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## Evaluation and Research in Education

**International Journal of Evaluation and Research in Education (IJERE)** is an interdisciplinary journal that publishes material on all aspects of education research. The IJERE aims to provide a forum for scholarly understanding of the field of education and plays an important role in promoting the process that accumulated knowledge, values, and skills are transmitted from one generation to another; and to make methods and contents of evaluation and research in education available to teachers, administrators and research workers.

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## **Evaluation and Research in Education**

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## Students' Satisfaction toward the Services of the Chemical Laboratory

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### ABSTRACT

Chemistry Laboratory serves all of the students that were programmed chemistry laboratory works. The satisfaction of the students was studied that involving 50 students. The study was conducted to measure the students' satisfaction towards the services offered by the laboratory. Measurement of the students' satisfaction was conducted using statistical parametric t-test. The study showed that the students' satisfaction more than 75%.

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## 1. INTRODUCTION

One of supporting tools for the learning process at the college is laboratory. Therefore, services of the laboratory must be improved continuously to meet the needs of the students as the users of the services and to support the learning process in chemistry, which includes Basics of Chemistry, Inorganic Chemistry, Organic Chemistry, and Biochemistry. Chemistry Laboratory is an important facility for education, research, community services and quality test as well as quality control. In view of the four functions, it is clear that chemistry laboratory is vital for a university, particularly one with exact science faculties. It is important to support the implementation of higher education functions, which includes education, research, and community services. Chemistry is based upon experiments, thus it involves a close relationship between theories and practices. Chemical laboratory classes aim at providing the students with illustrations on the theoretical principles, establishing scientific attitude, developing skills in operating tools, mastering chemical measurements, and gaining experiences in experiments to be used as the bases for research. Chemistry Laboratory also serves as a place of research for both the senior students as the lecturers and as a public facility, namely, for the people outside the university and for both research and other kinds of tests.

Success of a laboratory as a working unit in a university is determined by the service quality; a quality service can be identified through satisfaction report from the customers, namely, the students. Cravens [1] notes that "to reach the ultimate satisfaction level, an understanding on what the customers need is necessary, to develop the commitment of every individual in an institution to meet the customers' needs."

Chemistry Laboratory of the Gorontalo State University served lab practice class for all of the students who took chemistry class. When it comes to facilities, the Chemistry Laboratory had two rooms equipped with adequate analytical devices, four laboratory staffs, and strategic as well as easily accessible



location. The Chemistry Laboratory of the Gorontalo State University excelled in that it was supported by competent lab staffs as well as by friendly and fast-working administrative staffs. Accordingly, as a working unit in the university, the laboratory should make the students' satisfaction the first priority since they are customers that deserve the best services. Services offered by the laboratory needed continuous improvement, which included lab work, research service for both students and lecturers, as well as community services. The service system refers to identification and measurement of the services. When it comes to service measurement, the quality must be assessed from five perspectives. They are (1) content, in relation to the standard procedure in practice; (2) process, in relation to timeliness in service delivery based on the standard procedure in practice; (3) structure, in relation to the suitability of the physical facilities and organizational structure; (4) outcome, in relation to the service delivery in view of the customer satisfaction; and (5) impact, in relation to long-term impact of the services received by the customers [1].

Students are internal customers of a university from academic and administrative perspectives. Satisfaction level measured to find out more on the learning quality was the students' satisfaction. Satisfaction refers to fulfillment of students' needs and expectation from their position as the customers of the educational services [2]. One of the most frequently used service quality models is service quality. The model consists of five dimensions of service, namely, tangible, reliability, responsiveness, assurance, and empathy [3].

Measurement of students' satisfaction level is important for the sustainability of educational system. Results of measurement for students' satisfaction level could be used to improve the educational system [4]. Service quality at the laboratory can be measured from the lab work service, research and community services, all of which are main tasks and functions of any university laboratory. The tone and performance of the laboratory are reflected from the three main services. They become the main indicators for students' satisfaction level. When they are satisfactory, the laboratory is said to have good performance.

In view of this, feedback from the students as the customers of the laboratory services is necessary. The feedback could be used as an evaluation and consideration tool in providing students' satisfaction oriented services. Therefore, a research is necessary to find out the students' satisfaction toward the services offered by the laboratory through feedback from the students.

Based on the background above, this research focused on the students' satisfaction toward the services of the Chemistry Laboratory of the Gorontalo State University based on the dimensions of customers' satisfaction. Formulation of the research problems was limited to the level of students' satisfaction toward the services at the Chemistry Laboratory of the Gorontalo State University.

Findings of the research are expected to be useful as additional information for the Gorontalo State University in improving the quality of learning process and as providing positive contribution toward the improvement of services at the Chemistry Laboratory of the Gorontalo State University.

### 1.1. Laboratory Service

Laboratory unit in an educational institution is established and organized to facilitate the learning process and to meet the needs of students at the campus. According to Indonesian Dictionary, laboratory is a certain place or room equipped with adequate tools for experiment (investigation and so on). According to Wikipedia free encyclopedia, laboratory (or lab) is a place where scientific research, experiment, measurement, as well as scientific training are conducted. Laboratory is usually established to allow for controlled implementation of every activity and program. A scientific laboratory is usually differentiated based on the scientific discipline, for instance, physics laboratory, chemistry laboratory, biochemistry laboratory, computer laboratory, and language laboratory.

[5] suggests that laboratory is an either open or close place used for investigation, experiment, practical work, tests, and development. A school laboratory serves as a supporting facility for the teaching and learning process – either open or closed – used for lab work, investigation, experiment, development, and standardizing works. In general term, a laboratory serves as a special service offered by an educational institution to support the learning process. On the other hand, specific objectives of a school laboratory are (1) to facilitate mastery of the materials provided by the lecturers, (2) to build personal courage based on the rights and truth value in all aspects of the students' life, (3) to train and develop the skills of teaching staffs and students in their professional majors, (4) to train and familiarize the students to study in an innovative way in both personal and group contexts. Functions of a laboratory is as a facility or place to strengthen and provide certain information, to determine cause-effect relationship, to prove the truth (verify) certain factors and phenomena, to practice what is known, to develop skills, to provide training, to encourage the students to use scientific methods in problem solving, and to do research. Given the objectives and the functions, a laboratory is called a service – anything conducted by a party (individual or group) to another party (individual or group). One of the examples is customer service.



Kotler [6] defines services as any action or activity offered by a party to another party. Service is an intangible object and it does not lead to any kind of possession (ownership of something). The production may or may not be related to a physical product.

Lovelock et.al [7] define service as an action or performance offered by a party to another party. Even though the process may be related to a physical product, the performance is not tangible and it does not lead to ownership over the production factors. Service is an economic activity that generates and benefits the customers at certain time and place because of action to realize a desired change in one's self or in the name of the service recipient. Another definition is that service is various actions or performance offered by a product to another person in an invisible form and not leading to ownership over something. The production may or may not be associated with a physical product [8].

According to Berry, et, al [9], service product has three characteristics that distinguish it from goods product. The first characteristic is intangible; it means that the service has no definite shape but its existence is perceivable by the customers through a process created by the service provider (producer). The second characteristic is heterogeneous; it means that the process varied with producer, with customers, and with time. The third characteristic is inseparable, since the elements of production and consumption in a service product cannot be separated. The service quality even appears when the service is being given.

Based on the description above, it can be concluded that laboratory service is defined as anything provided by the laboratory to other parties as the users (customers).

## 1.2. Students' Satisfaction

[6] suggests that satisfaction refers to a feeling of happiness or disappointment one perceives after comparing the perception and expectation toward a service with the products he/she receives. Therefore, satisfaction is a function of perception or impression over a performance and expectation. When the performance is inferior to the expectation, the result is dissatisfaction. On the other hand, when the performance meets the expectation, the result is satisfaction, and when the performance exceeds the expectation, the customers will be very satisfied or happy. The key to customer loyalty is providing superior values beyond their expectation.

The following are some definitions of satisfaction proposed by some experts, as cited by [7]. According to Zeithaml, satisfaction is response of a customer toward need fulfillment. According to Guiltinan, satisfaction is "A buyer's degree of satisfaction with product is the consequence of the comparison a buyer makes between the level of the benefits perceived to have been received after consuming or using a product and the level of the benefits expected prior purchase". According to Pasuraman, et. al, satisfaction is the customer feeling on a kind of service he/she receives. According to Lovelock, satisfaction is an emotional condition or post-purchase reaction, which may come in the form of anger, dissatisfaction, upset, happiness, or excitement. It is not surprising that any company is obsessed with the customers' satisfaction given its direct relationship to customers' loyalty, market share, and profit.

Students are internal customers of a college from academic and administrative perspectives. Satisfaction level measured to find out the quality of learning process is the students' satisfaction level. Satisfaction refers to fulfillment of needs and expectation as the customers of educational services [2].

A popular concept of service quality is, first developed by Pasuraman, et. al 15 years ago. At first, concept of the service quality was formulated into ten dimensions [1]. Kotler [6] suggests that five factors that determine the service quality include (1) Tangible (direct evidence), which includes physical facilities, equipment's, personnel, and communication facility, (2) reliability – an ability to provide the promised service in an accurate, immediate, and satisfactory way, (3) responsiveness, namely, willingness of the staff to help the customers and to give responsive services, (4) assurance, which includes knowledge, competence, politeness, and truthfulness of the staffs, freedom from any risks, harms, and doubts, and (5) empathy, which includes easiness in building relationship, communication, personal care, and understanding on the individual needs of the customers.

Furthermore, [10] suggest that real evidence (tangible) involves some indicators. They include (a) classroom comfort, (b) classroom facility, (c) classroom cleanness, (d) classroom neatness, (e) bathroom cleanness, (f) staff neatness, and (g) parking area. Reliability dimension involves two indicators, namely, (a) fast service procedure and careful administrative procedures. Responsiveness dimension involves the following indicators: (a) preparedness of the staffs in managing the parking area, (b) responsiveness of the staffs in serving the students, (d) preparedness of the teaching staffs in answering the students' questions, and (e) preparedness of the academic advisors in helping the students. Assurance dimension involves the following indicators: (a) ability of the lecturer in delivering the materials, (b) skills of the administrative staffs, (c) hospitality of the staffs in serving the students, (d) attitude of the staffs, (e) guarantee of timely mid-term grades, (f) guarantee of timely term grades, (g) timely testing schedules, (h) accuracy of the



teaching methods used by the lecturers, and (i) class discipline. Empathy dimension involves the following indicators: (a) personalized attention to the students and (b) controlled educational period.

Srinadi and Nilakusmawati [1] suggested that in the context of integrated quality management applied by the college, students are customers whose needs must be met. The educational institution needs to be aware of the dominant factors that determine the satisfaction before realizing the satisfaction itself. In this way, the institution can identify factors that need to be maintained and to be improved as an effort of enhancing the students' satisfaction toward the laboratory services.

Students' satisfaction refers to how the students perceive the services they receive (perceived service) and the expected service, as measured through five dimensions of Servqual service quality, namely (1) tangible; (2) reliability; (3) responsiveness; (4) assurance and (5) empathy [2].

Satisfaction can also be seen as a comparison between what is expected and what is received. Someone will be satisfied when the comparison is balanced. Imbalance will lead to dissatisfaction. On the other hand, imbalance that is perceived as profitable will lead to satisfaction. Wilton [1] suggest that customers' satisfaction refers to the customers' response toward the evaluation of imbalance perceived between the expected performance and the actual performance of a product. It can be said that customers' satisfaction is a condition, in which the customers' needs are met, in the sense that they receive all things they need based on the desired criteria. The higher the capacity that is met, the higher the customers' satisfaction. As discussed above, quality is the need to satisfy and satisfaction is the feeling of happiness or disappointment over the product or service performance. When the service quality is compared with the satisfaction level, a relationship is found between the customers' satisfaction and the service quality. When both are met, the results are either reception or rejection toward the services. One of the most important services perceived by the students as the customers at the faculty (as an educational institution) is learning support.

Four important aspects must be carefully considered in improving the learning process at the university [1]. They are (1) teaching methods, (2) learning quality, (3) application of the subjects, and (4) learning activities that encourage the students to be independent in an academic way by means of analytical thought. The students have individual expectation toward the learning process. When they perceive that the learning process provided by the lecturer meets their expectation, they will feel satisfied and report the learning process quality is good. On the other hand, when they do not get what they expect, they will report dissatisfaction to the learning process provided by the lecturer. Assessment toward the quality of learning process provided by the lecturer based on the extent to which the students' needs are met is called the students' perception.

Based on the description above, it can be concluded that students' satisfaction in the context of this research is fulfillment of the needs and expectation of the students as the users of the laboratory services, as reflected in five dimensions of service, namely: tangible, reliability, responsiveness, assurance, empathy.

Laboratory service refers to anything done by the laboratory for another party as a user. As a Technical Execution Unit in the college education system, laboratory plays an important role and function. It is a supporting facility for the academic activities – in both vocational and professional perspectives of a discipline. It is not only a learning facility that allows the students to practice their cognitive, psychomotor, and affective capability in an empirical way. It is also a place for scientific development for research and community service.

Accordingly, the laboratory is expected to be able to meet the students' needs and to improve its performance continuously. To be successful in improving its performance, it needs feedback from the students as the internal customers. Laboratory service is important for the students and other users. Therefore, the students' satisfaction plays an important role in the sustainability of laboratory system. In other words, the students' satisfaction must be the basis for decision making in the laboratory managerial level and the university must make the students' satisfaction level as the primary target of improvement efforts.

When it comes to laboratory service, the students' satisfaction refers to fulfillment of the students' needs. Satisfaction of the students as the internal customers of college educational system refers to positive perception of the students regarding the services during and after a lab activity. Students who perceive imbalance between the expected performance and the actual one in the laboratory are in disconfirmation position. Students in negative disconfirmation report dissatisfaction. On the other hand, students in positive disconfirmation report satisfaction.

Students' satisfaction is a measurement tool used by a college institution to help determine strengths of the laboratory as an execution unit and to identify areas that need improvement. In this way, the students' learning experience can be improved.

Accordingly, the students' satisfaction toward the laboratory services reflects the face and color of the laboratory. When it satisfies the students as the customers, its performance is good. Keys to influencing the students' satisfaction is interaction between the teaching staffs/laboratory staffs and the students as the



customers. The interaction must have a stimulatory quality to provide the customers with a feeling of comfort. Based on the thinking paradigm above, hypothesis proposed in this research is "the students' satisfaction level in the Chemistry Education Department toward the services of Chemistry Laboratory of Faculty of Mathematics and Natural Sciences Gorontalo State University is above 75%."

Once again, satisfaction in this research is fulfillment of needs and expectation of the students as the user of laboratory services as reflected in five dimensions of service satisfaction, namely, tangible (direct evidence), reliability, responsiveness, assurance, and empathy.

Measurement of the students' satisfaction toward the services of Chemistry Laboratory of Faculty of Mathematics and Natural Sciences Gorontalo State University was conducted by means of the students' responses toward fulfillment of their needs and expectations as the users of laboratory services, in view of the five dimensions. (1) The first dimension is tangible (direct evidence) with the following indicators: (a) laboratory comfort, (b) laboratory facility, (c) laboratory cleanness, and (d) information system. (2) Dimension of reliability involves the following indicators: (a) quick service procedure and (b) careful administrative procedures. (3) Dimension of responsiveness involves the following indicators: (a) responsiveness of the staffs in serving the students, (b) responsiveness in dealing with the students' complaints, (c) preparedness of the lecturer in answering the students' questions, and (d) preparedness of the academic advisor in assisting the students. (4) Dimension of assurance involves the following indicators: (a) ability of the lecturer in delivering the materials, (b) skills of the laboratory staffs, (c) attitude of the staffs, (d) timeliness in grade reporting, and (e) timeliness of lab works. (5) Dimension of empathy involves the following indicators: (a) personalized attention to the students and (b) good communication.

## 2. RESEARCH METHOD

Objective of this research is to find out the students' satisfaction level toward the services of Chemistry Laboratory of Faculty of Mathematics and Natural Sciences Gorontalo State University. The research was conducted on the students of Chemistry Education Department, Faculty of Mathematics and Natural Sciences Gorontalo State University, as the users of Chemistry Laboratory from July to October 2013.

Method of the research was causal survey with an analytical model that compares one independent variable (t-test). The method could be used to test the students' satisfaction level toward the services of Chemistry Laboratory, Faculty of Mathematics and Natural Sciences Gorontalo State University.

Population of the research was all subjects related to the satisfaction toward the services of Chemistry Laboratory as perceived by 335 students of Chemistry Education Department, Faculty of Mathematics and Natural Sciences Gorontalo State University who were registered in the academic year of 2013-2014. Sample of the research was taken in a proportional way to represent the population by using simple random sampling technique. The research used 50 students as the sample.

The data were collected using structured questionnaires with graded scale multiple options, ranging from 1 to 5. The instrument was prepared by firstly arranging the units derived from the research variables. The instrument includes a list of questions related to the specified indicator as well as instruction. There were 5 optional answers in rating scale, 1, 2, 3, 4, 5.

The instrument quality was tested for validity and reliability by using Product Moment technique. Instrument trial test for validity and reliability found that of 52 question items, 5 items were not valid, with a reliability value of 0,964. After the 5 question items were removed, reliability of the instrument was found to be 0,965. Therefore, the instruments used for this research include 47 question items that met high validity and reliability criteria.

Data analysis technique used in this research was descriptive analysis to describe the characteristics of score distribution for the research variables and inferential analysis by using inferential statistics that compared one independent variable, t-test, with the following formula:[11]

$$t_{count} = \frac{\bar{X} - \mu_0}{\frac{s}{\sqrt{n}}}$$

Description:

$\bar{X}$	=	sample average
$\mu$	=	hypothesized value
$s$	=	standard deviation of calculated sample
$n$	=	number of sample



### 3. RESULTS AND ANALYSIS

Description of the data presented in this section is data derived from the questionnaires to find out the students' satisfaction toward the services of Chemistry Laboratory, Faculty of Mathematics and Natural Sciences, Gorontalo State University. Theoretical scores of the research data were 47 for minimum score and 235 for maximum score. On the other hand, the empirical data of the research showed a minimum score of 143 and maximum score of 215. The results of data screening are presented in the following Table 1.

The data distribution was presented in the form of frequency distribution for the students' satisfaction score toward the services of Chemistry Laboratory, as presented in Table 2. Table 2. shows that 15 respondents (30, 00%) had a score that was below the interval class where the average score was situated, while 9 respondents (18,00%) had a score that was within the interval class where the average score was situated, and 26 respondents (52,00 %) had a score that was above the interval class where the average score was situated.

#### 3.1. Testing for Data Analysis Requirements

Hypothesis testing used statistical analysis with a parametric test that compared one independent variable, or t-test. The analysis required that the data be processed further to produce better estimates. For this, the analyzed variable was derived from population with normal distribution. Therefore, before the data were analyzed for hypothesis testing, a requirement analysis in the form of Data Normality Test was conducted.

To find out whether the results of research were normally distributed or not, a normality testing was conducted with statistical test  $\chi^2$ . When the results showed a value of  $\chi^2_{\text{count}} \leq \chi^2_{\text{table}}$ , they were said to be normally distributed and abnormally distributed for a value of  $\chi^2_{\text{count}} > \chi^2_{\text{table}}$ . Normality testing was conducted for a significance level of  $\alpha = 0, 05$ .

Normality test for the research data found a value of  $\chi^2_{\text{count}} = 2, 8181$ , and a value of  $\chi^2_{\text{table}}$  for a significance level of  $\alpha = 0,05$  and  $dk = k-1 = 6$ , was 12,592. Therefore,  $\chi^2_{\text{count}} \leq \chi^2_{\text{table}}$  that it can be concluded that the research had normally distributed data.

#### 3.2. Hypothesis Testing

Hypothesis to be tested in this research was "the students' satisfaction level toward the services of Chemistry Laboratory, Faculty of Mathematics and Natural Science, Gorontalo State University was above 75%." The hypothesis is translated into the following statistical hypotheses:

$$\begin{array}{lll} H_0 & : & \mu_0 \geq 176,25 \\ H_1 & : & \mu_0 < 176,25 \end{array}$$

Hypothesis testing was conducted using statistical test that compared one independent variable, or t-test. Principle of the testing used a significance level of  $\alpha = 0,05$  and  $dk = n-1$ . Criteria of the testing at the right part were: when  $+t_{\text{table}} \geq t_{\text{count}}$ , the hypothesis would be refused and when  $t_{\text{table}} \leq t_{\text{count}}$ , the hypothesis was accepted.

Analysis using Microsoft Excel 2007 as presented in Appendix 5 showed that the hypothesized value, or was 75% of the average ideal value, or 75% of the ideal value of 235, with  $\mu_0 = 176,25$ , and t count = 2,98. Statistical testing with a significance of  $\alpha = 0,05$  and  $dk = n - 1$  or  $dk = 50 - 1 = 49$ , t label was 2,00. Therefore, the value of  $+t_{\text{table}} \leq t_{\text{count}}$  or  $+t(0,05;49) = 2,00 \leq t_{\text{count}} = 2,98$ . Therefore, t count was situated at the  $H_0$  rejection area or  $H_1$  reception area. It can be concluded that the hypothesis that the students' satisfaction level toward the services of Chemistry Laboratory, Faculty of Mathematics and Natural Science, Gorontalo State University was more than 75% was accepted.

#### 3.3. Discussion

Empirical findings derived from the test for the five hypothesis refused  $H_0$  and accepted  $H_1$ ; it means that the students were satisfied with the services of Chemistry Laboratory, Faculty of Mathematics and Natural Science, Gorontalo State University, as evident in the value of  $+t_{\text{table}} \leq t_{\text{count}}$ .

The research data showed that the average students' satisfaction score toward the services provided by the laboratory was 3,91, range 1-5. Analysis on the students' satisfaction level based on the service dimensions showed that empathy dimension had the highest score, namely 4,12. It means that services of the chemistry laboratory in the form of empathy received positive response from the students. The students felt satisfied with the personalized attention offered by the laboratory staffs. There was a good communication between the laboratory staffs and the students, as evident in the high satisfaction level for the dimension of empathy. In the second rank was the dimension of assurance, with a score of 3,98. Dimension of assurance consisted of five indicators, namely, ability of the lecturers to deliver the materials, skill of the laboratory staffs, attitude of the laboratory staffs, timeliness in grade reporting, and timeliness of the lab work schedules. In the third position were the dimensions of responsiveness and tangible, with average scores of 3,87 and



3,86, respectively. Both dimensions showed a comparable satisfaction level. It means that the students provided positive responses in the laboratory comfort, laboratory facility, laboratory cleanliness, and information system in the Chemistry Laboratory of Faculty of Mathematics and Natural Sciences, Gorontalo State University. The same thing applies for the indicators of quickness of the laboratory staffs to serve the students, preparedness of the laboratory staffs to solve the students' problems, preparedness of the lecturers to answer the students' questions, and preparedness of the academic advisor in assisting the students. The dimension of reliability had an average satisfaction score of 3,77. It means that quickness of the laboratory staffs and lecturers in serving the students and carefulness in administrative producers were less satisfactory for the students, compared to those for any other dimensions of service.

In general, t-test statistical tests showed that the students felt satisfied with the services of Chemistry Laboratory, Faculty of Mathematics and Natural Sciences, Gorontalo State University, as evident in the value of t count = 2,98. Given the value of above t table = 2,00 at a confidence interval of 95% means that the hypothesis was accepted. This shows that satisfaction of the students as the internal customers of the college education system reflected a positive feeling in relation to the services they received when they were taking the subject and after doing an activity in the laboratory. Students who perceived imbalance between the expected performance and the actual performance were at the disconfirmation position. Those at negative disconfirmation reported dissatisfaction while those at positive disconfirmation reported satisfaction.

Measurements for the students' satisfaction toward the services of the Chemistry Laboratory, Faculty of Mathematics and Natural Sciences, Gorontalo State University could be used as a basis for decision making in the college institution to improve the service quality in the laboratory. They were also expected to help in identifying areas that needed improvement as an effort for improving the services to the students.

#### 4. CONCLUSION

Based on the data analysis and hypothesis testing, the research concludes that the students generally felt satisfied toward the services of Chemistry Laboratory, Faculty of Mathematics and Natural Science, Gorontalo State University, with a satisfaction level of more than 75%.

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