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Optimizing Marine Engineering Education: A Quality-Oriented Learning Management Model for Ship Machinery at Politeknik Ilmu Pelayaran Semarang

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ABSTRACT

This study aims to analyze the factors that influence the quality of graduates of the Politeknik Ilmu Pelayaran Semarang, with 224 respondent data, measuring four main variables, namely learning models, higher education quality, learning quality, and graduate quality. Data analysis was carried out using the SEM-PLS method to test the relationship between variables and their influence on the quality of graduates.

The results of the study showed that the composite reliability evaluation: learning model 0,952; college quality 0,946; learning quality (lecturer qualifications, industry involvement) 0,966; had a significant influence on the quality of graduates 0,972; because the value was> 0,700 (Nugrahanti et al., 2024). The concurrent validity value exceeds 0,49; the discriminant validity has a correlation value < 1, the results of the collinearity evaluation: the Variance Inflation Factor value is less than 10, so the results of the investigation do not have a collinearity problem.

Conclusion: learning models, college quality, learning quality, and shipping company involvement have a significant effect on the quality of graduates. Suggestion: to develop creative and innovative learning models, learning facilities should follow technological developments, improve lecturer qualifications, collaborate with shipping companies, and develop soft skills, which will enhance the quality of graduates.

1. Introduction.

With the increasing development of information technology today, the approach with online learning methods or e-learning has become one of the important innovations in implementing the educational learning process for maritime cadets who are taking maritime education (Bogusławski et al., 2022). Online learning among maritime cadets is not only a place for learning but also a new gateway to gain in-depth knowledge and continuous skill development (Wai, 2021). Cadets can take advantage of complete online digital facilities with the learning materials they are currently undergoing, ranging from teaching materials, and learning videos, to online discussions with fellow cadets and lecturers (Gamage et al., 2020). This allows each cadet to gain easy access to in-depth insights into the technical and managerial aspects of the shipping industry (Tabora, 2023). More than just taking online classes, the cadet-oriented e-learning approach for maritime cadets encourages active participation in discussions and exchange of ideas with lecturers and classmates (Sukomardojo, 2022). PIP Semarang has determined the applications or platforms used so that cadets do not download and try too many applications or platforms. This period can be an initial step for universities when compiling E-learning in the implementation of Blended Learning to realize Education 4.0 in the Industrial Revolution 4.0 era (Wai, 2021).

E-learning can be done online or offline (Hillier, 2020). In

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online learning, educators and students are in the same application or internet platform and can interact with each other like conventional learning that has been carried out so far, which is usually done with Zoom meetings, and Google Classroom (Pratama et al., 2020). In offline learning, educators upload materials via the web, send them via electronic mail (e-mail), or upload them via the E-learning portal media so that they can be accessed by students (Sarker et al., 2019). Offline, students learn independently without being bound by time and place (Dakhi et al., 2020). E-learning activities have long been carried out by several universities (Ebner et al., 2020), but this learning method is a form of awareness of the Industrial Revolution 4.0 era, an era that brings changes to the way humans work, interact, and transact (Taufik, 2020). From an educational perspective, the general term used by educational theorists as an implication of the Industrial Revolution 4.0 is Education 4.0, to describe various ways of integrating technology in the Industrial Revolution 4.0 era both physically and non-physically into learning (Oke & Fernandes, 2020). Education 4.0 can be seen as a creative response, namely humans utilizing digital technology, open source content, and global classrooms in organizing lifelong learning, flexible education systems, and personalized learning, to play a better role in society (Idris et al., 2021). By adopting blended learning, cadets will be familiar with the use of digital technology and online learning tools, which are skills that are in great demand in today's workforce (Yu et al., 2023).

The quality of marine engineering graduates is a crucial factor that determines the quality and competitiveness of graduates in the global job market, especially in the shipping sector. In facing the increasingly complex and dynamic demands of the maritime industry, the integration of blended learning innovations is the main key to improving the quality of graduates in maritime universities (Prahani et al., 2020). By implementing blended learning methods, maritime universities can combine online and face-to-face learning experiences, which synergistically improve theoretical understanding and practical applications in the field of marine engineering (Nofandi et al., 2020). Through an interactive online learning platform, cadets are given access to various learning resources, ranging from interactive learning modules to realistic simulations of technical situations and problems in the shipping world. The main advantage of blended learning innovations is its ability to produce graduates who have a deep understanding of the theory and practice of marine engineering (Hadgraft & Kolmos, 2020). The learning model applied in marine engineering universities plays a critical role in determining the quality of education provided to cadets (Tripolca, 2023). By combining online and face-to-face learning, the maritime engineering college is expected to be able to create a dynamic and adaptive learning environment, so that it can improve the quality of education provided to its cadets (Demirel, 2020).

The Politeknik Ilmu Pelayaran (PIP) Semarang has used the Standard Operating Procedure from ISO 9001-2015 from PT Sucofindo and all Formation Training, Ability Improvement Training, and Special Skills Training have received Approval from the Directorate General of Sea Transportation, and Institutional Accreditation and Engineering Study Program Accreditation have received an "A" grade so that they are encouraged to research, find out and develop the distance learning process (E-learning) what the process is like, how is the service, quality, and management of distance learning (Blended learning/E-learning) in educational institutions. From the results of observations during attending several research Webinars on the development of the E-learning learning model, there are still many unsatisfactory questions related to the management of practical learning, the trust of teaching staff who are less sure about the learning achievements given to their students, seen from the quality of the results of practical work. Moreover, if the college is a Vocational college (Polytechnic), where the learning material is 60 to 70% practical learning and 30 to 40% theoretical learning. This is a big challenge for the leaders of Vocational colleges.

2. Literature Review and Framework.

2.1. Learning Model.

The learning model is a series of principles that describe the process and stages that students must go through to gain a deep understanding of the subject matter being studied (Hattie & Donoghue, 2016). The learning model emphasizes the development of a systematic and structured learning plan (Granić & Marangunić, 2019). This model highlights the importance of learning through direct experience and deep reflection. Technology - based learning models, such as e-learning and blended learning, have experienced rapid development, allowing students to access learning resources online and develop the digital skills needed in the digital era (Dakhi et al., 2020). Through this model, cadets can learn independently and gain access to a variety of interactive and engaging learning materials (Yu et al., 2023). Learning models play a central role in creating stimulating, relevant, and adaptive learning environments, enabling learners to acquire the knowledge, skills, and understanding needed to face the challenges of an ever-evolving world (Shen, 2023). By utilizing blended learning applications, educational institutions can create responsive and relevant learning environments, while giving students the freedom to control their own pace and style of learning (Yu et al., 2023).

2.2. Collage Quality.

Maritime colleges are educational institutions responsible for producing reliable graduates in the world of shipping. As an institution that plays an important role in producing quality sailors, the quality of education provided by maritime colleges is a very crucial factor in producing graduates who can compete in the global arena. Education experts have different views on the definition of university quality, but in general, they agree that university quality includes various interrelated dimensions. The quality of maritime colleges is also reflected in competent and experienced teaching staff. Lecturers who teach at maritime colleges generally come from maritime industry backgrounds and have direct experience in ship operations (de Geus-Moussault et al., 2022). They emphasize the need for

curriculum development that is relevant to the needs of industry and society, efficient management, sustainable finance, and adequate infrastructure (Mian et al., 2020). This contributes to improving the quality of education delivered to cadets, thus producing graduates who are ready to work and highly competitive in the maritime industry (Demirel, 2020). Maritime universities emphasize the importance of implementing high safety and security standards in ship operations and other maritime activities (Qiao et al., 2021). Effective governance supports the development of strong partnerships between maritime universities and the maritime industry (Nawaz & Koç, 2020). This partnership helps ensure that maritime college graduates have skills that match the current demands of the maritime industry. Effective governance in maritime colleges plays a vital role in improving the quality of education, maritime safety, industry engagement, and innovative research (Bolton et al., 2020).

2.3. Learning Quality.

Learning quality includes improving cadets' academic achievement, the effectiveness of lecturers' teaching, and a comprehensive evaluation process to measure cadets' progress (Constantinou & Wijnen-Meijer, 2022). Learning quality includes student-centered teaching, integrated formative assessment, and an inclusive and welcoming learning environment for students from diverse backgrounds and abilities (Wassef & Elkhamisy, 2020). Learning quality is closely related to the achievement of set learning outcomes, as well as student satisfaction and personal development (Hew et al., 2020). Learning quality includes aspects of students' cognitive, social, and emotional development, as well as learning experiences that are challenging and relevant to students' real-world needs (Darling-Hammond, 2021). Safety and security are the main priorities in carrying out work on board a ship (Ricardianto et al., 2021). Good quality learning ensures that graduates from maritime colleges have in-depth knowledge and skills in safety and security procedures on board ships (Manuel, 2017), so that they can manage risks effectively and reduce the likelihood of accidents or dangerous incidents (Gnoni & Saleh, 2017). The quality of learning is not only related to excellence in teaching and research but also involves various other aspects, including facilities, academic environment, and relevance of the curriculum to job market needs (Henard, 2010). Politeknik Ilmu Pelayaran Semarang has been an excellent educational institution in preparing skilled and qualified workers in the maritime sector. With a focus on the development of maritime technology and improving the competence of cadets, it has succeeded in creating an effective and attractive learning environment for engineering cadets. The modern facilities owned by the institution are one of the keys to success in preparing cadets to face the challenges of the shipping industry. Facilities in the form of the latest ship engine simulators, a complete maritime technology laboratory, and a library rich in maritime literature allow cadets to gain in-depth and practical learning experiences. By using these facilities, cadets can develop practical skills needed in the real world before they enter the workforce. Politeknik Ilmu Pelayaran Semarang also has qualified and experienced lecturers in the field of shipping. The qualifications of the lecturers are not only to master theories related to shipping techniques but also to have direct experience in ship operations (Fox, 1983). With this extensive experience, the lecturers can provide practical insights and case studies that are relevant to the needs of the current maritime industry (James et al., 2014), so that cadets will be able to develop a deep and applicable understanding.

2.4. Graduate Quality.

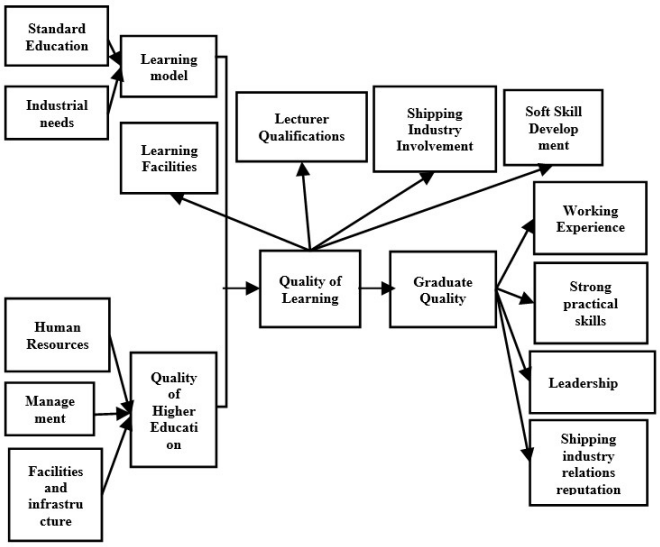
Graduates are expected to have strong professional competencies, including a deep understanding of theoretical concepts, practical skills, and the ability to apply this knowledge in the work environment (Holdsworth et al., 2019). Graduate quality involves assessing the extent to which graduates have the skills, knowledge, and other attributes that are relevant to the needs of a particular industry or job sector (Clarke, 2017). In this study, the quality of graduates of cadets in the marine machinery engineering department is defined as academic ability, practical skills, and professional characteristics. Graduates are expected to have in-depth knowledge in the field of marine machinery engineering, practical skills to operate and maintain ship engines, critical thinking and problem-solving skills, and good collaboration and communication skills. In addition, professional ethics, responsibility, independent learning skills, and adaptation to technology and innovation are also important aspects in determining the quality of graduates. Continuous evaluation is needed to ensure that the curriculum and teaching methods can produce graduates who are ready to face challenges in the maritime work environment and can make a positive contribution to the marine machinery industry.

3. Research Method.

In this study, the type of research used is "explanatory research", namely research that seeks to produce new knowledge by using a causality testing approach, as well as information exploration (Hall, 2020). The method in this study explains a new concept that is tested with other variables in the model to be studied. The subject of this research is to examine how the role of maritime universities in this case is Politeknik Ilmu Pelayaran Semarang in realizing superior quality graduates who can compete in an increasingly competitive world of work. Superior quality graduates can be obtained with the availability of adequate learning quality supported by a comprehensive learning model that is adjusted to industry needs and an emphasis on more practical courses than theory as well as the quality and reputation of the university itself techniques for collecting data in using, questionnaires via Google Forms, and tests. Population is defined as a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then conclusions drawn (Handayani, 2020).

The population that is the object of this study is cadets in semesters 7 and 8 and alumni of the Politeknik Ilmu Pelayaran Semarang of Engineering Department's cadets who graduated in 2022 and 2023 as many as 224 respondents. From the results of the sample calculation from the Krejcie and Morgan

Figure 1: Research Framework.



Source: Authors.

formula for a population of 500, the sample needed is 217,473, rounded up to 218 people. In this study, the sample was aimed at engineering students who were still active in semesters 7 and 8 as well as graduates who graduated in 2022 and 2023 who had experienced online learning methods. Data analysis used in this study uses the Structure Equal Modeling Partial Least Square (SEM-PLS) technique with the SmartPLS 4 analysis tool. The use of SEM-PLS is to test the predictive relationship between each construct, in terms of correlation and influence. This technique is a powerful method in testing theories even with small samples and data that is not normally distributed (Ghozali, 2017).

4. Research Result.

Reliability evaluation is an analysis of internal consistency, namely an assessment of the consistency of an investigation instrument or questionnaire tool in the same test (Adamson & Prion, 2013; Cheung et al., 2023). Internal consistency evaluation uses composite reliability values and Cronbach's alpha values, with the criteria that a variable is said to be reliable if the composite reliability value is > 0.700 (Haji-Othman & Yusuff, 2022; Nugrahanti et al., 2024).

The learning model variable (X1) has a composite reliability value of 0,952> 0,600; indicating that the variable is reliable. The university quality variable (X2) has an internal consistency value (composite) of 0,946> 0,600; indicating that the variable is reliable. The learning quality (Y1) has an internal consistency value (composite) of 0,966> 0,600; indicating that the variable Y1 is reliable. Finally, the graduate quality variable (Y2) has an internal consistency value (composite) of 0,972> 0,600; indicating the variable Y2 is reliable. These findings are based on the internal consistency analysis data in the above table.

Table 1: Internal Consistency Analysis.

Variable	*Alpha Cronbach's*	*Composite Reliability*	*Average Variance Extract*
Learning model (X1)	0,951	0,952	0,953
College quality (X2)	0,946	0,946	0,092
Learning quality (Y1)	0,966	0,966	0,907
Graduate quality (Y2)	0,972	0,972	0,923

Source: Output Analysis SmartPLS4 (2024).

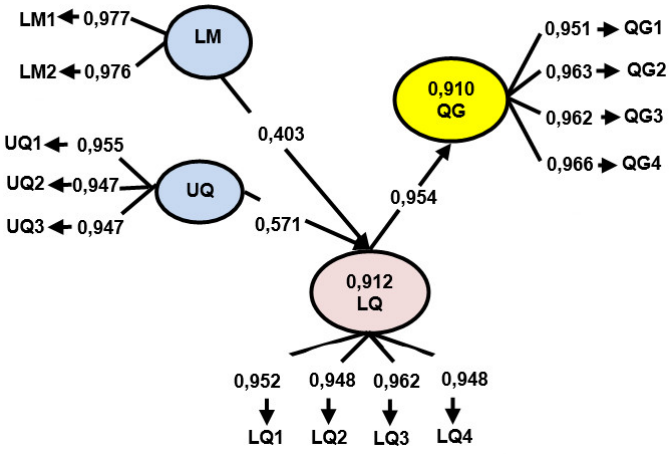
4.1. Structural Model Evaluation (inner Model).

The evaluation of the structural model or inner model analysis is carried out to examine the investigation hypothesis. The aspect that needs to be analyzed in the structural model is the coefficient of determination (R Square) with hypothesis testing (Hair Jr. et al., 2021).

4.2. Examination of the Significance of the Structural Model Path Coefficient.

In examining the analysis results, there are two phases, namely examining the direct influence hypothesis and examining the indirect influence hypothesis. The path coefficients of the hypothesis examination in the investigation are illustrated in the figure below:

Figure 2: Hypothesis Examination.



Source: Output Analysis Data SmartPLS4 (2024).

Examination of the significance of the path coefficient of the structural model of the results of this investigation is to determine the path coefficient of the structural model, this is to check the significance of all relationships or check the hypothesis (Hair Jr. et al., 2021).

The goal of the direct impact hypothesis analysis is to present data supporting the theories on the direct or indirect effects of

one variable on another (Ghozali, 2017). A positive value for the path coefficient suggests that an increase in one variable will be followed by an increase in the value of another. A negative path coefficient value suggests that a rise in one variable is followed by a fall in the value of another. (Hair Jr. et al., 2021; Haji-Othman & Yusuff, 2022; Mustafa & Wijaya, 2012). The null hypothesis is rejected (the influence of one variable on another is significant) if the significant value (p-value) is Alpha (0,05) (Mustafa & Wijaya, 2012).

Table 2: Direct Impact Hypothesis.

Correlation among variables	*Original sample (O)*	*Sample mean (M)*	*Standard deviation (STDEV)*	*T statistics (O/STDEV)*	*P values*
LM -> LQ	0,403	0,394	0,076	5,323	0.000
UQ -> LQ	0,571	0,577	0,075	7,592	0,000
LQ -> QG	0,954	0,950	0,018	52,997	0.006

Source: Output Analysis SmartPLS4 (2024).

The direct impact of the Learning Model variable (Learning Model 'LM') on the Learning quality variable will rise in response to an increase in the value of the learning model variable since the quality variable has a path coefficient of 0.403 (positive). It is determined that the learning model (LM) significantly and directly affects learning quality (LQ) based on the p-value of 0,000 <0,05 for the influence of the learning model variable on learning quality. The direct impact of the Institutional Quality variable (UQ) on the Learning Quality variable (LQ) has a path coefficient of 0,571 (positive), therefore an increase in the value of the Institutional quality is followed by an increase in the learning quality variable. The influence of the Institutional quality variable on the quality of learning has a p-value of 0,000 <0,05; therefore it is explained that the direct influence of Institutional quality (UQ) on the Learning Quality (LQ) is significant. An increase in the value of Learning Quality is accompanied by an increase in the Quality of Graduates (QG), as the direct impact of the Learning Quality (LQ) variable on the Quality of Graduates (QG) variable has a path coefficient of 0,954 (positive). The impact of the learning quality variable on the quality of graduates (QG) has a p-value of 0,000 <0,05; therefore it is said that the direct impact of Learning Quality on the quality of graduates (QG) is significant.

Examination of the indirect impact of exogenous variables on endogenous variables is presented in the Table 3.

Table 3: Direct Impact Hypothesis.

	Original sample (O)	*Sample mean (M)*	*Standard deviation (STDEV)*	*T statistics (O/STDEV)*	*P values*
LM -> LQ -> QG	0.384	0.375	0.072	5.307	0.000
UQ -> LQ -> QG	0.544	0.548	0.073	7.441	0.000

Source: Output Analysis SmartPLS4 (2024).

The indirect influence hypothesis is examined to support the theories on how one variable may affect other variables through intermediary variables (indirect). The intervening variable mediates the relationship between one variable and another if the value of the indirect effect coefficient is greater than the value of the direct impact coefficient. On the other hand, the intervening variable does not mediate the relationship between one variable and another if the value of the indirect effect coefficient is less than the direct impact coefficient (Miles et al., 2014). The results of this study indicate that the quality of learning (LQ) mediates the relationship between learning models (Learning Model) as evidenced by a significant value (p-value) of 0,000 < 0,05. However, on the other hand, the quality of learning mediates the effect of the quality of the Institution on the quality of graduates (Quality of Graduates QG) as evidenced by a significant (p-value) of 0,000 < 0,05.

4.3. Direct Influence of Learning Model (LM) on Learning Quality (LQ).

The results of this study indicate that the learning model has a significant influence on the quality of learning at Politeknik Ilmu Pelayaran Semarang (p-value 0,000 < 0,05). There are several reasons why the learning model can have a significant influence on the quality of learning is learning model determines the teaching method used in the learning process. A good method can improve student understanding and optimize the learning process (Mustafa & Wijaya, 2012). An effective learning model encourages active student involvement in learning, which can improve understanding and retention of the material. Each learning model is suitable for certain learning situations. For example, collaborative learning may be more effective in teaching social skills and teamwork, while project-based learning may be more suitable for developing practical skills. Some learning models utilize technology to increase the interactivity and accessibility of learning. The use of appropriate technology can increase the efficiency and effectiveness of learning. Learning models that pay attention to variations in student learning styles can be more effective in reaching different types of students. A good learning model provides a mechanism to evaluate student understanding and provide constructive feedback so that students can improve their understanding. The combination of these and other factors makes the learning model have a significant influence on the quality of learning.

4.4. The direct influence of academic (AQ) has a direct influence on Learning Quality (LQ).

The results of this study indicate that the quality of the institution has a significant effect on the quality of learning (p-value 0.000 <0,05). Some of the reasons that the quality of the institution can have a significant effect on the quality of learning are due to the following reasons:

Quality institutions tend to have high-quality lecturers and teachers, both in terms of academic expertise and practical experience. Quality teaching staff can provide deeper and more relevant learning.

Quality institutions usually have a well-structured curriculum that is relevant to the needs of the job market or the needs

of a particular industry. A good curriculum can ensure that students gain the knowledge and skills needed to succeed in the real world.

Quality institutions tend to have adequate facilities and infrastructure to support learning, such as laboratories, libraries, sports facilities, and access to modern technology. Good infrastructure can create a conducive learning environment.

Quality institutions may implement innovative and effective learning approaches, such as problem-based learning, active learning, or hands-on learning experiences. The right learning approach can enhance the understanding and application of course material.

Quality institutions typically provide learning support services, such as academic advising, career counseling, mental health services, and financial support. This support can help students overcome barriers to learning and reach their academic potential.

Quality institutions often have strong research and development programs in a variety of disciplines. Student involvement in research activities can enhance their analytical and critical skills and provide valuable practical experience. In combination with the above factors, Institutional quality can have a significant impact on the quality of learning and the overall educational experience of students.

4.5. The Influence of Facilities Suitability Indicators in Learning Quality (LQ) Variables on Graduate Quality (GQ).

The results of this study indicate that the indicator of the adequacy of facilities in the variable of learning quality has a direct influence on the quality of engineering cadet graduates. There are several reasons why the indicator of the adequacy of facilities can have a direct influence on the quality of engineering cadet graduates are the adequacy of facilities can affect the ability of cadets to access the resources needed for effective learning. Good facilities, such as engineering laboratories equipped with modern equipment, can increase opportunities for experiments, practicums, and projects that support engineering learning. Appropriate facilities can create a comfortable and safe learning environment for cadets. Clean classrooms, well-maintained buildings, and other supporting facilities can improve concentration and focus on learning. Modern and up-to-date facilities, such as engineering simulation software, the latest laboratory equipment, or access to a digital library rich in resources, can help cadets develop engineering skills and knowledge that are relevant to industry demands. A good learning environment can give cadets a positive impression of the importance of education and learning. This can motivate them to actively participate in learning and improve the quality of their learning outcomes. Adequate facilities can support the implementation of field practices and research or industrial projects involving cadets. This hands-on experience can provide a deeper understanding of the engineering concepts learned in class and assist in the development of practical skills. The combination of these factors can cause the facility adequacy indicator to have a direct impact on the quality of engineering cadet graduates, as good facilities can support effective learning and the development of skills needed for success in an engineering career.

4.6. The Influence of Lecturer Qualification Indicators in Learning Quality Variables on the Quality of Graduates of Engineering Cadets.

The results of this study indicate that the lecturer qualification indicator in the learning quality variable has a direct effect on the quality of graduates (p-value 0,000 <0,05). The lecturer qualification indicator that has a direct effect on the quality of graduates shows that lecturer qualification plays a key role in students' learning experiences and their outcomes. Here are some reasons why lecturer qualifications can have a significant direct effect on the quality of graduates, lecturers who have strong qualifications in their fields can provide students with a deeper understanding of the subject matter. They can convey information clearly and provide relevant insights, which helps students understand complex concepts. Lecturers who have practical experience in their fields may be able to provide valuable real-world perspectives to students. They can illustrate the application of theory in an industrial context or real-world case, which can help students understand the relevance of the subject matter to their future work. Qualified lecturers are usually better able to provide academic guidance and support to students in achieving their academic goals. They can provide constructive feedback, support student projects, and facilitate discussions that encourage critical and analytical thinking (Huliatunisa et al., 2022). Qualified lecturers may be involved in research and development in their field, which can bring new knowledge and innovation into the classroom. They can introduce students to the latest trends in their discipline and engage them in research projects that can enhance their research skills. Qualified lecturers can be role models for their students. They can inspire students to pursue academic and professional excellence and encourage them to engage in career development and community service. Strong lecturer qualifications not only impact the student's learning experience but can also have a direct impact on student's ability to achieve high academic outcomes and develop the skills necessary for success in their careers after graduation.

4.7. The Influence of Industry Involvement on Graduate Quality.

The results of this study indicate that industry involvement in the quality of Learning has a significant influence on the quality of Engineering cadet graduates (p-value 0,000 < 0,05). Industry involvement in the quality of learning can have a significant influence on the quality of engineering cadet graduates for the following reasons, Industry involvement allows Institutions to integrate industry needs and demands directly into the learning curriculum. This can ensure that the learning materials and skills taught are in line with job market demands and industry needs, thus preparing graduates with relevant and necessary skills. Through industry involvement, cadets can access valuable practical experiences, such as internships, field projects, or

industry visits. These experiences help them to apply the theoretical knowledge learned in class to real-world contexts, improve their understanding of engineering concepts, and develop practical skills needed in their careers. Industry involvement can provide cadets with access to industry resources and facilities that may not be available in the Institution's environment. For example, they can use the latest equipment and technology, attend industry seminars and workshops, or collaborate with industry professionals on research projects. Through industry engagement, cadets can have access to experienced industry mentors and coaches. These mentors can provide valuable guidance, feedback, and advice to cadets in the development of their technical and professional skills. Industry engagement can open doors for cadets to network and network with professionals and companies in their industry. This can enhance their career opportunities after graduation, such as job placements, career development programs, or the opportunity to start their own business. Thus, industry engagement not only enhances the quality of learning by enriching the cadets' learning experience but also provides direct benefits in shaping the quality of engineering cadet graduates by preparing them for success in a competitive and dynamic job market.

4.8. The Influence of Soft Skill Development Feasibility Indirectly through Learning Quality on the Quality of Politeknik Ilmu Pelayaran Semarang Graduates.

The results of this study indicate that learning quality acts as a variable that mediates the relationship between soft skill development indicators in the learning model variable and the quality of Politeknik Ilmu Pelayaran Semarang engineering cadet graduates (p-value 0,000 < 0,05). The results of the study indicating that learning quality acts as a mediating variable between soft skill development and the quality of engineering cadet graduates may be due to the following reasons, Soft skills such as communication skills, leadership, teamwork, and interpersonal skills can influence how students engage in the learning process. Students who have strong soft skills may be more active, more involved, and more effective in utilizing learning experiences, thereby improving the overall quality of learning. Good learning quality includes factors such as effective teaching methods, high student engagement, and constructive feedback. With increased learning quality, students have a better chance of understanding the subject matter better and developing the technical and conceptual skills needed in engineering majors. A good learning experience can provide opportunities for students to develop their soft skills. For example, collaborative projects, class discussions, or presentations can help students improve their communication, teamwork, and leadership skills, which in turn can contribute to the quality of their graduates. High-quality learning can prepare graduates with relevant and necessary skills and knowledge in the ever-evolving workforce. This can include a deep understanding of technical concepts, practical skills, and the ability to adapt to changing technologies and industry demands. Thus, learning quality acts as a mediating variable because it links the development of soft skills to the quality of engineering cadet graduates through an effective and quality learning process. Soft skills affect how students engage in learning while learning quality plays a significant role in providing an environment that supports the development of skills and knowledge necessary for success in the real world.

Conclusions.

The results of this study reveal several important findings regarding the factors that influence the quality of graduates of the Politeknik Ilmu Pelayaran Semarang. The learning model is proven to have a significant direct influence on the quality of learning, emphasizing the importance of effective teaching methods. The quality of the Politeknik Ilmu Pelayaran Semarang institution and the adequacy of learning facilities are also proven to have a direct influence on the quality of graduates, indicating that reputation, institutional standards, and adequate infrastructure play a crucial role. The level of lecturer qualifications and industry involvement have a significant influence on the quality of graduates, underlining the importance of teacher competence and cooperation with the industrial sector. The development of soft skills in the quality of learning has an indirect effect on the quality of graduates through the quality of learning as a mediating variable, indicating that improving soft skills must be integrated into the learning process. With all research hypotheses (H1 to H6) proven, these findings provide a strong foundation for Politeknik Ilmu Pelayaran Semarang to improve the quality of education through a holistic approach that includes academic aspects, practical skills development, adequate facilities, teacher quality, and relationships with industry. Implementation of strategies based on these findings can help Politeknik Ilmu Pelayaran Semarang produce more competent and work-ready graduates.

Suggest for Future Research.

Some approaches that can further deepen understanding of the factors influencing the quality of Politeknik Ilmu Pelayaran Semarang graduates are encouraged for further research in the future. Longitudinal studies would add insight into the long-term impacts of changes in the learning model, facilities, and industrial engagement. Comparative analysis at the national and international levels with similar institutions would also be important. Furthermore, research on the development of soft skills relevant to the maritime industry, the impact of technology integration in learning, and the role of alumni engagement is highly recommended. In addition, an in-depth evaluation of the effectiveness of various models of industry-academic cooperation, the influence of psychosocial factors such as student motivation and campus climate, and the effectiveness of assessment methods in measuring graduate competencies is needed. Further studies on the influence of changes in policies for higher education and factors influencing the readiness of graduates to compete in the international maritime job market are also important. Further research into these aspects will be able to provide a more comprehensive understanding of improving the quality of education and graduate competencies at PIP Semarang

and other similar maritime educational institutions to produce better-prepared graduates who will be ready to face challenges in the global maritime industry.

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