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Article

Innovation of Biochemistry Learning in Welcoming the Super Smart Society 5.0 Era

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ABSTRACT

Technological developments are now in the era of super-smart society 5.0 which is an advanced solution to the 4.0 industrial revolution. The era of super-smart society 5.0 is a learning innovation that changes from basic literacy to digital literacy. This study aims to analyze the innovation of Biochemistry learning in the Department of Chemistry at UIN Sayyid Ali Rahmatullah Tulungagung in welcoming the era of super-smart society 5.0. The research method used descriptive qualitative. The data analysis technique was carried out using a literature review. The method of data collection was carried out by observation, distributing questionnaires, documentation, lecturer interviews, and student interviews. The research instrument consisted of observation sheets, questionnaires, and interview sheets. The results showed that in the era of super-smart society 5.0, lecturers and students were required to be quick in making decisions and solutions when learning Biochemistry. Lecturers must dig up information and look for innovations so that students can think ahead and keep up with the times according to the era of super-smart society 5.0. Lecturers act as tutors or teachers, facilitators, and inspire students to achieve learning objectives. Based on the results of the study, it can be concluded that lecturers must have the ability in digital literacy and train students to be able to think critically and creatively in learning Biochemistry in the era of super-smart society 5.0.

INTRODUCTION

Biochemistry is a description of science that examines the composition, chemical structure, transformation, and composition of substances in living things (Murray RK, Granner DK, 2009). Biochemistry is a compulsory subject at chemistry education UIN Sayyid Ali Rahmatullah Tulungagung and is included in one of the courses in the comprehensive exam. The Biochemistry course discusses the composition, structure, properties, changes in energy, and the material that accompanies it. The Biochemistry course aims to enable students to understand interrelated theories, principles, concepts, and knowledge so that they can apply their knowledge in everyday life (Wahyuni, 2019).

Innovation in biochemistry learning must follow the development of super-smart society 5.0 era.

The era of super-smart society 5.0 is a time where people must be able to solve social problems caused by inventions in the industrial era 4.0, namely artificial intelligence, the internet of things, robot technology, to big data which of course can replace the need for human labor (Holroyd, 2020). In facing this era, educators, both teachers, and lecturers must present learning content that teaches students or students to have 4C skills, namely critical thinking and problem-solving, communication, collaboration, and creativity and innovation (Prayogi & Estetika, 2019). The role of education is very influential in shaping and directing students or students to have these competencies in facing the reality of the 21st century (Putri, Rahman, & Qonita, 2021).

The era of super-smart society 5.0 aims to create technology-centered humans so that people can enjoy a high, active, and comfortable quality of life. This era is here to be able to solve the problems of the world community, 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 (Dewi, R.K, 2021). The concept of society 5.0 is the answer to these problems with the aim of justice, equity, shared prosperity to create a super-smart society (Sudibjo, Idawati, & Retno Harsanti, 2019).

21st-century educational skills are educational support systems that regulate student conditions in learning, accommodate student learning needs, and support positive student relationships through effective learning (B Boholano, 2017). One technique in making learning effective and fun is to utilize technology and informatics (Bingimlas, 2009). Technology and information are very important in supporting the progress of the world of education today (Wijaya, Sudjimat, & Nyoto, 2016). Technology is a means to develop learning materials so that students are more interested and enthusiastic in learning (Lin, 2017). Technology can be in the form of interactive learning media as stated in 21st-century skills (Dede, 2010).

Technology-based interactive learning media in 21st-century skills is an important aspect in the era of globalization. The evolution of technology in the era of globalization is an innovative change in the world of education by enriching student creativity in a new, more competitive dimension of learning (Dewi, Wardani, Wijayati, & Sumarni, 2019). Efforts to apply 21st-century skills can be done by preparing facilities and infrastructure, improving the quality of professional lecturers with IT-based lecturer training, and student training/seminars on new IT-based learning media (Rahmatan, Liliasari, & Redjeki, 2012). Information and technology-based learning media refer to the exchange of ideas between lecturers and students, verbally or in writing as outlined in a computer application (Littlejohn, Falconer, & Mcgill, 2008). Computers and other educational technology facilities can make students discuss ideas, help their peers, and learn independently with different innovations (Arsyad, 2013). This provides an opportunity for students or students to communicate their understanding and understanding of Biochemistry subjects and can build creative ideas in learning (Widyaningrum & Wijayanti, 2019).

Information and technology-based learning media refer to the exchange of ideas between teachers and students, verbally or in writing as outlined in a computer application (Harahap & Surya, 2017). Computers and other educational technology tools can make students discuss ideas, help their peers, and learn independently with different innovations (Tabor, 2013). This provides an opportunity for students, especially chemistry education department FTIK UIN Sayyid Ali Rahmatullah Tulungagung students to communicate their understanding of Biochemistry subjects and can build creative ideas in learning.

Learning with computer-generated visualizations such as multimedia has become a topic of major concern in recent years (Rias & Zaman, 2013). Multimedia can be in the form

of e-learning which is a form of learning by utilizing electronic technology (radio, television, film, computer, and internet) (Aparicio, Bacao, & Oliveira, 2016). Multimedia-based learning such as e-learning on 21st-century skills for chemistry subjects is closely related to student competencies such as collaboration, digital literacy, critical thinking, and problem-solving developed in the world of information and communication technology (ICT) (Hadinugrahaningsih, Rahmawati, & Ridwan, 2017).

The development of the world of education has entered the era of super-smart society 5.0 where the form of human life has been based on technology and information. Graduates of chemistry education students are now expected to be qualified human beings, mastering technological developments and able to compete globally. This is important for everyone and the future of a nation and state. Digital literacy needs to be developed in the world of education to build a better national character and be more prepared to face the industrial era 4.0 and super-smart society 5.0 (Roblek, Meško, & Krapež, 2016). The purpose of this study was to find out innovations in biochemistry learning in welcoming the era of super-smart society 5.0 and how to build the character of chemistry education students, Faculty of Tarbiyah and Teacher Training, UIN Sayyid Ali Rahmatullah Tulungagung through digital literacy.

METHODS

The method used in this study is a qualitative descriptive method, namely by analyzing and describing the data from observations, interviews, and questionnaires. This research was conducted in September-October 2021 on students of chemistry education Semester VI at UIN Sayyid Ali Rahmatullah Tulungagung. The population of this research is all students of chemistry education Semester VI at UIN Sayyid Ali Rahmatullah Tulungagung. The sample in this study were students of chemistry education UIN Sayyid Ali Rahmatullah Tulungagung semester VI, totaling 70 students. The research instruments were in the form of documentation, observation sheets on-campus conditions, questionnaires on student responses to the learning process, lecturer interview sheets, and student interview sheets. Observations were carried out with researchers directly involved when collecting data with documentation and interviews. After the data was collected in the form of student questionnaires regarding the evaluation of biochemistry learning, evaluation of facilities and infrastructure, and evaluation of biochemistry learning skills, then it was analyzed descriptively and concluded with the era of super-smart society 5.0.

RESULTS AND DISCUSSION

The results of observations made at chemistry education, Faculty of Tarbiyah and Teacher Training at UIN Sayyid Ali Rahmatullah Tulungagung at the time of learning cannot be carried out because at this time the covid-19 pandemic is still not over so the lecture process is closed and students study from their homes. The research was continued with interviews with chemistry lecturers and chemistry students. The results of lecturer interviews when the biochemistry lecture process is carried out in class, the learning situation can take place well and smoothly, but when lectures are carried out online it appears that students' interest and motivation to learn is lacking because many do not pay attention when the lecturer is explaining, it can be seen from the zoom which does not show the students' faces. and student responses after the learning process ended no one asked. Students tend to be less active so that the interaction between lecturers and students is not going well. This research is continued by giving questionnaires to students who have taken biochemistry courses by providing a link on the google form. There are three aspects examined in this study, namely evaluation results of biochemistry learning, facilities and infrastructure that support biochemistry learning and student skills after taking biochemistry courses.

1. Learning System

The results of the student questionnaire responses to the Biochemistry learning process at UIN Sayyid Ali Rahmatullah Tulungagung are shown in Table 1.

Table 1. Evaluation results of biochemistry learning

No.	Statement	Answer (%)				
		STS	**TS**	**KS**	**S**	**SS**
1.	At the beginning of the lecture the lecturer gives the Biochemistry Semester Lesson Plan (RPS) to students	0	1	3	70	26
2.	At the beginning of the lecture process, the lecturer conveys the abilities produced by students after taking Biochemistry lectures	0	0	5	75	20
3.	At the beginning of the lecture, the lecturer explained about the main points of lectures and learning methods in the Biochemistry course	0	0	0	60	40
4.	At the beginning of the lecture system, the lecturer explained about the assessment system for Biochemistry courses to students	0	0	5	78	17
5.	Lecturers deliver Biochemistry lecture materials with good learning methods	0	0	2	72	26
6.	Lecturers inspire and motivate students	0	0	6	66	28
7.	I get a lot of knowledge about Biochemistry from the way this course is taught	0	0	9	63	28
8.	Lecturers provide good academic guidance to students who have difficulty understanding Biochemistry courses	0	0	3	75	22
9.	The assessment of this course takes into account individual work and group work	0	0	11	73	16
10.	Lecturers explain and facilitate learning activities for Biochemistry courses well	2	2	7	69	20

In the table, it can be seen that at the beginning of the lecture the lecturer gave the Biochemistry Semester Learning Plan (RPS) to students, the answers were 2% STS, 18% S, and 80% SS. Every lecturer is required to make RPS before the lecture takes place. RPS contains course descriptions, lecture objectives, lecture strategies, reference lists, assessment criteria, assignments, and assessment criteria (Sitepu & Lestari, 2017). The lecturer explained about the results of the abilities obtained by students after taking biochemistry lectures, the students' answers were 2% STS, 54% S, and 44% SS. The achievement of this biochemistry course is expected to enable students to provide alternative solutions in the fields of analysis, transformation, isolation, synthesis, identification, and metabolism of biomolecules at the simple molecular level which is used as the basis for making correct decisions (Poedjiadi, 2007).

At the beginning of the lecture process, the lecturer conveyed the abilities produced by students after taking biochemistry lectures, the students' answers were 3% STS, 1% KS, 58% S, and 38% SS. This biochemistry course discusses biomolecules, namely molecules that make up the body of living things in the form of carbohydrates, lipids, proteins and nucleic acids, as well as enzymes and vitamins, including studies on synthesis and reaction processes both catabolism and anabolism which then practice various identification tests. presence of vitamins, lipids, and carbohydrates, identification of several types of ions or compounds contained in urine, as well as enzyme activity tests (Kuchel PW, 2006). At the beginning of the lecture system, the lecturer explained about the assessment system for biochemistry courses to students, the answers were 1% STS, 1% KS, 45% S, and 53% SS. Aspects of assessment include attitudes, knowledge, and skills. The weight of the assessment consists of Middle Semester Test Values (UTS), Daily Values (NH), and also Final Semester Test Values (UAS) with the final formula = (2NH+2UTS+3UAS)/7. The daily value is taken from the activeness of students when participating in discussion activities, student attendance, and other tasks given by the lecturer.

Lecturers deliver biochemistry lecture materials with good learning methods, students' answers are 1% STS, 1% KS, 63% S, and 35% SS. The learning method used by lecturers in

teaching biochemistry courses is guided inquiry. The guided inquiry learning method is a learning activity that involves directly and maximally all students' abilities to investigate and search critically, systematically, analytically, and logically so that students can formulate their findings confidently (Jack, 2013) The guided inquiry learning method is more effective because students can be directly involved in asking questions, formulating a problem, hypothesis, then testing the hypothesis by conducting experiments, to conclude (Ratna Kumala Dewi, Haryani, & Wardani, 2018). This learning method is a process of inquiry and discovery. The main goal is to encourage students to develop thinking skills by asking questions and getting answers to student curiosity (R. K. Dewi & Wardani, 2020). It is hoped that applying this guided inquiry learning method, it can help overcome learning difficulties for students on chemistry or biochemical material (Österlund, Berg, & Ekborg, 2010).

Lecturers inspire and motivate students, the answers are 1% STS, 3% KS, 59% S, and 37% SS. Students are encouraged to be able to solve simple biochemical problems such as isolation, identification, transformation, analysis, and synthesis of inorganic-organic compounds through knowledge of molecular properties and structures, synthesis, and analysis methods in specific chemical fields, as well as the use of relevant technologies. IT-based learning media that support biochemistry courses include booklets, brochures, e-books, audio, flipchart, games, journals, multimedia interaction (MMI), leaflets, mock-ups, electronic modules, videos, web-based learning (WBL), and PowerPoint (PPT) . This learning resource is expected to be able to overcome student learning difficulties in biochemistry courses (Dewi & Wardani, 2018).

Students get knowledge about biochemistry based on this learning method, the students' answers are 4% KS, 73% S, and 23% SS. The knowledge gained includes students being able to provide alternative solutions in the fields of identification, transformation, analysis, isolation, and synthesis of simple molecular level chemicals that can be used as a basis for making accurate and scientific decisions. Biochemistry is a subject that is difficult for chemistry students to understand because this material tends to be pure chemistry and biology, not chemistry education.

Lecturers provide good academic guidance to students who have difficulty understanding biochemistry courses, the answers of students are 6% KS, 71% S, and 23% SS. Students can ask directly to the lecturer if there is a material that has not been understood. Lecturers can form groups randomly to solve a problem by guided inquiry. Lecturers try to help students understand the concepts asked and students need to know. Sometimes students who are assigned to discuss and present material in a paper have not mastered the concept well so that students who are appointed as resource persons are less useful. Conditions like this cause students to be passive by waiting for the lecturer's explanation and there is no feedback on questions from their friends.

The assessment of this course takes into account individual work and group work, student answers are 3% KS, 60% S, and 37% SS. Assessments from lecturers are not only obtained from students' daily scores, UTS scores, and UAS scores but the scores are also taken from the activeness of students in asking questions, cooperation in groups, and the ability to express opinions or answers. Lecturers explain and facilitate learning activities for biochemistry courses well, the answers of students are 3% KS, 71% S, and 26% SS. The results of interviews with three sixth-semester students at random showed that students still lacked understanding of biochemical concepts, especially on metabolic materials. Lecturers provide a lot of chemical structures and memorization in biochemistry courses.

The results of interviews with lecturers of biochemistry courses at UIN Sayyid Ali Rahmatullah Tulungagung showed that lecturers more often used the guided inquiry course model. This lecturer has been teaching biochemistry for 5 years. Learning is done by lecturers by giving material to students and then giving questions to students for discussion. Lecturers

sometimes use PowerPoint media in teaching, but many students cannot understand the concept because the material being taught is abstract and is not practiced in the laboratory. The chemistry education department has had a chemistry laboratory since 2018 but the laboratories in the chemistry education department do not yet have adequate tools and materials, the arrangement of places is not according to laboratory standards so that some practicums are sometimes rarely carried out.

Various types of student learning difficulties in the Biochemistry course are expected to encourage the chemistry education lecturer at UIN Sayyid Ali Rahmatullah Tulungagung to improve the lecture process both by making supporting media for Biochemistry material and learning systems with learning models that emphasize student activity. The Biochemistry learning media that will be developed by the lecturers is expected to encourage students to understand Biochemistry material well and students can implement their Biochemistry knowledge during lectures when they are already teachers at school.

The 21st-century learning process that can be done by teachers and lecturers to overcome student learning difficulties is to apply four phases including : (1) dabbling, (2) doing old things the old way, (3) doing things old things in new ways (old things in new ways) and, (4) doing new things in new ways (doing new things in new ways) (Prayogi & Estetika, 2019).

2. Infrastructure

The results of the student response questionnaire on the facilities and infrastructure in biochemistry learning at the chemistry education department of UIN Sayyid Ali Rahmatullah Tulungagung can be shown in Table 2.

Table 2. Results of evaluation of biochemistry learning facilities and infrastructure

No.	Statement	Answer (%)				
		STS	**TS**	**KS**	**S**	**SS**
1.	Chemistry lecture room complete with facilities that support the learning process	0	1	3	70	26
2.	There is a room or place for discussion for students	0	0	5	75	20
3.	Biochemistry textbooks or modules are provided by the lecturer	0	0	0	60	40
4.	Textbooks or modules help me understand biochemistry courses	0	0	5	78	17
5.	The use of an LCD projector in biochemistry learning makes it easier for me to understand what the lecturer is teaching	0	0	2	72	26
6.	University/Faculty/Department libraries are sufficient to have books, journals and, other reading materials for completion of biochemistry courses	0	0	6	66	28
7.	There is a chemistry laboratory that supports the lecture process	0	0	9	63	28
8.	There are biochemistry practicum activities in the laboratory	0	0	3	75	22
9.	The biochemistry practicum manual is provided by the lecturer	0	0	11	73	16
10.	The tools and materials in the chemical department laboratory are complete and according to standards	2	2	7	69	20

The first statement is that the chemistry lecture room is complete with facilities that support the learning process. The students' answers are 2% TS, 16% KS, 63% S, and 19% SS. The facilities in the classroom include blackboards, chairs, LCD projectors, and other teaching and learning equipment. There is a discussion room or place for students to learn the answers of 12% KS, 66% S, and 18% SS students, namely in classrooms, libraries, gazebos, etc. Textbooks or biochemistry modules are provided by the learning lecturer. The students' answers are 8% KS, 68% S, and 24% SS. Lecturers provide subject modules in the form of biochemistry book. Textbooks or modules help me understand biochemistry course students answer 2% TS, 16% KS, 63% S, and 19% SS. Books Textbooks or modules are a medium for students to seek information and deepen their knowledge of Biochemistry.

The use of an LCD projector in biochemistry learning makes it easier for me to understand what the lecturer is teaching, student's answers are 2% TS, 16% KS, 63% S, and

19% SS because with the LCD projectors the lecturer can explain biochemical material and students can present the results of their group discussions. University/Faculty/Department libraries are sufficient to have books, journals, and other reading materials for the completion of biochemistry courses. The student answers 2% TS, 16% KS, 63% S, and 19% SS because chemistry is a new department at UIN Sayyid Ali Rahmatullah. The library does not yet have books on biochemical material. There is a chemistry laboratory that supports the lecture process for student answers 2% TS, 16% KS, 63% S, and 19% SS because the department has had a chemistry laboratory since 2018 but the laboratories in the chemical education department do not have adequate tools and materials, the arrangement of the place is not following laboratory standards so that some practicums are sometimes rarely carried out.

Biochemistry lectures consist of giving material in class and practical activities in the laboratory (Hidayat, Iceng & Lesmini, 2015). The existence of biochemistry practicum activities in the laboratory answers 2% TS, 16% KS, 63% S, and 19% SS because there are no special courses for biochemistry practicum. Biochemistry courses consist of 3 credits, sometimes lecturers 1 credit for practicum 2 credits for material but practicum is rarely done. The biochemistry practicum manual is provided by the lecturer. The student answers are 2% TS, 16% KS, 63% S, and 19% SS because there is no biochemistry practicum book. Materials in biochemistry practicum usually consist of vitamin tests, blood tests, urine tests, determination of optically active substances with a polarimeter, determination of protein levels by spectrophotometry, determination of glucose levels in urine by titrimetry, enzyme tests, identification of the hormone chorion Gunadotropin in urine, and examination of blood group. The tools and materials available in the chemistry department are complete and follow the learning standards. The students' answers are 2% TS, 16% KS, 63% S, and 19% SS.

The biochemistry laboratory at UIN Sayyid Ali Rahmatullah Tulungagung became one with the chemistry laboratory due to the lack of space. Biochemistry learning is divided into 3 credits, namely 2 credits of learning and 1 credit of practicum. The absence of special courses for biochemistry practicum causes a lack of biochemistry practicum activities on campus. The chemical laboratory arrangement was not following laboratory standards because initially, the room was a classroom. Laboratory management has not been maximized because there is no head of the chemical laboratory at UIN Sayyid Ali Rahmatullah Tulungagung chemistry department. Limited tools and chemicals so that practicum activities have not run optimally.

The use of laboratories needs to be maximized on campus, especially when studying biochemistry. It is better to activate the chemistry laboratory with special practicum courses such as biochemistry practicum, organic chemistry practicum, inorganic chemistry practicum, food chemistry practicum, and other practicums. The biochemistry practicum can be carried out by making a practicum schedule in the lab considering that the laboratory is one of the supports in biochemistry courses. Based on the results of interviews, students understand and understand more about biochemical material that is taught through direct practice rather than theory.

3. Skilss

The results of the questionnaire on student responses to skills in biochemistry learning at the chemistry education department of UIN Sayyid Ali Rahmatullah Tulungagung can be shown in Table 3.

Table 3. Results of evaluation of biochemistry learning skills

No.	Statement	Answer (%)				
		STS	TS	KS	S	SS
1.	I have learned to think critically as a result of this biochemistry course activity	0	1	3	70	26
2.	I have learned to present ideas clearly as a result of this	0	0	5	75	20

No.	Statement	Answer (%)				
		STS	**TS**	**KS**	**S**	**SS**
	biochemistry course activity					
3.	Lecturers give time and space for discussion activities	0	0	0	60	40
4.	I have developed communication skills as a result of this biochemistry course activity	0	0	5	78	17
5.	I have developed my ability to work in groups or teams as a result of the work I did in the biochemistry course	0	0	2	72	26
6.	Through this biochemistry course, I get a good understanding of the field	0	0	6	66	28
7.	I think working in groups is an effective way to learn	0	0	9	63	28
8.	This biochemistry course has had an impact on how I make decisions and my scientific way of thinking	0	0	3	75	22
9.	My ability in laboratory activities improved after taking biochemistry courses	0	0	11	73	16
10.	I am willing to repeat the biochemistry course and practice questions at home	2	2	7	69	20

Statement that I has learned to think critically as a result of the activity of this course in biochemistry, the answers of students are 1% TS, 3% KS, 70% S, and 26% SS. One of the thinking skills that need to be developed to achieve optimal learning outcomes is critical thinking (Khasanah, Sajidan, & Widoretno, 2017). Critical thinking is a mental/intellectual process related to skills in making understanding or concepts, applying, analyzing, synthesizing, 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 generate insights and develop cohesive and logical reasoning patterns (Vong & Kaewurai, 2017). Critical thinking skills can develop if chemistry education students are actively involved in the Biochemistry learning process.

I have learned to present ideas answer 5% KS, 75% S, and 20% SS because the lecturer allow students the opportunity to share material, discuss, and present the results of their discussions. in front of the class. The online learning environment allows students to explore information from various sources quickly and easily. This can encourage students to think critically and selectively in choosing learning resources that are following the problems given by the lecturer. Students can control learning and determine their learning styles (Wilson, 2016). Lecturers give time and space for activities to discuss student answers 60% S and 40% SS. Discussions can build students to actively think and accept opinions from other groups (Pratiwia, Wijayati, Mahatmantia, & Marsudi, 2015). Discussion activities can make students discover new things but lately because lectures are conducted online many students have not actively participated in online discussion forums that have been provided by lecturers.

I have developed communication skills as a result of this biochemistry course activity students answer 5% KS, 78% S, and 17% SS. Being scientific in students includes being able to develop an attitude of curiosity, courage, courtesy, care for the environment, opinion/communicate scientifically, critically, collaboratively, honest, and diligent (R. K. Dewi, Wardani, & Wijayati, 2019). I have developed my ability to work in groups or teams as a result of the work I do in biochemistry courses. Students answer 2% TS, 16% KS, 63% S, and 19% SS. The formation of study groups each consisted of 4 students who were given different problems by the lecturer. Students discuss in groups starting from defining problems, asking questions and hypotheses, conducting research, testing hypotheses, making reports, and presenting in front of the class. Reports of discussion results are collected for assessment. When one group presents, the others can ask questions or respond to the discussion forum. The lecturer responds and directs student discussions to improve doubtful concepts.

Through this biochemistry course, I got a good understanding of the field, the student's answers were 6% KS, 66% S, and 28% SS. Field understanding and students' skills in solving biochemical problems are still low. Students have not been able to master the concepts that

have been studied, one of which is related to metabolic pathways. This is because students do not explore their learning resources and elaborate biochemical concepts in depth. Students have 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 the answers of 9% KS, 63% S, and 28% SS students answers.

Biochemistry course has had an impact on how I make decisions and the way I think scientifically, the answers of students are 3% KS, 75% S, and 22% SS. Smart students in the era of super-smart society must be able to think scientifically, logically, and dare to express their opinions. My ability in laboratory activities improved after taking the biochemistry course, the students answered 11% KS, 73% S, and 16% SS. Laboratory activities need to be further developed by chemistry education lecturers so that their graduates can later become teachers who can teach their students about various chemistry practicums. I am willing to repeat the biochemistry course and practice questions at home. Students' answers are 2% STS, 2% TS, 7% KS, 69% S, and 20% SS. Learning difficulties in students can be characterized by the presence of certain obstacles that hinder the achievement of learning objectives. There are various factors affect learning difficulties in students including student abilities, quality of lecturers, lecture environment, and infrastructure that support the learning process (Faika & Side, 2011). Conceptual models that have been developed in welcoming super-smart society 5.0 era are Social Inquiry Complex (ISC), and Creativity-Based Learning Skill Entrepreneurship (CEL-BaDiS) (Sajidan, Saputro, Perdana, Atmojo, & Nugraha, 2020).

Chemical educators or lecturers must upgrade their educational competencies following the era of super-smart society 5.0. Students as millennials who are experts in the digital world must utilize their potential through various ways, both methods, media, and learning processes, especially in biochemistry courses. Chemistry education lecturers and students must be familiar with the flow of information and technology. The product of department in the form of graduates must be able to answer the challenges in the era of super-smart society 5.0. Educational challenges in the future are very complex, including the implications of the Industrial revolution 4.0 to 5.0, advances in information technology, environmental problems, the convergence of science and technology, the rise of creative and cultural industries, knowledge-based economy, shifting world economic power, investment quality and transformation in the sector. education and the influence and impact of technology. These challenges must be followed up, to create a generation of excellent students in the future. Competencies that must be possessed by lecturers and students in the era of super-smart society 5.0 according to Handayani & Muliastrini, (2020) and Fukuyama (2018) were:

a. Communication skills,
b. Have a sense of responsibility towards the environment,
c. The ability to consider the moral aspect of a problem,
d. Have intelligence according to their talents and interests,
e. Critical thinking skills,
f. Have interest and creativity in life,
g. Have the readiness to work
h. Ability to live in a global society,
i. Ability to try to understand and tolerate different views,
j. Ability to be a responsible citizen.

Chemistry education lecturers and students must learn and master new literacy in facing the era of super-smart society 5.0, the new literacy includes:

a. Data literacy

   Ability to read, analyze and use information (big data) in the digital era

b. Human literacy
   Humanities, communication, and design of the combination of these literacies, humans are required to learn for life or learn to continue to develop their knowledge.
c. Technology literacy
   Understand how machines work, technology applications (coding, artificial intelligence, machine learning, engineering principles, biotech)

CONCLUSION

Biochemistry learning innovation in welcoming the era of super-smart society 5.0 and preparing superior chemistry education human resources requires educational intervention, including curriculum, educators and education staff, funding, infrastructure, and education management. Educational development strategies need to be carried out in order to improve chemistry education human resources at UIN Sayyid Ali Rahmatullah Tulungagung in the era of super-smart society 5.0 and to answer future challenges and competencies. The steps taken can be in the form of a strategic approach, level, and type of education, with the aim of developing human resources who are faithful, knowledgeable, devoted, have an integral, creative, independent, and nationalist personality. Biochemistry learning with the HOTS (High Order Thinking Skills) approach can be implemented in the learning era in super-smart society 5.0 by applying new literacy based on data, humanities, and technology.

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