



## **The Difficulty Of Physics Education Students Class 2018 In Studying Quantum Physics Courses Online**

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(Received: November 27, 2021; Accepted: April 04, 2022; Published: April 22, 2022)

### **ABSTRACT**

Problem-solving in the Quantum Physics course which requires a very mathematical description and analysis is considered difficult by students, especially if the learning is done online. This study aims to find out the difficulties of learning Quantum Physics courses through online learning for physics education students in class 2018 FKIP USK. The subjects in this study were students of physics education class 2018 who took the Quantum Physics course, totaling 49 people. The research approach used is descriptive quantitative. Data collection was carried out using a closed questionnaire based on the google form. The results showed that students had learning difficulties using online learning in the Quantum Physics course from internal factors, namely cognitive indicators with a total score of 841 while external factors, namely community environmental indicators, with a total score of 457. Conclusions Based on the difficulties experienced by students in this study, it can be seen that students have some difficulties in studying Quantum Physics material online.

**Keywords:** Learning Difficulty, Quantum Physics, Online Learning

### **INTRODUCTION**

Education is a very important need to develop knowledge for everyone. This knowledge is used himself in channeling the potential he has when socializing in society. According to Law No. 20/2003 concerning the National Education system, "Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential so that they have religious-spiritual strength, self-control, personality, intelligence, noble character, and the necessary skills. by himself, society, nation and state". Learning to improve the ability of educators, they must have a strong empirical basis to support their profession as teachers (Nurhadi, N., 2020). An effective and efficient learning atmosphere and learning process are needed by students in the learning process in schools and lectures such as in the Quantum Physics course.

Quantum Physics is one of the courses in the USK FKIP Physics education department. This course is offered in the sixth semester, the characteristics of the material in Quantum. Physics are difficult, this is because quantum concepts are generally abstract. The explanation of these concepts generally uses difficult mathematical concepts, such as differential and integral equations. This is following the results of research conducted by Restiarni, E.F., et al (2015) who obtained research results that Physics education students who had taken Quantum Physics courses, obtained information about the difficulties faced by students in studying Quantum Physics material, including (1) Lack of elaboration of the formula, (2) the material is still too abstract, (3) difficulty in obtaining appropriate learning resources, and (4) the teaching materials used are difficult to understand.

Students in the sixth semester who program this course generally lack mastery of mathematical concepts, especially calculus (Yanti, R.Y., et al., 2017). This is following the results of research conducted by Apriandi, D. & Krisdiana, I (2016) who obtained research results that students had difficulties in learning mathematics, namely difficulties in remembering facts, remembering concepts, understanding facts, understanding concepts, applying concepts, evaluating procedures, communicating metacognitively and researching facts and procedure.

### **Problem of Research**

In learning activities, lecturers are faced with some diverse student characteristics. Some students can take their learning activities smoothly and successfully without experiencing difficulties but on the other hand, not a few students experience various difficulties in their learning (Marisa, P., 2016). The difficulties of students are especially felt during the Covid-19 pandemic, this causes the learning system to be done online (Salmawati, S., et al., 2021). Problem-solving in the Quantum Physics course which requires a very mathematical description and analysis is considered difficult by students, especially if the learning is done online.

During online lectures, students experience various problems and difficulties in the learning process (Sobron, A.N, et al., 2019). This is reinforced by Gunada, W., et.al (2017) that the difficulties of students in learning Quantum Physics courses are caused by the inability of students to interpret Physics concepts correctly, inability to apply concepts and principles of Physics to make formulation models that are appropriate used for solving Physics problems.

### **Research Focus**

Based on the description of the problem above, the author conducted a study entitled "The Difficulties of 2018 Physics Education Students in Studying Quantum Physics Courses Online".

## **METHODOLOGY OF RESEARCH**

### **General Background of Research**

The place chosen to conduct this research is the Department of Physics Education, Faculty of Teacher Training and Education, Syiah Kuala University. While the time of this research was carried out from April-September 2021.

The approach used for this research is a quantitative approach. The type of research used in this research is descriptive research. Descriptive research was chosen to determine the perception of physics education students in attending online lectures (Djaali, H. & Muljono, P., 2015). The data collection method used in this study was a questionnaire/questionnaire. The type of questionnaire used in this study is a closed questionnaire with alternative answer choices. The type of scale used is the Likert Scale. This questionnaire (questionnaire) was compiled with 5 alternative answers for determining the score of the instrument answers using a Likert scale with the following alternative answers:

**Table 1.** Likert scale scoring criteria

<b>Answer options</b>	<b>Score</b>
Answer options	5
Strongly Agree (SS)	4
Agree (S)	3
Doubt - Doubt (RG)	2
Disagree (TS)	1

(Source: Yusrizal, 2016)

### **Subject of Research**

The sample in this study was 49 students majoring in Physics Education at USK who took Quantum Physics courses online.

### **Instrument and Procedures**

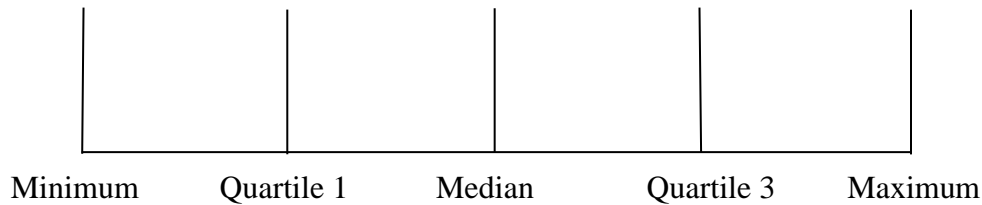
This research questionnaire consists of two aspects, namely internal aspects and external aspects. The internal aspect consists of 2 indicators, namely: Cognitive and Affective. While the external aspect consists of 5 indicators, namely: family environment, community environment, network availability, lecturers, and learning resources.

### **Data Analysis**

The questionnaire data obtained from the research results were analyzed descriptively. To calculate the total score of each respondent, that is by adding up the scores of each item obtained using the Likert's Summated Rating procedure. The difference in the number of scores obtained can be interpreted as a difference in attitude, positive or negative. (Yusrizal,

2016:350). To assess the attitude of individuals or groups (average score), that is by comparing the scores obtained with certain criteria. To determine the category from the aspect of perception and use of the application, that is by calculating the overall score of each aspect. The questionnaire consists of 5 (five) scales so to determine the category is to determine the maximum, minimum, median, quartile 1 score, and determine the quartile 3 score.

After getting the value, then determining the scale of each statement item for each aspect as follows:



**Figure 1.** Likert's Summated Rating

the following is a table of score categories obtained:

**Table 2.** Category Score Limits

Interval Skor	Category
Quartile 3 $\leq X <$ Max score	Strongly agree
Median $\leq X <$ Quartile 3	Agree
Quartile 1 $\leq X <$ median	Do not agree
Minimum score $\leq X <$ Quartile 1	Strongly disagree

(Source: Yusrizal, 2016)

## RESULTS AND DISCUSSION

Based on the data analysis that has been carried out, the following results are obtained:

**Table 3.** Data table of research result on learning difficulties of quantum physics online

Aspect	Indicator	Score per indicator	Criteria
Internal	Kognitive	841	Easy
	Affective	704	Easy
Eksternal	Family Environment	380	Easy
	Community Environment	457	Difficult
	Network Availability	411	Easy
	Lecturer	491	Easy
	Learning Resources	284	Easy

Source: Data Processing Results, 2021

Based on the results of the questionnaire data analysis described above, it can be seen that there are several factors causing learning difficulties for 2018 USK FKIP physics education students in the Quantum Physics course using online learning.

The results of research data on internal factors consist of two indicators, namely cognitive indicators which get a total score of 841 and affective indicators obtain a total score of 704 which are categorized as moderate/moderate difficulties. The dominant indicator is the cognitive indicator obtaining a total score of 841. This is because, during the online Quantum Physics lecture process, students have difficulty understanding the concepts of Quantum Physics material and have difficulty using mathematical equations of Quantum Physics formulas. This finding is supported by the results of research by Gunada, W., et.al (2017) that during the lecture process, there are several difficulties experienced by students in attending lectures including 1) the inability to correctly interpret Physics concepts, 2) the inability of students to apply concepts and the principles of Physics to solve problems, and 3) the inability of students to apply mathematical concepts to make formulation models used for solving Physics problems. This finding is also supported by the results of research by Hutauruk & Ropinus (2020) that students have difficulty understanding lessons with online lectures compared to face-to-face lectures due to the lack of opportunities for students to discuss directly and freely with lecturers caused by limited features and quality of the internet network. Student learning difficulties must be known and can be overcome as early as possible so that the instructional objectives can be achieved well. So it is necessary to carry out a diagnosis from the implementation of this diagnosis help students to obtain optimal learning outcomes (Darimi, I., 2016). According to Ririen, D., & Hartika, D. (2021) The factors that make it difficult for students to learn during the Covid-19 pandemic are the self-present factor, the lecturer factor, the environment/parents factor, and the facilities and infrastructure factor.

Then based on the results of research data on external factors consisting of 6 indicators, there is one indicator that is categorized as difficult. The most dominant indicator is the community environment indicator obtaining a total score of 457 with a high category of learning difficulties for Quantum Physics courses that use online learning. This is because students have difficulty finding friends to discuss in their respective areas of residence. This is supported by the results of research conducted by (Hariyanti, D., et al., 2020; Fauza, et al., 2020) that online learning causes students to have no friends to discuss lessons with other friends in the area where they live. The development of information technology in the digital era is very influential on the current learning system, indicated by a shift in learning from teacher-centered learning to student-centered learning, thus making students a little difficult in carrying out the learning process because of the limited number of friends to discuss the material or tasks when learning. carried out online (Sofyana, L., & Rozaq, A, 2019). Peers play an important role in building students' enthusiasm for learning. Direct interaction with peers will make students have enthusiasm and motivation to learn. In addition, the level of understanding of students' material will be much better than studying alone (Yuliani, M, et al., 2020).

Several previous studies also explained the obstacles experienced by students in the online learning process. Some of them experienced problems such as slow networks, lack of understanding of online learning, no interesting practicum tools, less effective and efficient in carrying out exams, and disturbed concentration in a crowded home atmosphere (Salmawati, et al., 2021; Ramiah, R. et al., 2021). During online lectures, students experience various problems in the learning process. Students who are not familiar with online lectures will experience problems and need adjustments. Various obstacles experienced by students in online lectures and expectations that are not following reality will lead to many perceptions from students (Rahmati, R. et al., 2021).

### CONCLUSIONS

Based on the results of research that has been done, it can be concluded that students have some difficulties in studying Quantum Physics material online. On the cognitive indicators, students have difficulty understanding the concepts of Quantum Physics material and difficulties in using mathematical equations of Quantum Physics formulas, while in the community environment indicators, difficulties are caused because students have difficulty finding friends to study in their respective areas of residence. Therefore, it is necessary to review the preparation and implementation of this course if the learning system is to continue in the future. Thus, it is hoped that Quantum lectures conducted through online learning in the future can eliminate student difficulties.

### Acknowledgments

Thanks are conveyed to all parties who have helped carry out the research in this thesis and also helped write this article so that it is complete.

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