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IMPLEMENTATION OF COMPETENCY-BASED ASSESSMENT MODEL IN OPERATIONAL PRACTICAL TEST

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Abstract: *The absence of a standardized operational-level practical test instrument for Technology Nautical Study Program cadets has led to inconsistencies in evaluating critical competencies, ultimately affecting the quality of training and readiness in maritime operations. This community service activity was initiated to address this gap by identifying the root causes behind the lack of implementation, such as inadequate alignment between practical assessments and core competencies, and by highlighting the consequential impact on vocational education quality. Using a qualitative approach through lectures, training sessions, and Participatory Action Research (PAR), this study involved lecturers and cadets from AMSS and Poltekpel Barombong. The intervention focused on socializing and implementing a competency-based assessment instrument that, based on preliminary indicators and observational data, demonstrated improvements in measuring participant skills with increased objectivity, validity, and reliability. However, limitations remain in that the instrument currently addresses only operational-level competencies and does not fully encompass all practical scenarios aligned with core competencies. The findings underscore the need for further research to expand and refine assessment tools, particularly at the management level, thereby contributing to enhanced vocational training and competency-based education in the nautical field.*

Keywords: *Competency-Based Assessment Model; Operational Level; Practical Test Instrument.*

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INTRODUCTION

The education situation and conditions in the maritime field from Akademi Maritim Sapta Samudera (AMSS) and Politeknik Pelayaran (Poltekpel) Barombong have similarities with

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Politeknik Pelayaran Sumatera Barat (Poltekpel Sumbar). This is because both are under the auspices of the Ministry of Transportation and regulated by the International Maritime Organization (IMO)[1]. In all three institutions, there are various facilities to support the educational process, including laboratories and practical simulators, such as workshops and engine room simulators[2]. In addition, practical learning of engineering study programs as a test of cadet competency is carried out in an engine room simulator in accordance with the Standards of Training, Certification, and Watchkeeping (STCW)[3]. Although these facilities provide sufficient potential to support the learning process, the reality in the field reveals obstacles in the implementation of competency assessments. This gap arises because the assessment method is still conventional and does not fully integrate practical aspects with the needs of the modern maritime industry. In addition, there are shortcomings in continuous evaluation, which results in graduates not fully having competencies that are in accordance with international standards. Therefore, innovation and improvement of the competency assessment system are needed to optimize the potential of existing facilities so that they can produce graduates who are truly ready to face challenges in the maritime world.

However, based on the analysis of the partners' situation through interviews with several lecturers, there are still several obstacles in terms of the practical test process in the engine room at AMSS and Poltekpel Barombong. First, there is no operational-level practical test instrument with a competency-based assessment model. Second, there is no practical test instrument that has been proven valid, reliable and effective to be used by cadets in engineering study programs. Third, the implementation of cadet competency assessments is not based on the indicator assessment standards in STCW but only on the core competencies of learning materials. The concrete impact of these obstacles is the gap between the potential of supporting facilities and the reality of graduate competencies, which ultimately reduces their readiness to meet the increasingly stringent demands of the maritime industry.

The fundamental problems above will be the causes of several problems in the Learning Outcomes of Graduates of engineering study programs. First, the imperfection of the practical test instrument by using a competency-based assessment model prevents cadets from mastering all the

[1] Ali Mashartanto, Wibisana Pranata, and Syafni Yelvi Siska, 'Development of Learning Media Maritime English Textbook for Ratings Forming', *JOLLT Journal of Languages and Language Teaching*, 12.3 (2024), 1238–52.

[2] Changhun Han, Rabiul Islam, and others, 'Advancing Maritime Technology: Evaluating Situation Awareness Support Systems for Engine Room Monitoring at the Future Shore Control Centre', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 8.3 (2024) <https://doi.org/10.1080/25725084.2024.2365504>.

[3] Samrat Ghosh, Gholam Reza Emad, and Anand Ravi, 'Investigating the Characteristics of Skills and Competency Frameworks through a Systematic Literature Review: A Feasibility Study to Revise the STCW Code for Seafarer Training', *Australian Journal of Maritime and Ocean Affairs*, 2024, 1–17 <https://doi.org/10.1080/18366503.2024.2374606>.

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skills needed by the work demanded in the maritime sector, because the competency assessment used does not reflect actual field conditions[4]. Second, instruments that are not valid, reliable, and effective will not really measure the actual skills or real competencies of cadets[5]. If the seafarers' competency test instrument does not comply with STCW and IMO, the assessment results cannot be relied on as an accurate measurement of competency[6]. Third, if a reliable usage guide does not accompany the test instrument, the instructors and examiners may give inconsistent assessments[7]. It causes subjectivity in the assessment, which can ultimately be detrimental to cadets. The consequences of using invalid instruments and subjective assessments have the potential to be detrimental to the development of cadet skills and readiness to face challenges in the field. Therefore, there is a high urgency for intervention to develop and implement valid, reliable, and objective assessment instruments in an effort to improve the quality of graduates.

To overcome the partners' problems above, Poltekpel Sumbar has designed an operational-level practical test instrument by using a competency-based assessment model that is valid, reliable, and effective[8]. This instrument is valid and reliable because it has been assessed by 4 assessors involving the cadets of the technology nautical study program at Poltekpel Sumbar as the sample. Validity testing was carried out using content validity[9] and reliability testing was carried out by using inter-rater reliability[10] with the test-retest method[11]. The results of the validity test from the four validators can be seen in Table 1.

[4] Mochamad Abduh, Juliandri Hasnur, and Syafni Yelvi Siska, 'The Effect of Maritime English Vocabulary for Beginners Module on the Vocabulary Learning Outcomes', *Jurnal Pendidikan Vokasi*, 12.2 (2022), 117–29 <https://doi.org/10.21831/jpv.v12i2.49033>.

[5] Alif Muarifah, Zhooriyati Zhooriyati, and Dian Ari Widyastuti, 'Construct Validity and Reliability of an Adolescent's Coping Strategy Instrument', *PSIKOPEDAGOGIA Jurnal Bimbingan Dan Konseling*, 10.2 (2022), 52 <https://doi.org/10.12928/psikopedagogia.v10i2.20206>.

[6] Giovanni Oktavinanda, Syafni Yelvi Siska, and Kartika Harda Putri, 'English for Mariners Coursebook: How Does Readability Formula Rate the Readability Level of Texts?', *Esteem: Journal of English Study Programme*, 2020, 50–56.

[7] Ayat Nabil Eltayar and others, 'Do Entrustment Scales Make a Difference in the Inter-Rater Reliability of the Workplace-Based Assessment?', *Medical Education Online*, 27.1 (2022) <https://doi.org/10.1080/10872981.2022.2053401>.

[8] Oliver R. Runswick and others, 'A Valid and Reliable Test of Technical Skill for Vision Impaired Football', *Science and Medicine in Football*, 6.1 (2022), 89–97 <https://doi.org/10.1080/24733938.2021.1885725>.

[9] Molli Wahyuni and others, 'Video Tutorials on Education Statistics Course Assisted with Screencastify: Validity and Feasibility', *Journal of Education Technology*, 5.1 (2021), 86 <https://doi.org/10.23887/jet.v5i1.33630>.

[10] Alexia Rohde and others, 'Inter-Rater Reliability, Intra-Rater Reliability and Internal Consistency of the Brisbane Evidence-Based Language Test', *Disability and Rehabilitation*, 44.4 (2022), 637–45 <https://doi.org/10.1080/09638288.2020.1776774>.

[11] Yavor Dragostinov and René Mõttus, 'Test-Retest Reliability and Construct Validity of the Brief Dark Triad Measurements', *Journal of Personality Assessment*, 105.2 (2023), 143–48 <https://doi.org/10.1080/00223891.2022.2052303>.

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Table 1. Content Validity Score

No.	Validator	Evaluation Indicators					
		CV1	CV2	CV3	CV4	CV5	CV6
1	I	4	3	4	3	4	4
2	II	4	4	4	3	4	3
3	III	4	4	4	4	4	3
4	IV	4	4	4	3	4	4
Mean		4	3.75	4	3.25	4	3.5
Score				**3.8**			
Criteria				**A**			

Based on the assessment results of 4 validators above, the content validity of this practical test instrument is 3.8 with a value category of A. Thus, this instrument is also effective, because an effectiveness test has been carried out on 30 cadets of the technology nautical study program in the engine room simulator of Poltekpel Sumbar[12]. The descriptive statistical analysis of the N-Gain calculation from the above data can be seen in Table 2.

Tabel 2. N-Gain Percentage

	N	**Min.**	**Max.**	**Mean**	**SD**
N-Gain Score	30	0.38	1	0.7461	0.1953
N-Gain Percentage	30	37.50	100	**74.60**	19.53

The results obtained are then compared with the intervals in Table 3 as follows.

Table 3. Effectiveness Conversion

Interval N Percentage	**Conversion**
85% < N ≤ 100%	Very Effective
72% < N ≤ 85%	**Effective**
58% < N ≤ 72%	Quite Effective
44% < N ≤ 58%	Not Effective
N ≤ 44%	Very Ineffective

Based on the results of the SPSS calculation, it was found that the N-Gain percentage = 74.60%, which is in the effective category. Thus, this community service activity aims to conduct socialization and implementation of operational-level practical test instruments with competency-based assessment models for Technology Nautical Study Program cadets at AMSS and Poltekpel

[12] Thamer Alshammari, Chris Messom, and Yen Cheung, 'M-Government Continuance Intentions: An Instrument Development and Validation', *Information Technology for Development*, 28.1 (2022), 189–209 <https://doi.org/10.1080/02681102.2021.1928589>.

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Barombong[13]. Therefore, this community service activity has a very important role in using the right instrument to assess cadet competence[14]. This activity is expected to improve the quality of maritime vocational graduates by providing appropriate, objective, and accurate assessment instruments so that the cadet competency evaluation process can reflect real conditions in the field. The socialization of the instrument is aimed at lecturers to ensure understanding and uniformity in the assessment. In contrast, the implementation of the instrument is aimed directly at cadets so as to produce graduates who are ready to compete and meet global maritime industry standards.

There are several previous studies on community service activities related to the socialization of assessment instruments in laboratories/simulators. First, a research entitled Socialization of Laboratory Use for Practical Activities[15]. Second, research on the socialization of assessment tools in the form of Google Forms[16]. Third, research on the results of community service on mentoring practical tests as an implementation of the independent curriculum [17]. Fourth, research on the implementation of self-evaluation tools for students[18]. Fifth, a research entitled Implementation of Students' speaking ability assessment based on practical activities[19]. Sixth, research on the socialization of competency-based assessment using applications[20]. Although several previous studies have examined community service activities related to the socialization of assessment instruments, this intervention really goes beyond existing efforts. This intervention not only socializes the assessment instruments but also integrates the competency-based assessment model operationally, specifically for maritime vocational education. This approach is designed to address the gap between conventional assessment practices and the need for more objective evaluations

[13] Melkam Zewdu Ayalew, Dawit Asrat Getahun, and Reda Darge Negasi, 'Faculty and Academic Leaders' Conceptions of Competence and Competence-Based Education', *Cogent Education*, 11.1 (2024) <https://doi.org/10.1080/2331186X.2024.2372187>.

[14] Reham Kaifi and others, 'The Relation Between Theoretical and Practical Exams for Health Sciences Students at King Saud Bin Abdulaziz University for Health Sciences-Jeddah', *Advances in Medical Education and Practice*, 15.May (2024), 419–30 <https://doi.org/10.2147/AMEP.S456501>.

[15] Arlian Firda, Mar'atul Afidah, and Sri Wahyuni, 'Sosialisasi Pemanfaatan Aplikasi Laboratorium Virtual Dalam Pembelajaran', *DINAMISIA: Jurnal Pengabdian Kepada Masyarakat*, 5.5 (2021), 1299–1304.

[16] Indah Muzdaliifah, Dian Rianita, and Elvira Asril, 'Sosialisasi Penerapan Google Forms Sebagai Alat Penilaian Pembelajaran Di SDN 117 Pekanbaru', *Dinamisia : Jurnal Pengabdian Kepada Masyarakat*, 5.4 (2021), 1069–73 <https://doi.org/10.31849/dinamisia.v5i4.7594>.

[17] Restu and others, 'Pendampingan Praktik Baik Sebagai Bentuk Implementasi Kurikulum Merdeka', *Jurnal Pengabdian Kepada Masyarakat (PKM)*, 30.1 (2024), 5.

[18] Raisa Rakhmania and Yulia Pratiwi, 'The Implementation of Self-Assessment in Character Pillar Activities of Elementary School Students', *Publikasi Pendidikan*, 14.1 (2024), 13 <https://doi.org/10.26858/publikan.v14i1.59547>.

[19] Emilius German and Disa Evawani Lestari, 'The Implementation of Activity Based Learning (ABL) Method at Elementary School to Enhance Students' Speaking Skills', *International Journal of Community Service Learning*, 4.3 (2020), 223–28 <https://doi.org/10.23887/ijcsl.v4i3.23939>.

[20] Tety Kurmalasari, 'Sosialisasi Soal-Soal Asesmen Kompetensi Minimum Dengan Menggunakan Aplikasi Quizizz Untuk Siswa Paket C Di PKBM Harapan Bangsa', *Jurnal Anugerah*, 3.2 (2022), 111–17 <https://doi.org/10.31629/anugerah.v3i2.3813>.

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that comply with international standards such as STCW and IMO. Thus, this intervention provides a comprehensive and innovative model that improves the consistency, validity, and reliability of practical assessments while supporting the improvement of the quality of graduates in the maritime sector.

From the previous research above, the socialization of instruments as one of the assessments has been widely carried out as part of community service activities. The similarity of this research with previous research is in the socialization activities related to instrumentation as one of the assessment tools[21]. However, there are several differences between this research and previous research which become the novelty of this research. First, this community service activity is not only in the form of socialization but also implementation. It means that the community service team assists lecturers and cadets until the stage of implementing the instrument [22]. Second, previous research mostly used one method of community service activity, while this research uses three methods, namely, lecture, training, and Participatory Action Research (PAR) methods[23]. This study is a follow-up step from previous development research, namely as a broader trial, so as to make the practical test instrument more effective and can be used on a larger sample scale[24]. Thus, the urgency of this activity is further strengthened, considering its potentially significant impact in improving the quality of cadet competency assessments as a whole and closing the gap between existing practical evaluations and the demands of the global maritime industry.

The purpose of this study is to explain the socialization activities, discussion results, and implementation results of the operational level practical test instrument by using a competency-based assessment model for cadets of the Technology Nautical Study Program at AMSS and Poltekpel Barombong.

METHOD

[21] Xin Wang, Baohui Zhang, and Hongying Gao, 'Developing and Validating an Instrument for Assessing Learning Sciences Competence of Doctoral Students in Education in China', *Sustainability (Switzerland)* , 16.13 (2024), 1–21 <https://doi.org/10.3390/su16135607>.

[22] Erna Handayani and others, 'Developing an Instrument and Assessing SDGs Implementation in Indonesian Higher Education', *International Journal of Sustainable Development and Planning*, 19.2 (2024), 577–90 <https://doi.org/10.18280/ijsdp.190215>.

[23] Sanne Siete Visser and Diana Kreemers, 'Breaking through Boundaries with PAR–or Not? A Research Project on the Facilitation of Participatory Governance through Participatory Action Research (PAR)', *Educational Action Research*, 28.3 (2020), 345–61 <https://doi.org/10.1080/09650792.2019.1624380>.

[24] Lu'luil Maxnun, Kristiani Kristiani, and Cicilia Dyah Sulistyaningrum, 'Development of Hots-Based Cognitive Assessment Instruments: ADDIE Model', *Journal of Education and Learning*, 18.2 (2024), 489–98 <https://doi.org/10.11591/edulearn.v18i2.21079>.

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This study uses a qualitative approach with the lecture method[25], training method[26], and Participatory Action Research (PAR)[27]. The lecture method was carried out at the instrument socialization stage with lecturers and cadets which was continued with a question and answer session and discussion. The training and PAR methods were carried out at the instrument implementation stage by involving lecturers and cadets in an engine room simulator. Participants in this study were all lecturers and cadets of the technology nautical study program. The flow of community service activities can be seen in Figure 1.

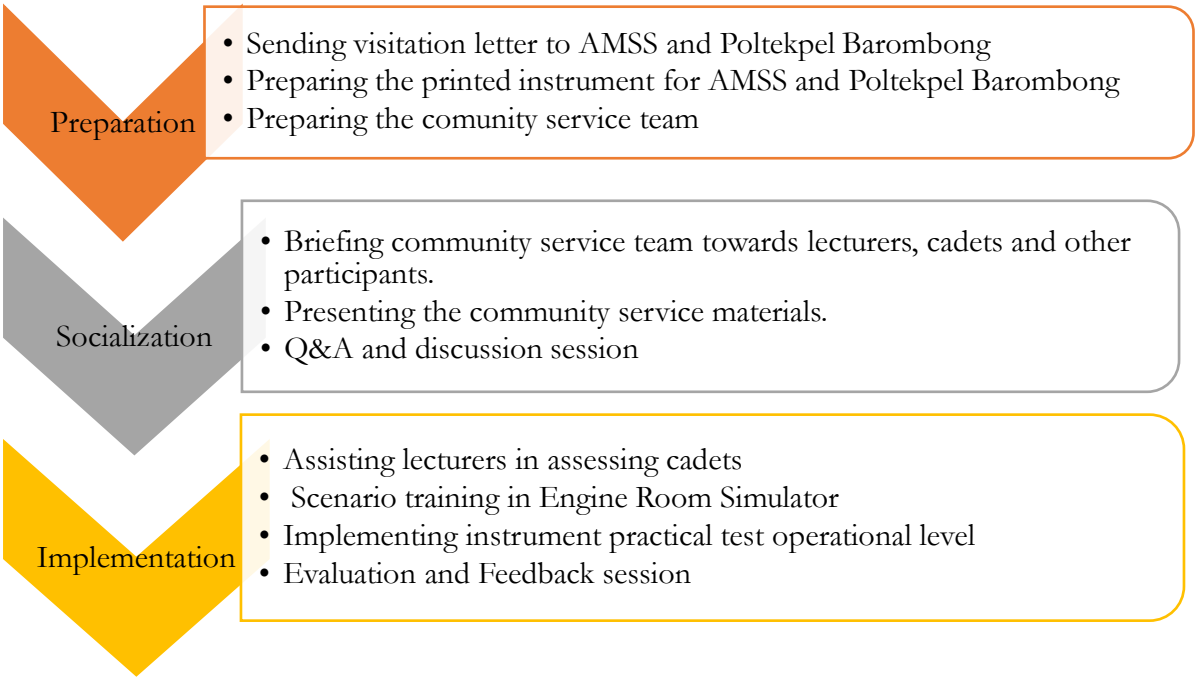

Figure 1. Community Service Activity Flow

RESULT AND DISCUSSION

The implementation of community service on the socialization and implementation of operational level practical test instruments by using a competency-based assessment model for Technology Nautical Study Program cadets at Poltekpel Barombong and AMSS aims to introduce

[25] Fred Ssemugenyi, 'Teaching and Learning Methods Compared: A Pedagogical Evaluation of Problem-Based Learning (PBL) and Lecture Methods in Developing Learners' Cognitive Abilities', *Cogent Education*, 10.1 (2023) <https://doi.org/10.1080/2331186X.2023.2187943>.
[26] Kuniki Imagawa and Kohei Shiomoto, 'Evaluation of Effectiveness of Pre-Training Method in Chest X-Ray Imaging Using Vision Transformer', *Computer Methods in Biomechanics and Biomedical Engineering: Imaging and Visualization*, 12.1 (2024) <https://doi.org/10.1080/21681163.2024.2345823>.
[27] Angela Feekery, 'The 7 C's Framework for Participatory Action Research: Inducting Novice Participant-Researchers', *Educational Action Research*, 32.3 (2024), 332–47 <https://doi.org/10.1080/09650792.2023.2234417>.

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competency-based assessment instruments and measure the operational competency of cadets in operating the Engine Room Simulator in accordance with the standards set by STCW. This community service activity was carried out for 4 (four) days, namely October 1st and 2nd, 2024, at AMSS Padang and October 3rd and 4th, 2024, at Poltekpel Barombong. A total of 40 cadets from both campuses took part in this competency test. The competency test process ran orderly and smoothly and provided solution-oriented feedback for cadets and lecturers.

In the preparation stage, the Poltekpel Sumbar community service team sent a letter of request to visit Poltekpel Barombong and AMSS to carry out community service activities. Then, the community service team prepared an operational practice test instrument with other related materials covering the operation of the main engine, fuel system, electrical system, cooling system, and handling emergencies in the engine room. After that, the community service team prepared the members to join this activity at AMSS and Poltekpel Barombong, which consists of the community service team, technicians, and Poltekpel Sumbar cadets as field assistants.

At the socialization stage, the research team provided direction to lecturers, cadets, and all community service activity participants. This direction began by explaining the importance of implementing competency-based assessments so that cadets can master the skills according to the work demand [28]. Second, direction regarding the importance of implementing valid, reliable, and effective competency test instruments so that the instruments measure the competencies and abilities of cadets according to standards[29]. Third, the community service team directed the participants regarding the assessment procedure, the competency indicators assessed, and the role of the simulator in facilitating this test[30]. In this session, the community service team holds questions and answers as well as discussions with participants.

Building on the insights from the socialization stage, the practical application of the competency-based assessment instrument has revealed significant potential for advancing maritime education. The confirmation of the instrument's validity, reliability, and effectiveness establishes a solid foundation for rethinking future assessments and training approaches. Specifically, these findings can be utilized to fine-tune curriculum development by ensuring that theoretical knowledge is closely aligned with practical skills demanded in the maritime industry. Maritime

[28] Craig J. Gonsalvez, 'On Accreditation Standards, Competence Assessments and Gate-Keeping: Houston, We Have a Problem!', *Clinical Psychologist*, 26.2 (2022), 193–97 <https://doi.org/10.1080/13284207.2022.2035652>.
[29] Riyan Hidayat and others, 'Validity of Engagement Instrument During Online Learning in Mathematics Education', *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, 8.2 (2024), 398–414 <https://doi.org/10.22437/jiituj.v8i2.34453>.
[30] Vadym Nechyporenko and Byongug Jeong, 'Comparative Safety Analysis of Engine Room Fires with Different Marine Fuels of MGO, LPG and H2', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 7.4 (2023) <https://doi.org/10.1080/25725084.2023.2269346>.

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education institutions can integrate this instrument into their regular evaluation processes, leading to more tailored training programs that directly address identified skill gaps. Furthermore, the detailed feedback and interactive discussions during the socialization sessions offer actionable insights for continuous improvement, enabling institutions to update their training modules and assessment procedures in line with evolving industry standards. Ultimately, these enhancements are expected to drive better learning outcomes, foster a culture of continuous improvement, and ensure that cadets are well-equipped to meet the challenges of modern maritime operations.

Figure 2. Community Service Team briefing to AMSS cadets

In a briefing session at the AMSS, the community service team delivered material on the concept and procedures for implementing competency-based operational-level practical test instruments. In addition to explaining the steps for implementing the practical test, the team also provided an understanding of the importance of assessment standards in accordance with STCW and IMO provisions. Through this presentation, it is hoped that the cadets will gain a

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comprehensive picture of what is being measured, how the assessment process is carried out, and the competency targets that must be achieved. The expected results are increased awareness and readiness of AMSS cadets in facing the practical test, so that they are able to display performance that is in accordance with international maritime industry standards.

Figure 3. Community Service Team briefing to Poltekpel Barombong cadets

In a briefing session at the Poltekpel Barombong, the community service team focused on training methods and mentoring in the use of assessment instruments. The team explained how to integrate technical competencies with objective practice-based assessments and presented implementation guidelines for lecturers and examiners. Through interactive discussions, the team also provided case examples and evaluation scenarios to improve cadets' understanding of real situations in the field. The expected result is the readiness of cadets to apply technical competencies in a structured and measurable manner so as to improve the quality of graduates and meet the performance standards of the shipping industry.

From the community service activities on both campuses, the community service team concluded that there were two questions and one suggestion related to the material. First, the suggestion from Mr. IA is that, the test instrument and scenario should be described in the form of a table by explaining the dimensions of competence, such as the dimensions of knowledge, skills, and attitudes[31]. Then, the table in the instrumentation also states the details of the time needed to carry out each scenario. This idea was responded positively by the community service team by

[31] Irwan Irwan and others, 'Influence of Parenting Patterns and Self-Efficacy on the Leadership of Cadet Regiment at Merchant Marine Polytechnic of West Sumatera', *International Journal of Islamic Educational Psychology*, 5.1 (2024), 86–106.

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making this suggestion as an evaluation for the instrument and will be revised according to the suggestions.

Next, the first question from Mrs. IS was about whether the instrument scheme could be used for all sailors, both from formation training and improvement training. The answer from the community service team was that the practical test instrument scenario scheme could be used in both forms of training as long as it is still at the operational level. This practical test instrument cannot be used for the officers at the management level.

Then, the second question from Mr. FS is whether this practical test instrument can be applied to cadets in semesters 1 and semester 2. The service team's answer is yes because this practical test instrument is designed with a competency-based assessment model applied to the engine room simulator given in practical learning[32]. Suppose the cadets have been introduced to the engine room simulator and have been taught about competencies or concepts of operational-level material. In that case, this practical test instrument can be applied[33]. In addition, it depends on the lecturers since the lecturers know when the exact time to give their cadets practical test assessments.

Figure 4. Q&A and Discussion Session with Community Service Participant from Poltekpel Barombong

[32] Diana Gaviria and others, 'Simulator-Mediated Learning: Enhancing Accounting Teaching-Learning Processes in Higher Education', *Cogent Education*, 11.1 (2024) <https://doi.org/10.1080/2331186X.2024.2340856>.
[33] (Han, et al., 2024)

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In the implementation stage, the service team assists lecturers to test cadets by using practical test instruments. Furthermore, the service team conducts scenario training with cadets in the engine room simulator. Cadets who take the competency test enter the Engine Room Simulator room according to the predetermined exam number. Lecturers who belong to external and internal examiners accompany cadets during the exam process, provide directions or instructions regarding the exam material, and ensure that all participants follow each instrument indicator correctly[34]. In this training, cadets are guided by instructors to understand how to operate the equipment safely and efficiently.

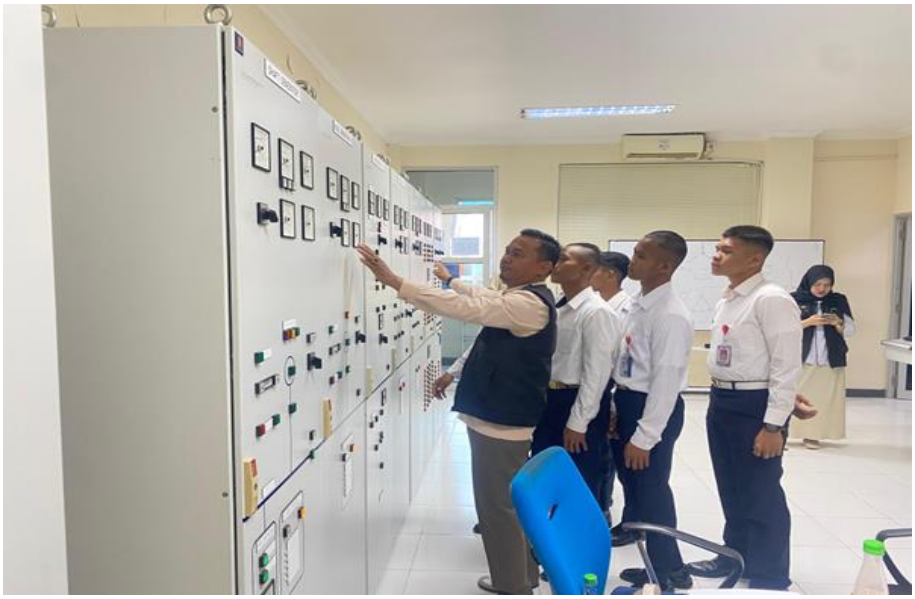

Figure 5. Implementation of Competency test in Poltekpel Barombong Engine Room Simulator

[34] Christina Turesson and Annika Lindh Falk, 'Learning Occupational Therapy Practice Using Standardised Patients in a Practical Examination – Experiences of Students and Teachers', *Scandinavian Journal of Occupational Therapy*, 30.4 (2023), 425–34 <https://doi.org/10.1080/11038128.2021.1974549>.

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Figure 6. Implementation of Competency test in AMSS Engine Room Simulator

Then, the implementation of a practical test instrument was carried out. This test involves a simulation scenario in which cadets are asked to perform various operational tasks, such as starting the main engine, alarm handling, and engine maintenance[35]. The assessment is carried out based on competency criteria that include technical aspects, occupational safety, and situation management. After the competency test is done, an evaluation is carried out in the form of a competency-based assessment to determine the extent to which the cadets have succeeded in meeting the set standards[36]. Cadets who have not achieved the set value standards are given feedback in the form of a re-explanation of the concepts and competency standards and are given the opportunity to take remedial courses through retraining in the engine room simulator[37].

[35] Abhinav Yadav and Byongug Jeong, 'Safety Evaluation of Using Ammonia as Marine Fuel by Analysing Gas Dispersion in a Ship Engine Room Using CFD', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 6.2–3 (2022), 99–116 <https://doi.org/10.1080/25725084.2022.2083295>.

[36] Maryam Mohammad Zadeh and others, 'Conceptualising Engineering Student Perceptions of Synchronous and Asynchronous Online Learning', *European Journal of Engineering Education*, 49.1 (2024), 94–112 <https://doi.org/10.1080/03043797.2023.2201178>.

[37] Folkert Kuiken and Ineke Vedder, 'The Interplay between Academic Writing Abilities of Dutch Undergraduate Students, a Remedial Writing Programme, and Academic Achievement', *International Journal of Bilingual Education and Bilingualism*, 24.10 (2021), 1474–85 <https://doi.org/10.1080/13670050.2020.1726280>.

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Figure 7. Evaluation and Feedback from the Assessment Team to Poltekpel Barombong Cadets

Figure 8. Evaluation and Feedback from the Assessment Team to AMSS Cadets

The assessment criteria for the practical test are adapted from the assessment criteria for practical work[38] , which can be seen in Table 4.

Table 4. Assessment Criteria for the Operasional Level Practical Test

[38] Unti Ludigdo, *Buku Pedoman Pendidikan Fakultas Vokasi* (Malang: Universitas Brawijaya Press, 2022).

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No.	Grade Range	Letter Grade	Point Grade	Ability
1	> 80 - 100	A	4.0	Excellent
2	> 75 - 80	B+	3.5	Very Good
3	> 69 - 75	B	3.0	Good
4	> 60 - 69	C+	2.5	Good Enough
5	> 55 - 60	C	2.0	Fair
6	> 50 - 55	D+	1.5	Fair Enough
7	> 44 - 50	D	1.0	Poor
8	0 – 44	E	0.0	Failed

The results of practical test assessment on both campuses refer to the assessment criteria above and can be seen in Table 5 and Table 6.

Table 5. Results of the Operational Practical Test Assessment for AMSS Cadets

Cadets	Assessment Result			TOTAL	Average	Criteria
	P1	P2	P3			
1	84	84	80	248	83	Excellent
2	84	80	80	244	81	Excellent
3	84	88	84	256	85	Excellent
4	80	88	80	248	83	Excellent
5	84	88	88	260	87	Excellent
6	77	80	77	234	78	Very Good
7	84	84	84	252	84	Excellent
8	80	84	80	244	81	Excellent
9	84	80	80	244	81	Excellent
10	80	80	84	244	81	Excellent
11	84	88	84	256	85	Excellent
12	88	80	84	252	84	Excellent
13	84	88	80	252	84	Excellent
14	81	73	77	231	77	Very Good
15	88	88	80	256	85	Excellent
16	84	80	84	248	83	Excellent
17	80	77	73	252	77	Very Good
18	80	84	80	244	81	Excellent
19	84	80	88	252	84	Excellent
20	88	84	84	256	85	Excellent

Table 6. Results of the Operational Practical Test Assessment for Poltekpel Barombong Cadets

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Cadets	Assessment Result			TOTAL	Average	Criteria
	P1	P2	P3			
1	84	84	80	248	83	Excellent
2	84	80	80	244	81	Excellent
3	84	88	84	256	85	Excellent
4	80	88	80	248	83	Excellent
5	84	88	88	260	87	Excellent
6	77	80	77	234	78	Very Good
7	84	84	84	252	84	Excellent
8	80	84	80	244	81	Excellent
9	84	80	80	244	81	Excellent
10	80	80	84	244	81	Excellent
11	84	88	84	256	85	Excellent
12	88	80	84	252	84	Excellent
13	84	88	80	252	84	Excellent
14	81	73	77	231	77	Very Good
15	88	88	80	256	85	Excellent
16	84	80	84	248	83	Excellent
17	80	84	88	252	84	Excellent
18	80	84	80	244	81	Excellent
19	84	80	88	252	84	Excellent
20	88	84	84	256	85	Excellent

Thus, the results of this competency test indicate that 85% of cadets have sufficient competency to enter the workforce as professionals in the field of ship engine operations[39]. In contrast, the other 15% need improvement in several aspects. Overall, the implementation of this competency test has met the main objective of the competency-based testing program, namely ensuring that graduates have operational skills in accordance with maritime industry standards[40].

For ease of access and further examination, a QR code is provided below that links directly to the PDF document containing the competency-based assessment model and operational-level practical test instrument used in this study.

[39] Timotheos Pomonis, Byongug Jeong, and Chengi Kuo, 'Engine Room Fire Safety Evaluation of Ammonia as Marine Fuel', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 6.1 (2022), 67–90 <https://doi.org/10.1080/25725084.2021.2015867>.

[40] Nik Mahmud Zuhdi Nik Mat, Mohd Faizal Ramli, and Izyan Munirah Mohd Zaideen, 'Fostering Seafarers' Development to Achieve the Malaysian Shipping Master Plan Goal', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 7.4 (2023) <https://doi.org/10.1080/25725084.2023.2292477>.

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Figure 9. QR Code of Competency-Based Assessment Model and Operational-Level Practical Test

Upon further analysis, notable differences between AMSS and Poltekpel Barombong emerged, which may have influenced the overall outcomes of the community service activity. For instance, AMSS demonstrated a more structured operational framework that facilitated the integration of theoretical instruction with practical assessments. At the same time, Poltekpel Barombong, with its emphasis on hands-on training, showed a higher degree of adaptability in implementing real-time assessment protocols. These distinctions suggest that institutional settings play a significant role in shaping the effectiveness of competency-based evaluation tools, highlighting the need for tailored approaches that address the unique strengths and challenges of each institution.

CONCLUSION

Based on the results of the socialization and implementation of the operational level practice test instrument with a competency-based assessment model, it can be concluded that the instrument applied to the cadets of the Technology Nautical Study Program at Poltekpel Barombong and AMSS has succeeded in measuring the level of participant skills validly, reliably and effectively. This competency-based practice test instrument not only assesses technical skills but also measures the readiness of cadets in dealing with emergencies on the ship which is an important part of operational activities in the engine room. Several technical obstacles that emerged during the implementation of this community service activity, such as the connectivity of tools in the simulator and overlapping in the operation of simulator devices, were successfully overcome thanks to the assistance of a team of technicians from each campus and the community service

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team. Recommendations for further research are to design, socialize, and implement practical test instruments at the management level.

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