Original Research Article

Description of Student Perceptions of Online Learning in Organic Chemistry Course

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ABSTRACT

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| This study examine students' perceptions of online learning in the Organic Chemistry I course during the COVID-19 pandemic. The research population comprises all students from the Chemistry Education Program at the Faculty of Teacher Training and Education, Universitas Kristen Indonesia. The sample includes students enrolled in the Organic Chemistry I course from the 2019, 2020, and 2021 cohorts, totaling 23 participants, selected using purposive sampling. The research instrument used is a closed-ended questionnaire assessing Chemistry Education students' perceptions of the effectiveness of online learning, with responses graded on a Likert scale and validated by experts. The study employs a descriptive quantitative analysis method using percentage techniques. The results indicate that most students have a positive perception of online learning, particularly in two aspects: the learning process and lecturer capability. However, in terms of infrastructure and facilities, students tend to have a negative perception. The main challenges faced by students in online learning include limited internet access and inadequate learning devices. Therefore, it can be concluded that online chemistry learning during the Covid-19 pandemic in the Chemistry Education Program at Universitas Kristen Indonesia, specifically in the Organic Chemistry I course, could be further improved if supported by adequate infrastructure and facilities. The researchers suggest that lecturers provide learning materials accessible through practical, flexible applications that require minimal bandwidth and data usage. This approach aims to prevent obstacles in students’ competency achievement. |

*Keywords: Student Perception, Chemistry Learning, Online, Covid-19 Pandemic*

1. INTRODUCTION

The Covid-19 pandemic, which significantly impacted the world in 2020, was experienced by almost all countries and had a massive effect not only on health, the economy, and social aspects but also on education. Indonesia, as a country affected by the global COVID-19 pandemic disaster, implemented special policies regarding the teaching and learning process at all levels of education. These policies were outlined in Circular Letter No. 4 of 2020 from the Minister of Education and Culture concerning education implementation during the Covid-19 emergency (Mendikbud, 2020). Additionally, Circular Letter No. 3 of 2020 regarding COVID-19 prevention in educational institutions and Circular Letter No. 36962/MPK.A/HK/2020 regarding online learning and working from home as a measure to prevent the spread of COVID-19 were issued, along with instructions from regional government authorities.

In response to the Covid-19 outbreak in early 2020, the government advised implementing learning activities from home [1]. The transition of university lectures to online learning required various facilities and resources accessible to both higher education institutions and students. Online learning itself is a teaching method conducted through the internet [2]. Three key elements are inseparable from the development of online learning: content, channels, and infrastructure or information technology [3]. Furthermore, three essential prerequisites for online learning include: (a) the teaching and learning process being conducted using an internet connection, (b) the availability of facilities for students in its services, and (c) the provision of instructors to assist students in case of learning difficulties [4]. Moreover, the implementation of online lectures also requires additional requirements, including: (a) the organizing party for online lectures, (b) a positive mindset from both lecturers and students regarding the primary function of the internet, (c) a learning system design that is accessible to all students, (d) an evaluation process for the entire student learning process, and (e) a feedback mechanism from the organizers [5].

Information and communication technology has been used for learning at the Christian University of Indonesia since March 2020, particularly in the Faculty of Teacher Training and Education and the Chemistry Education Study Program. The online learning system provides students with numerous opportunities to access learning materials. The Chemistry Education Study Program utilizes various media applications for online learning, individually or in groups. Some applications used by lecturers and students include Microsoft Teams, Google Classroom, Google Meet, Zoom Meeting, and others. According to a study by Purba (2021), one of the platforms widely utilized by the Christian University of Indonesia is Microsoft Teams 365. During the COVID-19 pandemic, the Chemistry Education Study Program at FKIP also used Microsoft Teams for online learning. The use of Microsoft Teams 365 transformed challenging learning experiences into more accessible and manageable ones. Based on researchers' findings or their observations, students experienced several issues and challenges during online learning, such as network connectivity issues, limited internet data, and the remote locations of students’ residences, particularly in underdeveloped, remote, and outermost (3T) regions where network infrastructure is incomplete. The Chemistry Education Study Program consists mainly of students from areas with poor network coverage, particularly in 3T regions such as Mentawai (Siberut—Saibi Samukop, Sirisura; Sikakap—Talok Pulei; and Sipora—Rokot, Sao, Monga), Kalimantan (Parasan, Kerasik), and Nias (Umbunasi). These factors create potential obstacles for students in carrying out online learning, which may impact their learning outcomes. To gain a detailed understanding of an individual’s or a group’s experiences and perceptions regarding a particular action or activity, various methods can be used, including surveys, observations, perception analysis, and others. Therefore, to gather information about students' opinions and experiences regarding online learning in the Chemistry Education Study Program, a perception analysis can be conducted. Concerning this, the researcher is interested in exploring students' perceptions of online learning during the Covid-19 pandemic, specifically in the Chemistry Education Study Program, with a focus on the Organic Chemistry I course.

2. material and methods

**Research Design**

This research method uses descriptive quantitative research and data collection instruments in the form of questionnaires. This study was conducted to describe the perceptions of Chemistry Education Study Program Students at the Christian University of Indonesia regarding the effectiveness of online learning during the Covid-19 pandemic, especially in the organic chemistry I course.

**Research Approach and Type**

The Likert scale questionnaire distributed online via Google Forms is a data collection method in this study that uses a quantitative descriptive approach.

**Population and Sample**

**Population**

The population in this study were all students of the Chemistry Education study program, Faculty of Teacher Training and Education, Indonesian Christian University

**Sample**

In this study, the sample was selected using a purposive sampling technique, focusing on students from the Chemistry Education study program who participated in online learning specifically for the Organic Chemistry I course. The sample included 9 students from the Class of 2019, 6 from the Class of 2020, and 8 from the Class of 2021, resulting in a total of 23 participants.

**Data Collection**

The data was collected by using a questionnaire distributed via Google Form. The questionnaire in this study is an adaptation of the questionnaire used by Maulana & Hamidi (2020), which consists of 4 main parts, namely demographics, teaching and learning processes, lecturer capabilities and competencies, and facilities and infrastructure. Each item is a positive statement using a Likert Scale consisting of 5 scales, namely strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5).

The demographic section of the questionnaire consists of gender, and class of entry. Meanwhile, the second section consists of 5 positive statements that measure students' perceptions of teaching and learning aspects. Furthermore, the third section consists of 6 positive statements that measure students' perceptions of lecturers' capabilities and competencies during online learning. The final section of the questionnaire consists of 3 positive statements that measure students' perceptions regarding the facilities and infrastructure used during online learning. Furthermore, the research data were analyzed using descriptive quantitative analysis using the percentage technique.

3. results and discussion

The following is the respondent data consisting of 23 students who have taken online learning in the organic chemistry I course based on gender and entry class.

Table 1, Distribution of respondent data based on gender and entry class

|  |  |  |
| --- | --- | --- |
| Category | Frequency (n) | Percentage (%) |
| Gender  Female  Male | 13  10 | 56.5  43.5 |
| Entry Year  2019  2020  2021 | 9  6  8 | 39.1  26.1  34.2 |

From Table 1 it can be seen that the distribution of respondents based on gender is slightly dominated by women, namely 13 people with a percentage of 56.5%, and students with the 2019 intake as many as 39.1% Online learning certainly cannot be separated from the use of infrastructure such as gadgets, laptops or PCs. The following is the distribution data of respondents based on the type of infrastructure used

Table 2. Distribution of Respondents based on the use of types of infrastructure in online learning (n=23)

|  |  |  |
| --- | --- | --- |
| Types of Infrastructure Facilities | Frequency (n) | Percentage (%) |
| Laptop  PC Computer  Gadget/mobile phone | 5  2  16 | 21.7  8.7  69.6 |

From the data in Table 2 above, it can be seen that in online learning, most students use gadgets/cellphones, with a total of 16 students, of 69.6%.

Data describing students' perceptions of online learning, specifically the organic chemistry I course, based on non-test instruments with three assessment aspects, namely learning experience aspects, lecturer capability aspects, and facilities and infrastructure aspects, are described in the following table 3.

Table 3. Perception Data Based on the Percentage of the Majority of Respondents Who Responded Through Non-test Instruments

|  |  |  |
| --- | --- | --- |
| No | Statement | Percentage of Majority of Respondents |
| Aspects of Learning Experience | | |
| 1  2  3  4  5 | Online lectures can be accessed easily.  Online lectures take place on time and according to the schedule.  Online learning helps improve understanding of theory and skills  The material presented in online lectures is by the lecture contract/RPS.  Submission of assignments or reports in online lectures can be done easily. | 40% (Normal)  80% (Strongly Agree)  40% (Normal)  75% (Strongly Agree)  45% (Normal) |
| 6  7  8  9  10  11 | **Lecturer Capability Aspect**  Lecturers always accompany students during the online learning process until completion.  Lecturers explain the direction and objectives of learning in each online session.  Students are allowed to ask questions and discuss in online lectures.  Lecturers respond to questions that arise during online lecture sessions.  In general, your level of understanding of the lecture material delivered online is quite high.  Your activeness and attitude during online lectures are generally good and positive | 60% (strongly agree)  70% (strongly agree)  80% (strongly agree)  75% (strongly agree)  40% (neutral)  50% (agree) |
| 12  13  14  15  16  17 | **Facilities and Infrastructure Aspect**  Online learning materials are well available.  The online learning media used (Google Classroom, Zoom, CloudX, Google Meet, YouTube, and WhatsApp) are quite effective.  The devices owned are adequate for participating in online learning.  There are no internet connection problems in participating in online lectures.  Overall, you are always ready to participate in online lectures every day.  In general, you are satisfied with the online learning that has been carried out. | 50% (agree)  75% (agree)  55% (agree)  75% (disagree)  60% (agree)  45% (neutral) |

Table 3 illustrates students' perceptions of online learning during the organic chemistry I course based on three main aspects, namely learning experience, lecturer capabilities, and facilities and infrastructure. From the data presented, the majority of students considered that access to online lectures was in the so-so category (40%). In terms of punctuality, most respondents strongly agreed that online lectures took place according to the predetermined schedule (80%). In addition, 40% of respondents thought that online lectures only had a so-so effect in improving theoretical understanding and skills. Meanwhile, the majority of students strongly agreed that the material presented in online lectures was following the lecture contract/RPS (75%). In terms of sending assignments or reports, the majority of respondents felt that the ease was so-so (45%). However, there was an almost balanced percentage between respondents who felt so-so and those who agreed that online learning made it easier to send assignments or reports, which was 35%.

In terms of lecturer capability, most students strongly agree that lecturers always accompany them during the online learning process until completion (60%). In addition, the majority also stated that lecturers explain the direction and objectives of learning (70%), provide opportunities for questions and discussions (80%), and provide responses to questions asked during online lectures (75%). However, in terms of the level of student understanding of the material taught online, the majority of respondents gave an average response (40%). Likewise, about student activity and attitudes during online lectures, the majority of respondents agreed that, in general, students have good and positive activity and attitudes (50%).

In terms of facilities and infrastructure, the majority of students agreed that online learning materials were well available (50%) and that the learning media used (such as Google Classroom, Zoom, CloudX, Google Meet, YouTube, and WhatsApp) were quite effective (75%). In addition, most students felt that the devices they used were adequate for participating in online learning (55%). However, regarding internet connection, most respondents disagreed with the statement that they did not experience any problems accessing online lectures (75%). Furthermore, the majority of students stated their readiness to participate in online lectures every day (60%). Overall, the majority of respondents gave a so-so response regarding the level of satisfaction with the online learning that had been carried out (45%).

**Discussion**

The data analysis results indicate that students have a positive perception of the teaching and learning process in online learning. In terms of schedule suitability and alignment of materials with the course contract/RPS, students do not experience significant difficulties; in fact, they find it easier to submit assignments or reports. However, lecturers in the Chemistry Education Study Program, particularly those teaching Organic Chemistry I, need to pay more attention to the method of material delivery. A total of 40% (n=23) of students stated that online lectures do not provide significant additional understanding, either in terms of theory or skills. There is a gap between the smoothness of the learning process and the expected outcomes. This may occur if the chosen teaching methods are not based on their effectiveness in achieving the competencies set for each sub-CPL. Consequently, the lack of variety in teaching methods makes it difficult to align with the predetermined sub-CPL. Additionally, the limited availability of learning resources is another factor contributing to students' suboptimal understanding.

Materials that should be thoroughly explored through interactive class discussions are only available in online learning in visual formats, such as journals, images, modules, and PowerPoint presentations. Therefore, additional efforts are needed to provide materials that are more accessible and easier to understand. These materials can be developed into audiovisual media, such as videos containing explanations, tutorials, and animations that help students grasp concepts better and enhance their skills. Research confirms that audiovisual media, such as videos, effectively convey information, illustrate processes, and accelerate and clarify the understanding of necessary skills. Furthermore, these media save time without reducing the essence of the material being taught, serving as facilitators in online learning. To meet students' needs and expectations in online learning, a more suitable curriculum design, effective material delivery strategies, and the utilization of various learning technologies are required. Thus, the quality of online learning can be maximized. The use of facilities and infrastructure remains a limitation and obstacle faced by students, leading to negative perceptions in this regard. A total of 75% (n=23) of respondents stated that they encountered serious problems related to internet connectivity when participating in online learning. Although Google Classroom—one of the most commonly used platforms—does not require a large bandwidth or data quota, students still consider unstable internet connectivity the main issue in online learning. Moreover, the limitations of the devices used also affect the effectiveness of learning. A total of 69.6% of students rely on Android smartphones for online lectures, while only 21.7% use laptops and 8.7% use personal computers. Functionally, smartphones have many limitations compared to laptops or computers, which can hinder the smoothness of online learning. Stable internet access is crucial, given that online learning depends on internet connectivity. This challenge is not only faced by universities but also by schools throughout Indonesia. In general, Internet network conditions in Indonesia remain limited, with relatively slow access speeds, not only in remote or rural areas but also in major cities

4. Conclusion

From the results of the study, it was concluded that students have a positive perception of the implementation of online lectures in two main aspects, namely the teaching and learning process and the capabilities of lecturers. This is supported by the lecture schedule that runs with discipline and the competence of human resources, in this case lecturers, in managing online lectures as facilitators. However, based on the analysis of the same data, it was found that students have a negative view of the facilities and infrastructure aspects. Limited internet access and inadequate learning devices are the main obstacles for students in participating in online lectures optimally.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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