Problems of online learning and the use of information and communication technology (ICT) in physics learning at Sumedang, West Java

R Nurliani*, P Sinaga, and D Rusdiana*
Program Studi Pendidikan Fisika, Sekolah Pascasarjana Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung 40154, Indonesia

*rani.nurliani@upi.edu, dadirusdiana@upi.edu

Abstract. This study investigates students' and teachers' perceptions of online learning problems and the use of Information and Communication Technology (ICT) in teaching and learning physics in high schools at Sumedang, West Java. The study population consisted of all high school students and physics teachers at one public high school in Sumedang, West Java. The sample was 69 students and 2 teachers selected from one public high school. The instrument used in collecting relevant data for this study was an online questionnaire consisting of 23 items that obtained information about the difficulties of online learning and the application of ICT in schools for learning physics. Data collected were analysed using frequency and percentage calculations. The results showed that online learning can simplify the learning process and mentoring besides ICT being able to broaden students' insights about physics. However, there are several obstacles in online learning including the limitations of question and answer activities to friends or teachers directly, many assignments, and the lack of ICT facilities.

1. Introduction
During the Covid-19 Pandemic, fundamental changes were made in the implementation of physics learning. Learning in school and practice in the laboratory can no longer be done because of the rules of self-isolation and physical distance. Physics learning is completely replaced through online learning and the use of ICT. In the past and present, almost everyone in the countries of the world has gained access to use it. Also, much research has been carried out to advance knowledge about ICT for use in education such as research related to ICT-based learning media including: Mobile Learning [1], e-books [2], Lectora [3], Moodle [4], virtual laboratory [5], Macroscopic Virtual Media [6].

This of course changes the way the teacher teaches content. For this reason, teachers must adapt to the delivery of content using various learning modes based on online learning or E-learning [7, 8, 9, 10]. Also students must be prepared with online learning and using technology. Based on several surveys conducted on the application of online learning during the Pandemic Covid-19, more than 60% of respondents agreed to use online learning and half of the respondents stated that the online system made the process easier. However, students are faced with several challenges, both technical problems and learning problems [11].

Social distance policy influences the field of education. Therefore, the government suddenly stopped or moved the learning process from schools/madrasas to the home, and made many parties confused. The unpreparedness of schools to implement online learning is a major factor. Current learning
conditions force various parties to follow the path that can be taken, and the choice is to use technology as an online learning medium. Learning to use this technology also actually has many obstacles including technological mastery is still low, limited facilities and infrastructure, internet networks, and costs [12]. However, the role of government is very important in determining policies with the national education system. All educational institutions must comply with applicable regulations because national education has the same goal in efforts to build the nation. In an emergency situation due to the current pandemic co-19, the government quickly issued a policy regarding the implementation of online learning that must be carried out by every educational institution. Direct face-to-face learning activities in schools should only be held in the green zone area that starts in the New School Year in July and is carried out in stages, in accordance with a Joint Decree on Press Releases: 137/sipres/A6/VI/2020 [13] concerning guidelines governing learning new school year during the pandemic. The existence of education units in the green zone is the first and most important requirement that must be met for education units that will conduct face-to-face learning. Only 6% of the green zone are invited to make the decision to go to school directly, the remaining 94% is prohibited because there is a risk of spreading Covid-19.

Based on the problems that have been revealed, the researcher intends to discuss the difficulties of students in online learning, especially in physics and the use of ICTs in learning activities during a pandemic. It is hoped that the results of this survey will provide input for teachers to improve the overall education system and for the government to strengthen the distribution of internet networks throughout Indonesia so that they can support the success of online learning.

2. Methods

2.1. research questions
For this purpose, the following research questions are asked to guide learn: 1) How do respondents respond to online learning?; 2) What are the benefits or role of ICT in online learning in Physics?; 3) How is it difficult to learn Physics online both in terms of understanding content and the difficulty of using ICT?

2.2. participants
The population in this study were students and teachers in one of the high schools in Sumedang Regency with a sample of 2 teachers and 69 students (average age 17 years). Because this research is only interested in online learning and the use of ICTs applied in physics, only physics teachers and students with natural science majors were selected for this study.

2.3. research Model
This research is a type of descriptive research survey [14] because it aims to describe how students and teachers responded in carrying out physics learning during the Covid-19 Pandemic period. Research subjects were 71 respondents consisting of students and physics teachers. Response students about online learning of physics subjects were screened using an online questionnaire (google form). Questionnaires were distributed to respondents after they had taken three months of online learning. The online questionnaire consisted of 23 questions with answer choices that varied according to the context of the question. Respondents were also asked to give reasons for choosing answers. The data obtained then processed using descriptive statistics, namely changing every response to the item the question becomes the percent of the number of responses.

2.4. instrument
The instrument used to collect data relevant to this study was a questionnaire entitled 'Online Learning Survey'. The instrument has two parts: A and B. Part A looks for information about the respondent's data (such as name, school name, gender, and class), while Part B contains 23 items designed to obtain information about online learning problems and the application of ICT in schools to physics learning.
2.5. data analysis
Data collected for the study were analysed using descriptive statistics such as the number of frequencies, percentages, and averages. It is structured in a 4-point Likert scale type of Strongly Agree (4), Agrees (3), Disagrees (2), and Strongly Disagree (1). The percentage of response results is converted to qualitative data with criteria such as [15], shown in Table 1.

| Percentages (%) | Category           |
|-----------------|--------------------|
| 75<x<100        | Strongly Agree     |
| 50<x<74.99      | Agree              |
| 25<x<49.99      | Disagrees          |
| 0<x<24.99       | Strongly Disagree  |

3. Result and Discussion
All data collected in the study were analysed using descriptive statistics such as the number of frequencies, averages, and percentages. This section presents an analysis of the data that has been collected.

3.1 research question 1: how do respondents respond to online learning?

| Descriptions                                                                 | Percentages | Category   |
|------------------------------------------------------------------------------|-------------|------------|
| I am used to online learning                                                | 58          | Agree      |
| I am very enthusiastic about online learning                                 | 59          | Agree      |
| The online learning system facilitates the learning and mentoring process    | 58          | Agree      |
| I am having difficulty with the use of online learning applications         | 62          | Agree      |
| I like learning in class directly rather than online learning               | 91          | Strongly agree |

Table 2 shows that 58% to 91% of respondents agreed with the statement above. The biggest percentage is 91% strongly agree with direct learning compared to online learning.

3.2 research question 2: what are the benefits or role of ICT in online learning in physics?

| Descriptions                                                                 | Percentages | Category   |
|------------------------------------------------------------------------------|-------------|------------|
| ICT is a tool that makes it easy for students to understand physics.         | 67          | Agree      |
| Using ICT more easily provides a real picture of the material presented.    | 70          | Agree      |
| ICT is a tool that helps students to more actively learn physics.            | 62          | Agree      |
| ICT can foster student's interest in learning physics because learning becomes more interesting. | 63          | Agree      |
| ICT can broaden students' insights about physics                            | 77          | Strongly agree |
| ICT makes students easy to think of new ideas.                              | 71          | Agree      |
| ICT can improve the quality of student work.                                | 70          | Agree      |
| ICT allows students to obtain knowledge faster and easier.                  | 74          | Agree      |
Table 3 shows that 62% to 77% of respondents agreed with the statement above. The biggest percentage is 77% strongly agree that ICT can broaden students' insights about physics.

3.3 research question 3: how is it difficult to learn physics online both in terms of understanding content and the difficulty of using ICT?

Table 4. Responses from respondents about learning physics online both in terms of understanding content and the difficulty of using ICT.

| Descriptions                                                                 | Percentages | Category     |
|----------------------------------------------------------------------------|-------------|--------------|
| Students are more difficult to understand the subject matter with online methods because there are limitations of question and answer activities | 83          | Strongly agree |
| With the online method, students are more difficult to manage learning time, it is because many other activities might occur compared to those students who are in school. | 87          | Strongly agree |
| More assignments were given by teachers in online learning than direct learning in class | 83          | Strongly agree |
| The lack of ICT facilities is a barrier to online learning. | 85          | Strongly agree |
| Difficulties in using ICT are due to the low level of knowledge and skills possessed by students and teachers | 71          | Agree         |
| Difficulties in the use of ICT due to lack of willingness to learn to use ICT media | 68          | Agree         |
| Economic problems are a factor in the limitations of internet access that can hamper online learning | 88          | Strongly agree |
| Virus attacks in computer programs that are used to inhibit the use of ICT | 75          | Strongly agree |
| The ability of English to understand software programs hinders the use of ICT | 73          | Agree         |
| Networks are sometimes unstable, which interferes with online learning | 87          | Strongly agree |

Table 4 shows that 68% to 88% of respondents agreed with the statement above. The largest percentage, which is 88%, strongly agrees that economic problems are a factor in the limitations of internet access that can hamper online learning.

Research results are discussed based on research questions. Students and teacher responses to online learning revealed that most respondents agreed with the statement. The biggest percentage is 91% strongly agree with direct learning from online learning, most of the respondents stated the reason is more agree with direct learning than online learning because learning methods require students to understand the material that must be learned by themselves. With the self-taught method, students cannot meet directly with the teacher to ask content that is not yet understood. Also, there are so many obstacles to online learning. For example, in limited internet availability and internet networks that do not exist such as research conducted by [16, 17] that students have limitations in buying internet data and internet networks that are not good.

In response to the Benefits and Role of ICT in online learning in physics, the majority of respondents stated that ICT is very useful for students because students not only get material from teachers but students can easily search for learning material with the help of ICT media. In line with the research conducted by [18] that teachers are aware of the benefits of ICT to promote learning in their usual daily teaching practices. However, some respondents disagree about the subject of physics conducted online. They argue that face-to-face learning makes it easy for students to quickly understand, compared to ICTs that are less effective. Based on the results of the following survey, ICT applications that are often used in physics learning are presented in Figure 1.
Figure 1 shows the online system application used by teachers and students for 3 months of learning happen. Most teachers use a combination of online learning through Whatsapp groups and Google Classroom, which is as much as 56%. As for the difficulty of learning physics through online learning in terms of the difficulty of using ICT, the majority of respondents stated that limited internet access was the main factor. And the difficulty in understanding the contents of most respondents stated that physics had to do practicum activities, but because of online learning, practicum did not exist. In addition, with online learning, space for activities is limited. Unlike direct learning, usually, if there is material that is not understood, students can ask questions directly to friends / teachers.

4. Conclusion
Based on the findings of this study, it can be concluded that the response of respondents to online learning is that online learning can facilitate the learning process and mentoring. In addition, ICT can expand students' insights about physics.

However, there are several obstacles in online learning including: (1) The limitations of question and answer activities; (2) Students are more difficult to manage learning time; (3) Many assignments; (4) Lack of ICT facilities (5) Difficulties in using ICT (6) limited internet access (7) Internet networks are sometimes unstable. Based on the findings of this study, it is recommended that: (1) Future online learning requires teachers to be more creative in utilizing ICT media to reduce the assignment method that is too much for students; (2) Teachers can make electronic books with various representations and can facilitate the practice of physics online with virtual simulations (3) And for the government to strengthen the distribution of internet networks throughout Indonesia so that they can support the success of online learning.

5. References
[1] Liliarti N and Kuswanto H 2018 Improving the Competence of Diagrammatic and Argumentative Representation in Physics through Android-based Mobile Learning Application International Journal of Instruction 11 3 pp 107-122
[2] Sinaga P, Amsor and Cahyanti FD 2019 Effectiveness of the new generation e-book application for mobile phones in improving the conceptual mastery of kinematics International Journal of Mobile Learning and Organisation 13 2 pp 217-222
[3] Kurniawan RB, Mujasam M, Yusuf I and Widyaningsih SW 2019 Development of physics learning media based on Lectora Inspire Software on the elasticity and Hooke’s law material in senior high school Journal of Physics: Conference Series 1157 3
[4] Yusuf I, Prasetyo ZK, Widyaningsih SW and Istiyono E 2019 Development of Moodle Learning Management System-Based E-Learning Media in Physics Learning *Advances in Social Science, Education and Humanities Research* AIP Press

[5] Masril M, Hidayati H and Darvina Y 2018 The Development of Virtual Laboratory Using ICT for Physics in Senior High School. *IOP Conference Series: Materials Science and Engineering* 335

[6] Wibowo FC, Suhandi A, Rusdiana D, Darman DR, Ruhiat Y, Denny YR, Suherman and Fatah A 2016 Microscopic Virtual Media (MVM) in Educational technology Learning: Case Study on Students Understanding of Heat Transfer *Journal of Physics: Conference Series* 739

[7] Chen CH 2014 An adaptive scaffolding e-learning system for middle school students’ physics learning *Australasian Journal of Educational Technology* 30 3 pp 342-355

[8] Kravets AG, Oxana V, Titova and Shabalina OA 2013 E-Learning Practice-Oriented Training In Physics: *The Competence Formation IADIS International Conference e-Learning 2013*

[9] Daniel Y, Shee and Wang YS 2008 Multi-criteria evaluation of the web-based e-learning system: A methodology based on learner satisfaction and its applications *Computers & Education* 50 3 pp 894–905

[10] Renata B and Jana M 2012 E-learning as a motivation in teaching physics *Procedia - Social and Behavioral Sciences* 64 9 pp 328-331

[11] Darmalaksana W, Hambali R Y A, Masrur A and Ushuluddin F 2020 Analisis Pembelajaran Online Masa WFH Pandemic Covid-19 sebagai Tanggantian Pemimpin Digital Abad 21 *Karya Tulis Ilmiah (KTI) Masa Work From Home (WFH) Covid-19 UIN Sunan Gunung Djati Bandung Tahun 2020*

[12] Farida I, Sunarya RR, Aisyah R and Helsy I 2020 Pembelajaran Kimia Sistem Daring di Masa Pandemi Covid-19 Bagi Generasi Z *Karya Tulis Ilmiah (KTI) Masa Work From Home (WFH) Covid-19 UIN Sunan Gunung Djati Bandung Tahun 2020*

[13] Kementerian Pendidikan dan Kebudayaan: Stasiun Pers Nomor: 137/sipres/A6/VI/2020 Source : www.kemdikbud.go.id

[14] Creswell J W 2009 *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (Third) (Nebraska: Sage, Pub)

[15] Akbar S 2013 *Instrumen Perangkat Pembelajaran*. Bandung: PT Remaja Rosdakarya

[16] Napsawati 2020 Analisis situasi pembelajaran ipa fisika dengan metode daring di tengah wabah covid-19 (studi kasus peserta didik mts ddi seppange kabupaten bone) *Jurnal Pendidikan Fisika dan Terapaninya*

[17] Atsoglou K and Jimoyannis A 2011 Teachers’ decisions to use ICT in classroom practice: An investigation based on Decomposed Theory of Planned Behavior *International Journal of Digital Literacy and Digital Competence*, 3 2 pp 20-37