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The Effect of Laboratory Management Knowledge, Facility Contribution, Management Competence on the Effectiveness of LAB Utilization for Physics Learning Through the Implementation of Laboratory Management

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Abstract

The purpose of this study was to determine the Effect of Laboratory Management Knowledge, Facility Contribution, Management Competence on the Effectiveness of LAB Utilization for Physics Learning Through the Implementation of Laboratory Management. This research is included in descriptive quantitative research. This research was conducted at SMPN 4 Malang. The sampling technique in this study was random sampling which was carried out on students in grades 1,2, and 3 so that in this study the sample obtained was 100 students of SMPN 4 Malang. The data analysis technique in this study used Partial Least Square (PLS). PLS is a Structural Equation Modelling (SEM) equation model with an approach based on variance or component-based structural equation modeling. The results showed that some variables show the effect while some do not. The future research that involves another place and other variables need to be conducted.

Keywords
laboratory management knowledge, facility contribution, manager competence, effectiveness of lab utilization, implementation of laboratory management

I. Introduction

Education is a process of learning, involving contact between students and instructors. All parts of the learning process interact intricately with one another (Ningrum, 2016). Education is something important and cannot be separated from a person's life, both in the family, society and nation (Sari, 2021). Education has a very strategic role in determining the direction of the forthcoming of the nation's quality of community knowledge (Musdiani, 2019). This compulsory education program is expected to provide minimum education for Indonesian citizens to be able to develop their potential so that they can live independently in a community environment or continue their education to a higher level (Martono, 2020). The process cannot stand alone; it must be supported by infrastructure, curriculum, money, and the surrounding environment, among others. All components must collaborate to carry out the educational process at each stage efficiently. Physics is one of the subdisciplines of Natural Sciences (IPA) that examines events and symptoms that occur in the cosmos; hence, physics is considered a technical foundation that is enough for preparing students for future life. Experiments confirm the theories found in physics textbooks, therefore studying physics is not limited to texts alone.

The scientific approach is emphasized by Minister of Education and Culture Regulation Number 65 of 2013 about the standard procedure of the 2013 curriculum. The scientific method can be implemented, including the use of practicum. The practicum attempts to create

many dimensions of learning objectives, including the areas of attitude (affective), skills (psychomotor), and knowledge (cognitive). Practicum is defined as a learning process designed to clarify concepts through direct contact with tools, materials, or natural events in order to improve students' intellectual skills, either through observation or search for complete and selective information that supports practical problem solving, problem-solving training (Sari, 2020). The efficacy of learning in a school is a metric for measuring the quality of education in that institution. The term effective derives from the term effective. To be capable of producing outcomes is to be effective. Effectiveness equals business achievement (SB & Zain, 2001). The effectiveness of learning is a measure of success, therefore the more effectively the learning achieves its planned objectives, the greater its degree of effectiveness. The efficacy of learning is affected by the qualities of teachers and students, learning materials, and other components of the learning environment. Therefore, in learning, emphasis is placed on the development of critical thinking abilities and the capacity to grasp the subject matter, where information originates from the outside yet is built inside each learner (Bhara, 2020).

The school's scientific laboratory is one of the locations where science education takes place. In order for the laboratory's teaching and learning process to provide quality learning outcomes, the laboratory's facilities must meet the minimal criteria for laboratory facilities. According to Minister of National Education Regulation No. 24 of 2007 on the standard of school/madrasah facilities and infrastructure, the school science laboratory serves as a location for hands-on science education and requires specialized equipment. Teachers must be capable of managing scientific laboratories. This learning media may aid teachers in the teaching process and help students improve their learning outcomes, as media is one of the aspects that can increase students' motivation and interest in learning (Munawaroh, 2014). The scientific laboratory is not only a learning instrument, but also a source of learning that enhances the efficacy of science education.

II. Review of Literature

2.1 Laboratory Management Knowledge

Laboratory management is the process of attempting to manage a laboratory. A properly managed laboratory is mostly defined by a number of connected aspects. Some sophisticated laboratory equipment with competent professional personnel may not perform effectively if laboratory management is inadequate. Consequently, laboratory management is an integral component of everyday laboratory operations. Laboratory management is the process of attempting to manage a laboratory. A properly managed laboratory is mostly defined by a number of connected aspects. Some advanced laboratory equipment and competent professional personnel may not necessarily perform well if laboratory management is inadequate. Consequently, laboratory management is an integral component of everyday laboratory operations. The effectiveness of laboratory administration will be enhanced if the laboratory's organizational structure is backed by a Board of Management that serves as a guide and advisor.

Dimension	Indicator
Planning	1. Organizing all activities held in the laboratory consisting of research, trials, application of theory in the laboratory, theory testing and so on. 2. Determining indicators of success in each planned stage
Organizing	1. Determination of the resources and activities needed to achieve organizational goals 2. The design and development of an organization or work group that will be able to bring these things towards the goal. 3. Assignment of specific responsibilities 4. Delegation of necessary authority to individuals to carry out their duties.

2.2 Facility Contribution

According to Zain (2001), "facilities are everything that makes student life simpler." Unpleasant learning environment, stifling classroom atmosphere, cluttered desks and chairs, and less available amenities lead to laziness in the classroom. Therefore, it is the teacher's responsibility to create a pleasant learning environment for pupils using the school's resources. The facilities facilitate the attainment of educational objectives. The facilities at issue are computer laboratory facilities, which include all technology and supplies directly utilized in the teaching and learning process. With proper computer laboratory equipment, it is anticipated that students would achieve successful learning results (SB & Zain, 2001).

From the various descriptions above, it can be concluded that the indicators of the computer laboratory facilities in this study are (1) Study area/room; (2) Lighting; (3) Air conditioning/AC (4) Supporting books; (5) Study equipment (computer set); (6) Cleanliness and tidiness of the room (Pertiwi, 2019).

2.3 Manager Competence

Competence is derived from the English word for ability or talent, competence. Competence in a wide sense can also be defined as an underlying individual attribute that is intimately tied to a person's work performance, including motivation, qualities and attitudes, self-perception, knowledge and conduct, or abilities (Taylor & Ntoumanis, 2007). According to Law No. 14 of 2005, competency is defined as a collection of knowledge, abilities, and behaviours that instructors and lecturers must acquire, internalize, and exercise control over in order to perform their professional tasks. Competence is derived from the English word for ability or talent, competence. Competence in a wide sense can also be defined as an underlying individual attribute that is intimately tied to a person's work performance, including motivation, qualities and attitudes, self-perception, knowledge and conduct, or abilities (Taylor & Ntoumanis, 2007). In addition, according to Law No. 14 of 2005, competency is defined as a collection of knowledge, abilities, and behaviours that instructors and lecturers must acquire, internalize, and exercise control over in order to perform their professional tasks.

Dimension	Indicator
Personal Competence	1. Present yourself as a mature, steady, and noble person. 2. Demonstrate commitment to the task
Social Competence	1. Work together in the implementation of tasks
Administrative Competencies	1. Planning the use of school/madrasah laboratories

	2. Organize storage of materials, equipment, tools, and spare parts for school/madrasah laboratories
Professional Competence	1. Preparing school/madrasah laboratory activities 2. Laboratory Technicians for Science, Physics, Chemistry, Biology and Vocational Productive Programs 3. Language Laboratory Technician 4. Computer Laboratory Technician 5. Maintain equipment and materials in the laboratory 6. Maintain work health and safety in school/madrasah laboratories

2.4 Effective Use of LAB

According to Wahyudiati (2016), practical activity is a teaching approach in which the teacher, an outside expert, or a student shows the entire class a process, such as how a tool works or how to build something. By demonstrating how things function, one of the teaching approaches utilized by instructors is practical exercises. In school-based laboratories, students engage in practical tasks. Measuring the extent to which the office administration laboratory is utilized effectively in practical tasks is the efficacy of the laboratory's utilization. The efficiency of laboratory use also depends on the efficiency of laboratory administration. According to (Wahyudiati, 2016), practical activities are said to be effective if:

A clear formulation of the skills or skills students get after doing practice.

The practical method is a reasonable method to use and the most effective method to achieve the formulated objectives.

1. The tools are used for practice are easily available and have been tested beforehand. 4) The number of students allows for practice.
2. Determine the outline of the steps are carried out before the practice. 6) Take into account the time required for practical activities.
3. The information delivered by the teacher is clearly heard by students and the tools are placed in a good position so that each student can see clearly during the practical activity.
4. Establishing a plan for assessing student progress.

2.5 Implementation of Laboratory Management

Good laboratory management must be complemented by effective execution. The laboratory administration system serves a significant role in management, including the management of stock cards for lab equipment and supplies, loan cards, procurement cards for lab equipment and supplies, and repair cards (Adriani, 2021). When it comes to the storage of materials in the laboratory, there are occasionally schools that have not divided chemicals/labs according to their kind and/or intended purpose, such as mixing liquid and solid chemicals. The implementation of practicum in schools is often effective due to the group-based nature of the implementation and the requirement that all school personnel be committed to achieving the implementation of good laboratory management (Adriani, 2021). The activities that must be done in the implementation of biological laboratory, according to Decaprio, 2017 and (Sekarwinahyu et al., 2019), are in the following.

The laboratory coordinator or laboratory assistant arranges a schedule for biology laboratory activities at the beginning of each semester to avoid collisions in using the laboratory.

1. Laboratory assistants prepare tools and materials used for practical activities according to the request of the biology teacher.

2. Before experiments and research are carried out, the biology teacher must always provide direction to students on the use of practical tools and materials.
3. The teacher checks the tools and materials that have been used, then put them back in their original place and the laboratory must be left clean.

2.6 Framework

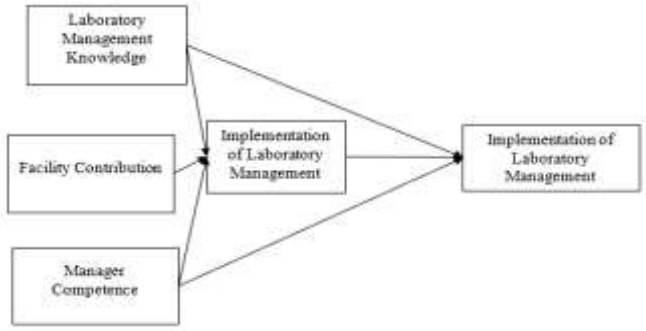

Figure 1. *Framework*

III. Research Methods

This research falls under quantitative descriptive research. According to Sugiyono, (2017), research procedures are essentially scientific features used to collect data for certain purposes. Methodology utilized in quantitative approaches. According to Sarstedt, Hair, et al., (2020), descriptive research is research that use observations, interviews, or questionnaires to describe the current state of the topic under study. We collect data through surveys and other means to test for hypotension or answer a query. Through this descriptive research, the researcher will describe what actually transpired with regard to the present phenomenon under investigation.

This research was conducted at SMPN 4 Malang. The sampling technique in this study was random sampling which was carried out on students in grades 1,2,3, so that in this study the sample of this study was 100 students of SMPN 4 Malang.

This study employed Partial Least Squares as its data analysis method (PLS). PLS is a Structural Equation Modelling (SEM) equation model employing a variance- or component-based structural equation modelling methodology. The objective of PLS-SEM, according to Sarstedt et al., (2020), is to establish or construct a theory (prediction orientation). PLS is utilized to explain whether or not latent variables are related (prediction). PLS is a potent analytical technique since it does not presume current data with a certain scale measurement, the sample size is modest, and the number of samples is low (Hair & Brunsveld, 2019).

IV. Discussion

4.1 Outer Model Analysis

a. Validity Test

Validity test is used to measure the validity or validity of a questionnaire. In this study, assessment for validity is conducted utilizing convergent validity and AVE. Using convergent validity, the measurement model with indicator reflections is evaluated based on the PLS-calculated correlation between item scores and component scores. Individual reflection size is deemed to be large if its correlation with the observed structure exceeds 0.70. However, according to Dahri, (2017), for research in the early phases of building a measuring scale, a loading value between 0.5 and 0.6 is acceptable.

Table 1. Validity Test Results

Variable		Outer Loading	AVE	Information
Laboratory Management Knowledge (X)	X1.1	0.816	0.684	Valid
	x1.2	0.831		Valid
	x1.3	0.739		Valid
	x1.4	0.875		Valid
	x1.5	0.784		Valid
	x1.6	0.906		Valid
Facility Contribution (X2)	X2.1	0.791	0.650	Valid
	X2.2	0.732		Valid
	X2.3	0.912		Valid
	X2.4	0.857		Valid
	X2.5	0.724		Valid
	X2.6	0.804		Valid
Manager Competence (X3)	X3.1	0.681	0.648	Valid
	X3.10	0.699		Valid
	X3.11	0.873		Valid
	X3.2	0.775		Valid
	X3.3	0.641		Valid
	X3.4	0.797		Valid
	X3.5	0.856		Valid
	X3.6	0.914		Valid
	X3.7	0.819		Valid
	X3.8	0.876		Valid
	X3.9	0.871		Valid
Effectiveness of LAB Utilization (Y)	Y1.1	0.782	0.630	Valid
	Y1.2	0.825		Valid
	Y1.3	0.872		Valid
	Y1.4	0.804		Valid
	Y1.5	0.673		Valid
	Y1.6	0.792		Valid
Implementation of Laboratory Management (Z)	Z1.1	0.895	0.744	Valid
	Z1.2	0.784		Valid
	Z1.3	0.834		Valid
	Z1.4	0.891		Valid
	Z1.5	0.904		Valid

b. Reliability Test

The Cronbach Alpha test and the Composite Reliability test are used in this study to assess reliability. Cronbach Alpha assesses the minimum level of dependability. The data is deemed credible if its Cronbach alpha value is greater than or equal to 0.70. Composite reliability evaluates the true value of a variable's reliability. The data is deemed to have good reliability if its composite reliability score is more than or equal to 0.7.

Table 2. Reliability Test Results

	Cronbach's Alpha	Composite Reliability
Effectiveness of LAB Utilization (Y)	0.881	0.910
Manager Competence (X3)	0.944	0.952
Facility Contribution (X2)	0.890	0.917
Implementation of Laboratory Management (Z)	0.913	0.935
Laboratory Management Knowledge (X)	0.906	0.928

The test results show that all instruments are declared reliable with a Cronbach Alpha score and Composite reliability of > 0.7.

c. Convergent Validity Test after Modification

Following is an image of the calculation results of the PLS SEM model after the indicator that did not meet the requirements for the loading factor value was removed; in the image, it can be seen that the factor loading value of the indicators in each variable is not less than 0.6; therefore, the analysis continues with the discriminant validity test.

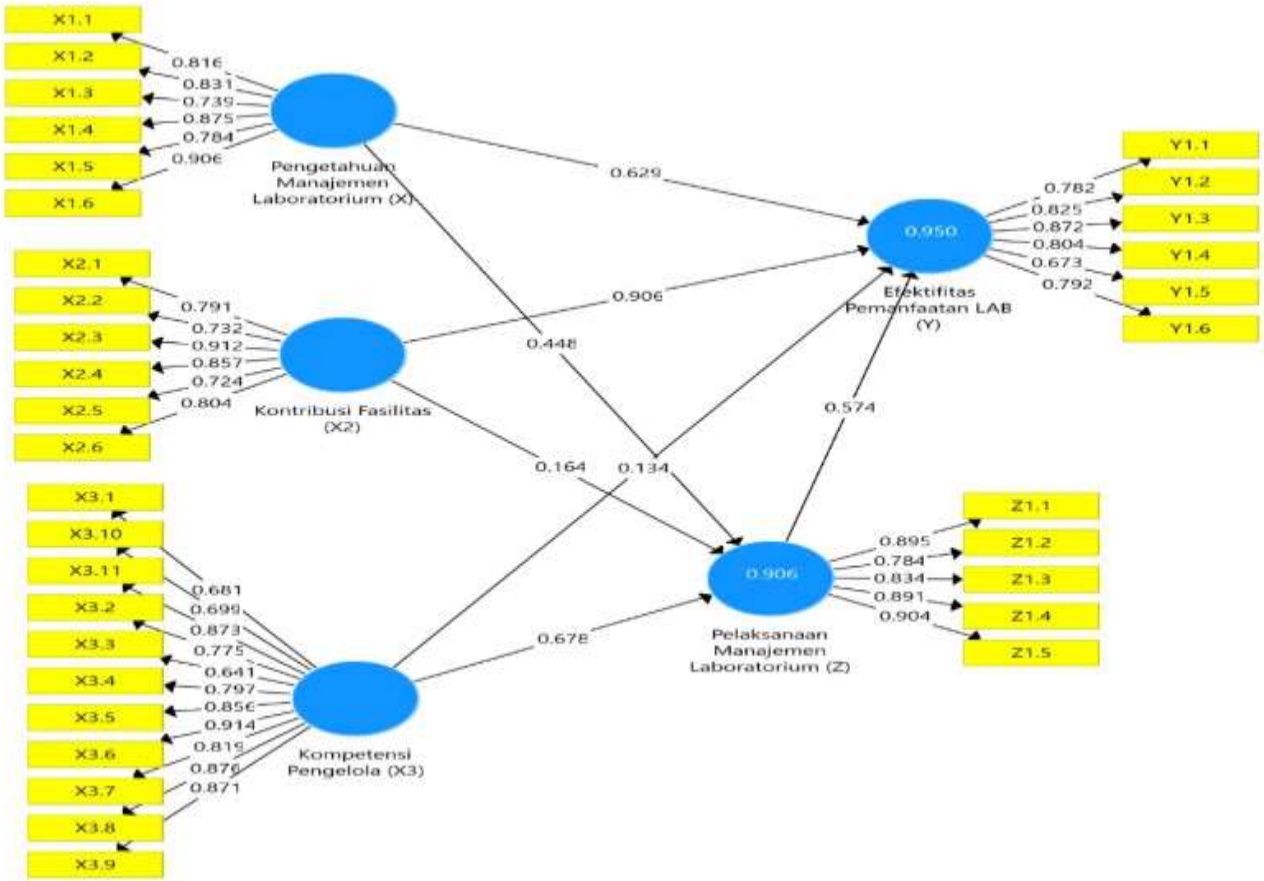

Figure 2. *Convergent Validity Test after Modification*

d. R-Square Test

The R-Square Coefficient (R-Square) test measures the extent to which the endogenous variable is impacted by other factors. The R-Square value is calculated as indicated in the following table based on data analysis performed with the smartPLS application.

Table 3. R-Square Test

	R Square	R Square Adjusted
Effectiveness of LAB Utilization (Y)	0.950	0.946
Implementation of Laboratory Management (Z)	0.906	0.901

Based on the test results, the R-Square score for the Effectiveness of Lab Utilization (Y) is 0.950, which means that the Effectiveness of Lab Utilization is influenced by Management Competence (X3), Facility Contribution (X2), Laboratory Management Implementation (Z), Laboratory Management Knowledge (X) by 95% and the other 5% is influenced by variables that have not been explained in this study.

In addition, based on the test results, obtained an R-Square score for the Implementation of Laboratory Management (Z) of 0.906 which means that the Implementation of Laboratory Management is influenced by Manager Competence (X3), Facility Contribution (X2) Laboratory Management Knowledge (X) of 90.6% and 9, The other 4% are influenced by variables that have not been explained in this study.

e. Hypothesis Test

The value of t-statistics and probability values can be used to test the hypothesis. For hypothesis testing using statistical values, compare t count and t table for alpha 5%. Therefore, the criteria for accepting or rejecting the hypothesis are: H0 is rejected if t-statistics are greater than t count. To reject/accept the hypothesis based on probability, Ha is accepted if the p value is less than 0.05.

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
Direct Influence			
Management Competence (X3) -> Effectiveness of LAB Utilization (Y)	0.134	0.946	0.345
Manager Competency (X3) -> Laboratory Management Implementation (Z)	0.678	7.090	0.000
Facility Contribution (X2) -> Effectiveness of LAB Utilization (Y)	0.906	9.385	0.000
Facility Contribution (X2) -> Laboratory Management Implementation (Z)	0.164	1,236	0.217
Implementation of Laboratory Management (Z) -> Effectiveness of LAB Utilization (Y)	0.574	5.021	0.000
Laboratory Management Knowledge (X) -> LAB Utilization Effectiveness (Y)	0.629	5.936	0.000

Laboratory Management Knowledge (X) -> Laboratory Management Implementation (Z)	0.448	4.114	0.000
Indirect Influence			
Management Competence (X3) -> Laboratory Management Implementation (Z) -> LAB Utilization Effectiveness (Y)	0.389	3.728	0.000
Facility Contribution (X2) -> Laboratory Management Implementation (Z) -> LAB Utilization Effectiveness (Y)	0.094	1.182	0.238
Laboratory Management Knowledge (X) -> Laboratory Management Implementation (Z) -> LAB Utilization Effectiveness (Y)	0.257	3.149	0.002

4.2 Discussion

a. The Effect of Laboratory Management Knowledge (X) on the Effectiveness of LAB Utilization (Y)

The results of evaluating the hypothesis that Laboratory Management Knowledge influences Laboratory Management Implementation indicate that the p-value is 0.000, which is less than 0.05. In addition, the t-statistic value of 5.936 is more than 1.660, and the beta score is 0.629. Therefore, the above explanation demonstrates that Laboratory Management Knowledge has a substantial beneficial effect on the Effectiveness of LAB Utilization. According to Kinicki and Kreitner, "organizational efficiency is an essential subject for managers, investors, government agencies, and organizational behavior specialists." Many individuals, including managers, shareholders, government agencies, and organizational behavior specialists, consider organizational effectiveness to be an essential issue. In addition, these findings suggest that enhancing laboratory management expertise will have a substantial impact on efficiency (Kreitner, Robert and Kinicki, 2010).

According to Subagia & Wiratma (2016), the laboratory is an integral component of science education, and chemistry is no exception. The laboratory serves as a vehicle for demonstrating scientific ideas that students theoretically acquire in class. In this instance, the laboratory may be viewed as an experiential learning facility that reinforces students' textbook-based theoretical knowledge. According to Hamidu, MY, Ibrahim AI, & Mohammed (2014), the utilization of laboratories in education is the key to enhancing the quality of education. The laboratory practicum promotes the attainment of science education objectives and enhances students' comprehension of scientific principles in terms of application, practical competence, and problem-solving skills.

b. The Effect of Laboratory Management Knowledge (X) on the Implementation of Laboratory Management (Z)

The results of testing the hypothesis that there is an influence between Laboratory Management Knowledge on Laboratory Management Implementation, it is shown that the p-value is 0.000, which is smaller than 0.05. And the t-statistic value is 4.114, which is greater than 1.660 and the beta score is 0.448. So from the explanation above, it will show that Laboratory Management Knowledge has a significant positive influence on the Implementation of Laboratory Management.Situmorang et al., 2015Laboratory management (Laboratory management) is an attempt to manage a laboratory based on the concept of standard management. Good laboratory management depends on several interrelated factors. Some sophisticated laboratory equipment with professional and skilled staff does not necessarily operate properly. Therefore, laboratory management is a part that cannot be separated from daily laboratory activities or activities. This activity is usually related to organizational objectives and is aimed at achieving a certain result such as shared knowledge, increased performance, competitive advantage, or a higher level of innovation together for effectiveness.

c. The Effect of Facility Contribution (X2) on the Effectiveness of LAB Utilization (Y)

The results of evaluating the hypothesis that there is a relationship between the Contribution of Facilities and the Implementation of Laboratory Management indicate that the p-value is less than 0.05, indicating that the hypothesis is not supported. In addition, the t-statistic value is 9,385, which is more than 1,660, and the beta score is 0.9006. The above explanation demonstrates that the Facility Contribution has a considerable beneficial influence on LAB Utilization Effectiveness.

This study's findings are consistent with prior studies. According to Mahiruddin (2008), the facilities and managerial skills have a substantial impact on the administration of the scientific laboratory. In addition, according to Gorodilova et al. (2018) found that learning facility satisfaction may be predicted. Students will be more satisfied with colleges with comprehensive learning facilities than with institutions with insufficient amenities. Similarly, research done by Manzoor et al. (2017) demonstrate that the learning facilities supplied to students will have a substantial influence on their happiness in higher education.

d. The Effect of Facility Contribution (X2) on the Implementation of Laboratory Management (Z)

The results of testing the hypothesis that there is a relationship between the Contribution of Facilities and the Implementation of Laboratory Management indicate that the p-value is larger than 0.05, indicating that there is an impact. In addition, the t-statistics value of 1.236 is less than 1.660, and the beta score is 0.164. Consequently, the preceding explanation demonstrates that the Facility Contribution has no substantial beneficial influence on the Implementation of Laboratory Management. This is appropriate given that complete and suitable facilities might impact laboratory management implementation. Facilities are the necessary equipment and infrastructure for carrying out an activity. Laboratories are one of the educational facilities that facilitate the execution of the learning process in schools, particularly those connected to practical activities. This contradicts the findings of research conducted by Khorasani et al. (2014), which indicated that kids were content with the facilities given by the school so that effective learning could occur.

e. The Effect of Management Competence (X3) on Effectiveness of LAB Utilization (Y)

The results of testing the hypothesis that there is a relationship between Management Competence and LAB Utilization indicate that the p-value is larger than 0.05, indicating that

the hypothesis is not supported. In addition, the t-statistic value of 0.946 is less than 1.660, and the beta score is 0.134. Consequently, the above explanation demonstrates that Management Competence has no substantial beneficial influence on the Effectiveness of LAB Utilization.

The existence of a strong relationship between the competence of managers and the efficacy of laboratory learning suggests that a competent management of a scientific laboratory can enhance the effectiveness of laboratory learning. According to (Dole et al., 2003), personal competency (skills) is extremely vital for management performance. Consequently, all management components participating in the organizational structure of the scientific laboratory must possess professional knowledge, abilities, and attitudes, comprehend their roles and obligations, and be able to apply them in practice while managing science laboratory operations.

f. The Effect of Manager Competency (X3) on Laboratory Management Implementation (Z)

The results of evaluating the hypothesis that there is a relationship between manager competency and laboratory management implementation indicate that the p-value is less than 0.05, or 0.000. In addition, the t-statistic value of 7,090 is more than 1,660, and the beta score is 0.678%. The above explanation demonstrates that Management Competence has a substantial beneficial effect on the Implementation of Laboratory Management. The application of laboratory management will be enhanced by the teacher's management proficiency. This is consistent with the findings of conducted by Bonnet et al. (2014), which also support effective laboratory management. Management of micro-based labs (MBLs) and virtual laboratories that aid students with laboratory work, followed by remote laboratories, databases, and more technologies. This demonstrates that effective laboratory administration may enhance scientific education in the laboratory.

g. The Effect of Implementation of Laboratory Management (Z) on Effectiveness of LAB Utilization (Y)

The results of evaluating the hypothesis that there is a relationship between the Implementation of Laboratory Management and the Effectiveness of LAB Utilization indicate that the p-value is less than 0.05, indicating that the hypothesis is not supported. In addition, the t-statistic value of 5,021, which is larger than 1,660, and the beta score of 0.574 are both greater than 1.660. Consequently, the above explanation demonstrates that the Implementation of Laboratory Management has a substantial beneficial impact on the Effectiveness of LAB Utilization. The more efficient laboratory utilization is, the better the laboratory management. Other than that, learning equipment also plays a crucial role in assisting instructors and students with the classroom teaching and learning process, particularly in laboratories and workshops.

h. The Effect of Laboratory Management Knowledge (X) on LAB Utilization Effectiveness (Y) Mediated by Laboratory Management Implementation (Z)

The p-value for evaluating the hypothesis that there is a relationship between Laboratory Management Knowledge mediated by Laboratory Management Implementation and LAB Utilization Effectiveness is 0.002, which is less than 0.05. And the value of the t-statistic is 3,149, which is more than 1,660, and the beta score is 0.257. Therefore, the preceding explanation demonstrates that the knowledge of laboratory management, as mediated by the execution of laboratory management, has a considerable beneficial impact on the efficiency of LAB usage. The more successful the laboratory administration in schools, the more efficient the laboratory's usage, and the more the implementation of laboratory

management is supported by laboratory management implementation mediation. According to Luketic & Dolan (2013), the use of scientific laboratories in the twenty-first century has been hailed as an effective student coaching strategy for enhancing student attitudes about science and fostering a greater interest in science development and engagement. Good management must support the utilization of scientific laboratories since the objective of science education is to enhance topic knowledge via many sorts of work.

i. The Effect of Facility Contribution (X2) on LAB Utilization Effectiveness (Y) Mediated by Laboratory Management Implementation (Z)

The p-value for the relationship between the Contribution of Facilities mediated by Laboratory Management Implementation and the Effectiveness of LAB Utilization is 0.238, which is larger than 0.05, according to the findings of hypothesis testing. In addition, the t-statistic value of 1.182 is less than 1.660, and the beta score is 0.094. Consequently, the preceding explanation demonstrates that the contribution of facilities mediated by the application of laboratory administration has no appreciable beneficial impact on the efficiency of LAB usage. The notion that the contribution of the facilities is proportional to the efficiency of laboratory usage cannot be refuted by the application of laboratory management. This is pretty logical given that complete and sufficient facilities might impact the efficacy of education. Facilities are infrastructural types required to carry out an activity. The Science Laboratory is one of the educational facilities that supports the application of the learning process in schools, particularly those connected to practical activities. This study's findings are consistent with research conducted by Olufunke (2012), which demonstrates that there are considerable disparities in physics learning success across federal, public, and private pupils. These results imply that the availability and utilization of physics facilities have an influence on physics achievement. Khorasani (2014) also reported that pupils were pleased with the school's amenities, which allowed for successful learning.

j. The Effect of Management Competence (X3) on LAB Utilization Effectiveness (Y) Mediated by Laboratory Management Implementation (Z)

The p-value is 0.000, which is less than 0.05, indicating that there is an impact between Manager Competencies mediated via Laboratory Management Implementation and the Effectiveness of LAB Utilization. And the value of the t-statistic is 3,728 which is more than 1,660, and the beta score is 0.389. The above explanation demonstrates that the Competency of Managers, as mediated through the application of laboratory management, has a substantial beneficial impact on the efficiency of LAB use. This is also reinforced by the mediation of factors in the implementation of laboratory management, which is proportional to the manager's level of competence. This study's findings are consistent with research of Peniati et al. (2013), who concluded that a teacher-candidate must have laboratory management skills. When these individuals become instructors, they will be able to instruct pupils in the application of scientific techniques. Due to the intimate relationship between learning and scientific activity, it is crucial for students to be able to manage laboratories as future educators.

V. Conclusion

On the basis of the study and discussion conducted, it can be stated that Laboratory Management Knowledge has a considerable beneficial impact on LAB Utilization Efficiency. Laboratory Management knowledge has a substantial favorable influence on laboratory management implementation. The contribution of facilities has a substantial favorable impact on the efficacy of LAB usage. The contribution of the facility to the Implementation of

Laboratory Management has no substantial beneficial effect. Management Competence does not have a substantial beneficial influence on LAB Utilization Efficiency. Management Competencies have a substantial favorable influence on Laboratory Management Implementation. Implementing laboratory management has a substantial beneficial impact on the efficiency of LAB use. Knowledge of laboratory management, as mediated through laboratory management implementation, has a considerable favorable influence on the efficiency of LAB usage. The contribution of facilities mediated by the application of laboratory management has no appreciable impact on the efficiency of LAB usage. The application of laboratory management has a considerable favorable influence on the efficiency of LAB use through the mediation of manager competence. The Effectiveness of Lab Utilization (Y) has an R-Square score of 0.950, indicating that it is impacted by Management Competence (X3), Facility Contribution (X2), Laboratory Management Implementation (Z), and Laboratory Management Knowledge (X) by 95%. The R-Square value for Laboratory Management Implementation (Z) is 0.906, indicating that the Implementation of Laboratory Management is impacted by the Competence of Managers (X3), the Contribution of Facilities (X2), and the Knowledge of Laboratory Management (X) to the extent of 90.6%. It is desired that school laboratory assistants can enhance their skills and facilities so that laboratory operations may be carried out more efficiently.

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