

Level of Student Satisfaction with the Performance of Electrochemical Analysis Practice Instructors

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ABSTRACT

This study aims to analyze student satisfaction with instructors' performance in Electrochemical Analysis Practice at AKA Bogor Polytechnic. This study uses a quantitative approach with a survey method. Data was collected through a questionnaire based on the Likert scale, which was distributed to 23 students who had completed the course. Data analysis is carried out descriptively with frequency and percentage calculations, then converted into qualitative information. The study results showed that the overall level of student satisfaction was in the "good" category, with an average of 72.24%. The aspect of professionalism obtained the highest score (73.62%), while the aspect of practice implementation had the lowest score (69.56%). These results show that even though students are satisfied, there is room for improvement, especially in implementing practice. The main recommendations are developing technology-based teaching materials, improving laboratory equipment, and providing more comprehensive practical tutorials. This finding is expected to improve the quality of electrochemistry practicum learning.

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1. INTRODUCTION

Electrochemistry is a branch of Chemistry that discusses the properties of electricity and its effect on chemical substances. This field has an important role in various industrial applications and scientific research. Most electrochemical studies focus on chemical changes caused by the presence of electric currents and the generation of electricity due to chemical reactions. Electrochemistry encompasses a wide range of important phenomena, such as electrophoresis [1], [2] and corrosion [3]. In addition, this field also involves the development of advanced technological equipment, such as electrochromic displays [4], Electroanalytic sensors [5], batteries [6], and fuel cells [7]. In

addition, electrochemistry is also applied in various modern industrial technologies, including electroplating [8].

Electrochemistry plays a role in laboratory analysis techniques referred to as electroanalytics. Electroanalytic is a collection of quantitative analytical methods that measure the electrical properties of analyte solutions in electrochemical cells. The technique has high sensitivity with low detection limits and can provide detailed information, including reaction stoichiometry, charge and mass transfer rates, and chemical reaction equilibrium constants. The application of electroanalytics has grown widely, especially in food safety [9], Environmental Monitoring [10], and biomolecule detection in strip test-based biochemical sensors [11].

The Electrochemical Analysis Practice Course is one of the courses given to students of the Chemical Analysis Study Program of AKA Bogor Polytechnic. As a service provider, AKA Bogor Polytechnic must pay attention to and maintain the quality of facilities, infrastructure, and practical services by continuously improving and evaluating. It is committed to providing services that satisfy students and produce quality graduates. As a service provider, universities must provide the best possible service so that students achieve optimal success. In its activities, universities must be able to manage student satisfaction in various aspects, such as the teaching and learning process [12], [13], [14], Student [15], Study Program Institution [16], library [17], and academic aspects [18], [19], [20].

In implementing laboratory practices, instructors and lecturers have a crucial role in creating a conducive learning environment. As teaching staff, instructors are expected to continue to innovate and improve teaching methods and practice effectiveness. The use of information technology, the development of interactive teaching materials, and the optimal use of campus facilities can improve the quality of student learning. The learning paradigm shifts from simply pursuing learning outcomes to focusing on a quality learning process. Thus, good learning outcomes will be achieved if the lecture process is optimally designed and implemented [14]. Practice performance is influenced by various factors, including pedagogical competence, professionalism, personality, and the instructor's social skills. In addition, the completeness of the laboratory and the availability of practical materials are also determining factors for the success of learning [21]. Through active involvement in laboratory activities, students can develop a deeper understanding of electrochemical concepts, ultimately increasing their readiness in the industrial and research worlds.

This study aims to measure the level of student satisfaction with the implementation of Electrochemical Analysis Practice. Some of the main questions that want to be answered in this study are: (1) Are students satisfied with the practice process that has been implemented? (2) How high is student satisfaction with the instructor's performance? (3) What are the aspects that still need to be optimized in the implementation of laboratory practices? In this study, the evaluation was carried out based on instructor competency indicators, as stipulated in Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, which includes pedagogic, personality, social, and professional competencies. Pedagogic competence includes designing, implementing, and evaluating the learning process effectively. Personality competence refers to the ability

of the instructor to build a professional, integrity, and authoritative character. Social competence is related to the ability to communicate and interact effectively with students and colleagues, while professional competence emphasizes mastery of teaching materials and innovative learning methods.

By referring to these four aspects of competence, instructors are expected to improve the quality of laboratory practice so that students not only theoretically understand the concept of electrochemistry but also be able to apply it in actual practice. If these four aspects can be implemented optimally, the quality of lectures and the competence of graduates will increase.

In this regard, this study aims to evaluate student satisfaction with instructors' performance and examine the influence of laboratory facilities in supporting the effectiveness of Electrochemical Analysis practices. With the results of this research, it is hoped that concrete recommendations can be obtained to sustainably improve the quality of electrochemical practice services.

2. METHOD

The technique used in this study is a questionnaire technique with a quantitative approach. The quantitative approach is research that describes or explains a problem whose results can be generalized. The survey method is research in which the primary source of data and information is obtained from respondents as research samples by using questionnaires or questionnaires as data collection instruments [22]. According to Waruwu [23], quantitative research uses data from numbers and exact science to answer research hypotheses.

The data was collected by distributing questionnaires to AKA Bogor Polytechnic students who had completed the electrochemical analysis practice with the help of Google Forms. The questionnaire will be distributed from January 30 to 31, 2025, after the electrochemical analysis practical lecture ends. The source of data was obtained from respondents or people who responded and answered the questions in the questionnaire. The data collection aims to determine students' perceptions of the practice of electrochemical analysis. The data collected in this study was a questionnaire technique using an attitude scale. The attitude scale contains attitude statements, which are statements about the object of the attitude. The Likert scale is used as a measure of the attitude scale with four categories of answers as follows [24]:

Table 1. Alternative scores of student questionnaire answers

Category	Answer Score
Very satisfying	5
Satisfying	4
Quite satisfying	3
Less satisfactory	2
Unsatisfactory	1

The percentage of student responses can be calculated based on the formula:

$$\text{Response percentage} = \frac{\text{Total Score}}{\text{Maximum number of scores}} \times 100\% \quad (1)$$

The collected questionnaire data will be analyzed using descriptive statistical techniques. Data analysis is carried out through cumulative frequency calculations. The results of the percentage of responses are converted into qualitative data shown in Table 2.

Table 2. Student response criteria

Percentage (%)	Category
81 – 100	Excellent
61 – 80	Good
41 – 60	Enough
21 – 40	Less
0 - 20	Very Less

Source: E. Nuraini [15]

3. RESULTS AND DISCUSSION

3.1. Data Collection

Student satisfaction with the services of Electrochemical Analysis Practice instructors was measured by 24 statements divided into five indicators with five levels of satisfaction. The indicators used in this study were pedagogic (5 statements), professionalism (6 statements), personality (5 statements), social (5 statements), and practice implementation (3 statements) and two suggestions. The total population of students in the Chemical Analysis study program of AKA Bogor Polytechnic who took the Electrochemical Analysis Practice course was 219. In comparison, the respondents who collected data in this study amounted to 23 students in the chemical analysis study program Politeknik AKA Bogor.

Table 3. Number of respondents by gender

Gender	Number of Respondents	Percentage
Female	19	83%
Male	4	17%

Table 3 above shows that as many as 19 women filled out the Google form with a percentage of 83%, and as many as 4 men filled out the Google form with a percentage of 17%. Based on the study's results, student satisfaction with all aspects of electrochemical analysis practice services, data on student satisfaction with the performance of electrochemical analysis practice instructors was obtained, as shown in Figure 1.

Based on Figure 1 below, of the 23 respondents, no students expressed dissatisfaction, there were 2% of students felt dissatisfied, 11% stated that they were quite satisfied, 52% stated that they were satisfied, and 35% stated that they were very satisfied with the performance of the practical instructors. The data is then processed to obtain qualitative data. From the calculation results, student satisfaction is a good criterion, with an average of 72.24%.

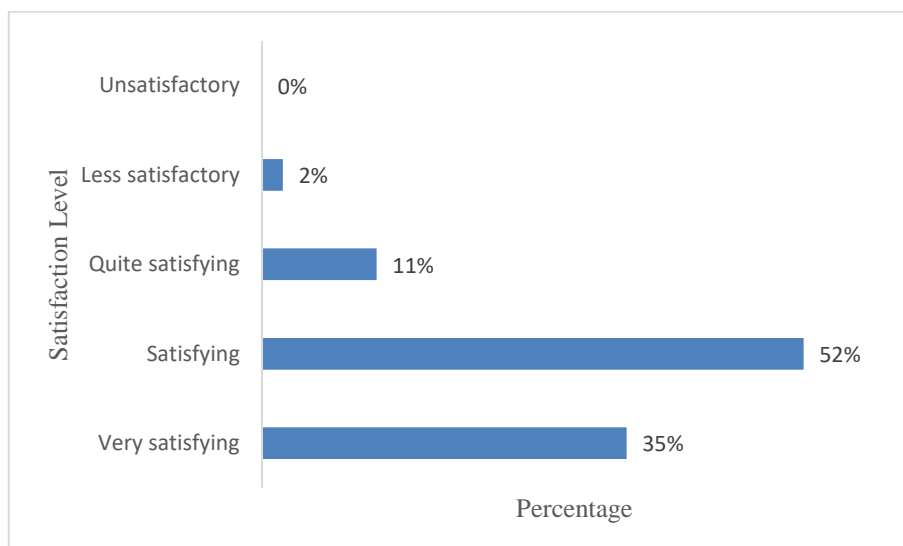


Figure 1. The level of student satisfaction with the performance of the Electrochemical Analysis practice instructor

A summary of the results of data analysis for each aspect of the electrochemical analysis practice service of AKA Bogor Polytechnic can be seen in the following table :

Table 4. Summary of the results of the analysis of the questionnaire data of the electrochemical analysis practice service

No	Service Aspects	Percentage Skor	Criteria
1	Pedagogy	72,17%	Good
2	Professionalism	73,62%	Good
3	Personality	72,52%	Good
4	Social	72,00%	Good
5	Practice Implementation	69,56%	Good
	Average	72,24%	Good

Based on Table 4 above, the lowest percentage value is the aspect of practice implementation, which is 69.56%. Although the criteria for the percentage obtained for this aspect are included in the good category, it is necessary to pay attention to the instructors and laboratories of the electrochemical analysis practice course to improve services.

3.2. Pedagogic Aspects

Pedagogic competence is the ability of teachers to plan, implement, and evaluate effective and efficient learning processes. Pedagogic competence is essential because it can help improve learning quality by planning and implementing an effective and efficient learning process, improving learning outcomes and increasing student satisfaction by creating a comfortable and pleasant learning environment. The results of data analysis for pedagogic aspects can be seen in Table 5.

Based on the results shown in Table 5, it is known that there are 5 (five) items of statements that produce a level of satisfaction with good criteria. The overall average for the pedagogic aspect is 72.17%. This value shows that the pedagogic aspect is on good criteria. It can be concluded that students are satisfied with the instructor's performance in

the pedagogical aspect. However, in the future, it is still necessary to improve the overall pedagogic aspect, especially in the statement of the ability to manage and liven up the classroom atmosphere.

Table 5. Results of data analysis for pedagogic aspects

No	Statement	Score Percentage	Criteria
1	The lecturer team could convey the lecture method (learning contract and SAP) at the beginning of the meeting.	76,52%	Good
2	The lecturer team can manage and liven up the practice atmosphere	65,22%	Good
3	The lecturer team can utilize media and learning technology	70,43%	Good
4	The lecturer team can use teaching methods that are following the teaching materials	73,04%	Good
5	The lecturer team can provide exam materials following the material practised	75,65%	Good
Average		72,17%	Good

3.3. Aspects of Professionalism

Professional competence is the ability of teachers and lecturers to carry out their duties and responsibilities as professional educators. Professional competence is very important for teachers and lecturers because it can help them carry out their duties and responsibilities effectively and professionally. Thus, they can help students achieve their learning goals and develop their abilities optimally. The results of data analysis for the professionalism aspect can be seen in Table 6.

Table 6. Results of data analysis for the Professionalism aspect

No	Statement	Score Percentage	Criterion
1	The lecturer team masters the material taught	77,39%	Good
2	The lecturer team delivered practical material accompanied by examples relevant to the concept in the lecture	72,17%	Good
3	The lecturer team can answer every student's question clearly and accurately	77,39%	Good
4	The lecturer team can connect practical materials with the experience and context of student life	70,43%	Good
5	The lecturer team provides actual information and new insights related to lecture materials	72,17%	Good
6	The lecturer team provides actual information and new insights related to lecture materials	72,17%	Good
Average		73,62%	Good

Based on the results shown in Table 6, it is known that there are 6 (six) items of statements that produce a level of satisfaction with good criteria. Based on the overall average for the professionalism aspect, it is 73.62%. This value shows that the aspect of professionalism is on good criteria. It can be concluded that students are satisfied with the instructor's professionalism in electrochemical analysis practice.

3.4. Personality Aspects

Personality competence is the ability of teachers and lecturers to show good personalities, such as having integrity, empathy, and the ability to communicate

effectively. Personality competencies are important for teachers and lecturers because they help create a conducive and supportive learning environment. The results of data analysis for personality aspects can be seen in Table 7.

Table 7. Results of data analysis for personality aspects

No	Statement	Score Percentage	Criterion
1	The lecturer team provides good examples of attitude and behaviour	75,65%	Good
2	The lecturer team can control emotions when facing practical problems	72,17%	Good
3	The lecturer team is friendly to students	69,56%	Good
4	The lecturer team behaves wisely, fairly, and responsibly towards the implementation of learning in lectures	73,04%	Good
5	The lecturer team has unity between what is said/taught and what is done	72,17%	Good
Average		72,52%	Good

Based on the results shown in Table 7, it is known that there are 5 (five) items of statements that produce a level of satisfaction with good criteria. Based on the overall average for the personality aspect, it is 72.52%. This value shows that the personality aspect is on good criteria. It can be concluded that students are satisfied with the instructor's performance in terms of the personality aspect of the instructor of electrochemical analysis practice.

3.5. Social Aspects

Based on Law Number 14 of 2005 concerning Teachers and Lecturers [25], social competence refers to the ability of an educator (teacher or lecturer) to interact effectively and harmoniously with students, colleagues, and the wider community. This social competency is very important in creating a positive learning environment and supporting the development of students. This social competency aims to create an inclusive, open, and respectful learning environment, ultimately supporting the development of the quality of education in Indonesia. The results of data analysis for the social aspect can be seen in Table 8.

Table 8. Results of data analysis for social aspects

No	Statement	Score Percentage	Criterion
1	The Lecturer Team is open to receiving criticism and suggestions from students	70,43%	Good
2	The lecturer team is flexible in getting along and communicating with students	75,65%	Good
3	The Lecturer Team is sensitive and cares about the academic needs of students	68,69%	Good
4	The lecturer team respects differences of opinion	72,17%	Good
5	The lecturer team creates an atmosphere that allows students to express their opinions and work together	73,04%	Good
Average		72,00%	Good

Based on the results shown in Table 8, it is known that there are 5 (five) items of statements that produce a level of satisfaction with good criteria. The overall average for

the social aspect is 72.00%. This value shows that the social aspect is on good criteria. It can be concluded that students are satisfied with the instructor's performance in the social aspect of the instructor's electrochemical analysis practice.

3.6. Implementation of Practice

The implementation of practice, especially related to natural sciences, is influenced by the quality of the instructors and by the completeness of the laboratory where the practice takes place [21]. The results of data analysis for implementing the practice can be seen in Table 9.

Table 9. Results of data analysis for practice implementation

No	Statement	Score Percentage	Criteria
1	How motivated are students to participate in the practice of electrochemical analysis?	72,17%	Good
2	How complete is the laboratory for the implementation of electrochemical practice?	66,09%	Good
3	What is your level of achievement in electrochemistry practice?	70,43%	Good
Average		69,56%	Good

Based on the results shown in Table 9, it is known that there are 3 (three) items of statements that produce a level of satisfaction with good criteria. The overall average for the implementation of practice aspects is 69.56%. This value shows that the implementation of the practice is on good criteria. It can be concluded that students are satisfied with the instructor's performance in implementing electrochemical analysis practice.

In terms of practice implementation, in addition to the three statements, respondents were also asked to give their hopes for implementing electrochemistry practices in the future. The main thing students convey is updating tutorial videos and practice guides.

3.6. Discussion

The study results showed that student satisfaction with the instructor's performance in Electrochemical Analysis Practice was good, with an average score of 72.24%. Of the five aspects measured, professionalism obtained the highest score (73.62%), which shows that students consider the instructor to have a good mastery of the material, be able to provide relevant examples and explain the concept of practice clearly. On the other hand, the aspect of practice implementation obtained the lowest score (69.56%), which indicates that there are challenges in the adequacy of laboratory facilities and the effectiveness of practice. These findings align with previous research, which shows that the quality of laboratory facilities significantly influences the success of laboratory practices [21], [26].

The pedagogic, personality and social aspects also obtained good scores, 72.17%, 72.52%, and 72.00%, respectively. High scores on personality and social aspects show that students feel that instructors have a professional, communicative attitude and can create a

conducive learning environment. However, in the pedagogical aspect, some students revealed that instructors must be more interactive in managing practices and livening up the learning atmosphere. This aligns with a study that states that instructors' pedagogic skills are very important in increasing students' motivation to learn [12], [14].

Research shows that good pedagogic skills can create a more engaging and interactive learning environment, thus encouraging students to be more active in their learning process [27]. In addition, the pedagogic skills instructors possess significantly affect student learning outcomes. Research reveals that understanding various electrochemical analysis methods and the ability to relate them to practical contexts can increase students' interest and motivation in understanding the material [28]. It is said that when teachers integrate practical experience with theory, students tend to show higher levels of motivation because they can see the relevance of the teaching material in daily life [29]. Thus, pedagogy in the teaching of electrochemical analysis is not only about conveying information but also about arousing students' curiosity and active involvement in learning.

The main obstacle found in this study is the aspect of practice implementation, which can still be improved. Students provide feedback that the laboratory needs to update the facilities, and instructors must provide more systematic guidance through video tutorials or more comprehensive practicum modules. Several studies have shown that using multimedia-based learning technology can improve the effectiveness of laboratory practices, especially in making it easier to understand experimental procedures [9], [10]. Therefore, an improvement strategy is needed in this aspect so that students can develop laboratory skills more optimally.

Based on these findings, improving the competence of instructors, laboratory facilities, and technology-based learning methods is a strategic step to improve the quality of Electrochemical Analysis Practice. Periodic evaluations are also needed to ensure that the practical services are always relevant to technological developments and student needs. With continuous improvement, it is hoped that electrochemistry will improve students' skills and prepare them to face challenges in industry and research.

4. CONCLUSION

The results of this study show that the level of student satisfaction with the instructor's performance in Electrochemical Analysis Practice is in a good category, with an average score of 72.24%. The professionalism aspect obtained the highest score (73.62%), which shows that the instructor is considered to have a good mastery of the material and can convey the concept. On the other hand, the aspect of practice implementation has the lowest score (69.56%), which indicates the need to improve the completeness of laboratory facilities and practicum teaching methods.

Although the level of student satisfaction is in a good category, this study identifies several aspects that need to be improved, especially related to the management of laboratory practices. Students propose renewing laboratory facilities and providing more comprehensive guidance, such as video tutorials and technology-based practicum modules.

With the improvement in this aspect, it is hoped that the students' practical experience can be more optimal and in line with technological developments and industry needs.

The findings in this study have implications for the development of curriculum and academic policies, especially in improving the quality of laboratory-based practicum. Periodic evaluation, integration of technology in practical learning, and continuous instructor training are strategic steps in improving the quality of academic services. With the proper recommendations, the Practice of Electrochemical Analysis can be more effective in improving student competence in academic aspects and professional skills.

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