle down and build a society of a more complex order, marked by the emergence of various kingdoms, writings were introduced, until large cities began to be built (Subekti, 2020).

During *the Society 3.0* period, the community increasingly focused on the field of Agliculture along with the increasingly complex number of people, making the need for food and clothing increasing. With the existing science, humans began to create factories by producing something to meet human needs. The establishment of factories had an impact on the needs of human labor as workers and was rewarded with a wage system (Masyithoh et al., 2021).

During the time of Society 4.0, marked by the increasing development of science and technology, humans knew computers to the internet so that they could obtain information very quickly. The extremely fast data flow makes human life seem to have no barriers to the distance of time and space. The industrial world is competing to build products that help humans get easier in obtaining information (Mumtaha & Khoiri, 2019).

Society 5.0 is an improvement of *society 4.0*, where technology is part of humans themselves, not only to share information, but to facilitate the activities of daily human life. *Society 5.0* emphasizes an integrated, easy and fast life. For example, the use of robots that can clean the house, help with work in restaurants, and others can be controlled with the internet and computers. *Society 5.0* makes human life automated and practical. So that technology does not master humans but humans can get a good and comfortable quality of life (Mumtaha & Khoiri, 2019).

METHOD

The method used in this study is a qualitative descriptive method, namely by analyzing and describing data from observations, interviews and questionnaires. This research was conducted in April - May 2022 in class XI students in MAN 2 Kota palu. The population of this study is all students of class XI science even semester in MAN 2 Kota Palu. The samples in this study were students of class XI IPA 1 and XI IPA 2 in MAN 2 Kota Palu in the even semester totaling 49 people. Research instruments in the form of documentation, observation sheets for the state of madrasahs, questionnaires of student responses to the learning process, lecturer interview sheets, and student interview sheets. The implementation of observations is carried out with researchers directly involved when collecting data with documentation and interviews.

FINDINGS AND DISCUSSION

The research was conducted through interviews with physics teachers and students of XI IPA 1 and XI IPA 2. The results of teacher interviews when the physics learning process is carried out in class, the learning situation can take place properly and smoothly. This research was continued by giving a questionnaire to students who had provided a link on the google form. There are two aspects studied in this study, namely facilities and infrastructure that support physics learning and students' skills after studying physics.

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Infrastructure

The results of the questionnaire of student responses to facilities and infrastructure in learning physics in class XI science MAN 2 Kota Palu can be shown in Table 1.

Table 1. Evaluation Results of Physics Learning Facilities and Infrastructure

No	Question	Answer (%)				
		STS	**TS**	**KS**	**S**	**SS**
1	Classrooms complete with facilities that support the learning process	0	2	7	53	38
2	There is a room or discussion place for students	0	0	11	60	29
3	Textbook materials or Physics modules are provided	0	0	12	73	15
4	Textbooks or modules help me in understanding physics learning	0	0	15	59	26
5	The use of LCD Projectors in Physics learning helps me understand what the teacher is teaching	0	0	12	56	32
6	Library MAN 2 Kota Palu, it is enough to have books as reading material and complete physics tasks	0	10	28	38	28
7	is a Physics Laboratory that supports the physics learning process	0	0	16	49	35
8	existence of Physics Practicum activities in the laboratory	0	10	7	63	20
9	The existence of a Practicum manual	0	0	5	60	35
10	The tools and materials in the physics laboratory are complete and according to standards	0	10	15	59	16

The first statement of the classroom is complete with facilities that support the learning process, student answers 2% TS, 7% KS, 53% S, and 38% SS. The facilities in the classroom include whiteboards, chairs, LCD projectors and other teaching and learning equipment. There is a discussion room or place for students, student answers are 11% KS, 60% S, and 29% SS, namely in classrooms, libraries and in parks. Textbooks or physics modules are provided by the teacher, student answers are 12% KS, 73% S, and 15% SS. Teachers provide subject modules in the form of textbooks and physics diktats. Textbooks or modules help me understand physics subjects, student answers are 15% KS, 59% S, and 26% SS. Textbooks or modules are a medium for students to seek information and deepen their knowledge of physics materials.

The use of LCD projectors in physics learning makes it easier for me to understand what the teacher is teaching, student answers are 12% KS, 56% S, and 32% SS because with the existence of LCD the teacher can explain physics material and students can present the results of their group discussions. The MAN 2 Library in Kota Palu is sufficient to have books and other reading materials for the completion of physics assignments, student answers are 10% TS, 28% KS, 38% S, and 28% SS because the MAN 2 Kota Palu library was damaged during the earthquake, the library still lacks references to books on physics materials. There is a physics laboratory that supports the learning process, students' answers are 16% KS, 49% S, and 35% SS because physics has had a laboratory for a long time, but the laboratory still lacks adequate tools and materials, so some practicums are sometimes rarely done.

Physics learning consists of providing material in the classroom and practicum activities in the laboratory ((Mulyaningtyas et al., 2020)). The existence of physics practicum activities in the laboratory, student answers are 10% TS, 7% KS, 63% S, and 20% SS. Physics practicum manuals are provided by the

teacher, student answers are 5% KS, 60% S, and 35% SS. The tools and materials in the physics laboratory are complete and according to standards, student answers are 10% TS, 15% KS, 59% S, and 16% SS.

The management of the physics laboratory in MAN 2 Kota Palu is quite good, because sdh has a physics laboratory head but does not yet have a laboratory. Limited physical tools and materials so that practicum activities have not run optimally. The use of laboratories needs to be maximized in the MAN 2 Science class in Kota Palu, especially during physics learning. Practicum materials include: Circular motion, Simple pendulum swing, Potential Energy, Momentum and Impulse, Weight Point, Static Fluid, Dynamic Fluid, Thermodynamics. In order for the physics program to be carried out properly, it is necessary to make a practicum schedule in the physics lab considering that the laboratory is used classes X, XI and XII. Based on the results of the interview, students understand and understand more about the physics material taught through direct practice rather than theory.

Skills

The results of the questionnaire of student responses to skills (skills) in physics learning in class XI IPA MAN 2 Kota Palu can be shown in Table 2.

Table 2. Results of Evaluation of Physics Learning Skills

No	Question	Answer (%)				
		STS	**TS**	**KS**	**S**	**SS**
1	I have learned to think critically as a result of the activity of physics subjects	0	1	5	72	22
2	I have learned to present ideas in a clear way sebagai akibat dari aktivitas mata kuliah biokimia ini	0	0	6	73	21
3	Teachers give time and space for discussion activities	0	0	0	55	45
4	I have developed communication skills as a result of the activity of the physics eye	0	0	4	75	21
5	I have developed my ability to work in groups or teams as a result of the work I do in physics subjects	0	0	3	69	28
6	Through these physics subjects I gained a good understanding of the field	0	0	4	68	28
7	I think working in groups is an effective way to learn	0	0	7	63	30
8	This Physics subject has had an impact on how I make decisions and the way of thinking scientifically	0	0	1	76	23
9	My ability in laboratory activities improved after attending physics subjects	0	0	10	74	16
10	I am willing to repeat physics lessons and practice questions at home	1	3	5	70	21

My statement has learned to think critically as a result of the activity of physics subjects, students' answers are 1% TS, 5% KS, 72% S, and 22% SS. One of the thinking skills that need to be developed to achieve optimal learning outcomes is critical thinking (Khasanah et al., 2017). Critical thinking is a mental /intellectual process related to skills in making understandings or concepts, applying, analyzing, making synthesis, and evaluating so that it can then be applied to solve problems, make decisions, analyze assumptions, and conduct research (Kwan & Wong, 2015). Critical thinking needs to be developed to analyze arguments and bring out insights and develop cohesive and logical

patterns of reasoning (Vong & Kaewurai, 2017). Critical thinking skills can develop when XI science students are actively involved in the physics learning process.

I have learned to present ideas in a clear way as a result of the activity of physics subjects, this is the answer of students 11% KS, 60% S, and 29% SS because the teacher gives the opportunity to the students to divide the material, discuss, and present the results of their discussion in front of the class. The conducive learning environment allows students to explore information from multiple sources quickly and easily. This can encourage students to think critically and selectively in choosing learning resources that are in accordance with the problems given by the teacher. Siswa can control learning and determine their own learning styles (Wilson, 2016).

The teacher gives time and space for discussion activities, student answers are 55%S and 45% SS. Discussion can build siswa to actively argue and accept opinions from other groups (Karyatin, 2017). Discussion activities can make siswa discover new things. I have developed communication skills as a result of the activity of physics subjects, this answers students 4% KS, 75% S, and 21% SS. Being scientific in students can develop an attitude of curiosity, courage, courtesy, caring for the environment, opinion / communication scientifically, critically, working together, honestly, and diligently (Widyaningrum & Wijayanti, 2019). I have developed my ability to work in groups or teams as a result of the work I do in physics subjects, student answers are 3% KS, 69% S, and 28% SS. The formation of a study group consists of 4 students who are given different problems by the teacher. Siswa discusses in her group starting from defining problems, asking questions and hypotheses, conducting research, testing hypotheses, making reports, and presenting in front of the class. The report on the results of the discussion is collected for assessment. When one of the groups is presenting, then the other can ask or respond on the discussion forum. The teacher responds and directs the discussion of siswa for the improvement of dubious concepts.

Through this physics subject I gained a good field understanding, answers siswa 4% KS, 68% S, and 28% SS. Students' field understanding and skills in solving physics problems are still low. siswa has not been able to master the concepts that have been learned. This is because students lack theexploration of their learning resources and elaborate on physics concepts in depth. Theself has not been able to develop concepts to be implemented in solving contextual problems encountered in everyday life. I think working in groups is an effective way to learn, students answer 7% KS, 63% S, and 30% SS. This physics subject has had an impact on how I make decisions and the way of thinking scientifically answers students 1% KS, 76% S, and 23% SS. Siswa who is intelligent in the era of super smart society must be able to think scientifically, logically, and boldly in expressing his opinion.

My ability in laboratory activities improved after attending physics subjects, student answers were 10% KS, 74% S, and 16% SS. Laboratory activities need to be developed again by physics teachers so that graduates can later continue to the desired college. I am willing to repeat physics subjects and practice questions at home, students' answers are 1% STS, 3% TS, 5% KS, 70% S, and 21% SS. Learning difficulties in students can be characterized by the presence of certain obstacles that hinder the achievement of learning goals. There are various factors that affect learning difficulties in students including student abilities, teacher quality, learning environment, and infrastructure that supports the learning process (Winarti, 2021).

Physics educators or teachers must upgrade their educational competencies in accordance with the era of super smart society 5.0. Students as millennials who are experts in the digital world must be utilized their potential through various ways, both methods, media, and learning processes, especially in physics subjects. Teachers and siswa must be familiar with the flow of information and technology. Products in the form of graduates must be able to answer the challenges of the super smart society 5.0 era. The challenges of education in the future are very complex, including the implications of the Industrial revolution 4.0 to 5.0, advances in information technology, environmental problems,

convergence of science and technology, the revival of creative and cultural industries, a knowledge-based economy, shifts in world economic strength, the quality of investment and transformation in the education sector as well as the influence and impact of technoscience. These challenges must be followed up, in order to create a generation of superior students in the future. Competencies that teachers and students must have in the era of super smart society 5.0: (a). Ability to communicate, (b) Have a sense of responsibility to the environment, (c) Ability to consider the moral aspects of a problem, (d) Have intelligence according to their talents and interests, (e) Ability to think critically, (f) Have interest and creativity in life, (g) Have readiness to work, (h) Ability to live in a global society, (i) Ability to try to understand and be tolerant of different views, (j) Ability to be a responsible citizen (Sumarno, 2019).

CONCLUSION

Innovation in physics learning in welcoming the era of super smart society 5.0 and preparing superior human resources, it is necessary to carry out educational interventions, including curriculum, educators and education personnel, funding, infrastructure, and education management. Education development strategies need to be carried out in order to improve the Human Resources of MAN 2 physics teachers in Kota Palu in the era of super smart society 5.0, as well as to answer future challenges and competencies. The steps taken can be in the form of strategic approaches, levels, and types of education, with the aim of developing human resources who are faithful, knowledgeable, devout, have an integral, creative, independent, and nationalist personality. Physics learning with the HOTS (High Older Thinking Skills) approach can be implemented in the learning era in super smart society 5.0 with the application of new literacy based on data, humanities, and technology.

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