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CADETS' PERCEPTION FOR MULTIMEDIA WEB-BASED LEARNING AND TECHONOLOGY ADVANCEMENT FOR MET IN STEM GOAL: CASE STUDY IN AKMI CIREBON FOR ON BOARD PREPARATION

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ABSTRAK

Teaching and learning for online learning has developed at the Maritime Academy of Suaka Bahari. Such the learning media which the Moodle application to prepare the cadet applied technological knowledge dan competence on the ship. Because of the seafarer competences have to be completed proficiently while they are learning in Maritime Education and Training (MET). Since the revolution industry 4.0 has emergence in the industry, the technological advancement required for workplace maritime competence. Such as integrating digital data, software, and information technologies. There for Maritime workplace has undergone rapid technological advancement. STEM qualification in the maritime industry careers for employers have increased related technological advances and mathematics for the marine, nautical science and marine engineering. Research design this study use the qualitative research A total of 41 cadets from deck officer and engineering officer Maritime Academy of Suaka Bahari have participated filling the questioners. This research founded that perceptions of the use of web-based multimedia in the Prala STEM application, on average, strongly agree at 53% in making it easier to understand the material. Meanwhile, 31.7% of cadets enthusiastically stated that they strongly agreed that they were not enthusiastic about using web-based multimedia in the Prala STEM application.

Keyword: deck officer; marine engineer; STEM; web-based learning

1. Introduction

The seafarer lead important in the ship operation and demanded high skill and specialization competence (Manuel, 2017). Seafarers are the main subjects who operate and navigate ship adapts to technological advances (Setiawan et al., 2021), navigation (Mustain et al., 2021). The technology improvement need the role seafarer in digitalization such e-navigation concept (Patraiko & Wake, 2010), (IMO, 2006) and high level automation (Demirel, 2020). Maritime education does not standardized facts and procedures designed to prepare the workforce but MET must be following both the technology and industry needs (Alop, 2019).

In the tradisional learning MET empasize the cognitive and practical skill (Manuel, 2005). Maritime Education and Training (MET) should provide few subjects related to the training and skills required (Boonadir et al., 2020). Additionally, more industry need qualified and competent seafarer for continuity and sustainability the economy and business (Development, 2019).

Qualification maritime education related to curricula elements that will foster a sustainable paradigm of highly competent (Manuel, 2017) and to develop curriculum designs and pedagogical applied (Falloon et al., 2020). Such as the pedagogical applied in the learning and new technology in the experiment (Erdogan & Demirel, 2017). Maritime Academy Suaka Bahari faced the technology challenges in teaching and learning process. Preparation cadet on board ship in the work practice program has attentioned for future. Teaching and learning scenario as the curriculum need on board ship program can be designed by offline or online learning and now day have blended learning for teaching computer science (Bedebayeva et al., 2022). Combination for offline and web-based learning is the strategy to increase contribution and interactivity between student (Lawanto, 2000). Meanwhile, the use of web-base multimedia interactive can effectively improve the understanding subject matter in the vocational high school (Susanti et al., 2018).

The STEM Prala application is a web based learning developed by researchers in Maritime Academy Suaka Bahari with the website address https://stemprala.or.id/login/index.php. As shown in Figure 1. This application uses the Moodle application as an online learning application that is accessed by lecturers and cadets to prepare for the prala practice with several learning materials

and tests. The stemprala.or.id application is the beginning of the development of future cloud computing applications.

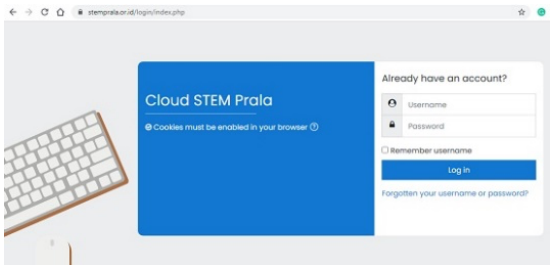

Figure 1. STEM Prala Page (Andromeda et al., 2022)

The aim for the study is to identify assessing STEM Prala web based learning for cadet in course while they prepare work practice (mentioned as Prala) program before a cadet take onboard practice. The specific objective of this research is activity assessment for completion and content in the course on the STEM in responding technological advancement.

Seafarers has to prevent the accidents and ensure that responsibility for safety priority for maritime transportation onboard ship and in the ship port. More accidents at the sea are caused by human element because of poor competence of the seafarers and performance while they work on board (Ishak et al., 2019). Maritime transportation research board –commission on sociotechnical systems reported more accidents at the sea are caused by human factor (NAS, 1976), the competence of the seafarers and performance related to while they work on shipboard (International Maritime Organization, 2010) The competences for seafearers on ship board required any certificates to fill particular position, carry out a specific task, or assume supervisory responsibility.

The IMO's International Convention on Standards of Training, Certification and Watchkeeping for Seafarers explain that the competent authority may define appropriate criteria for the designation of such persons and may determine the duties assigned to them. Seafarer competences have to completed proficiently while they are learning in Maritime Education and Training (MET). MET program has aim to overcome problem of human errors to minimalize the accident at the sea (Jiang & Li, 2017).

Science Technology Engineering Mathematic (STEM) discipline prepare the student expected to have competency level necessary to be successful employees (e.g., (Olson et al., 2012)2018; National Academies of Sciences, Engineering, and Medicine 2007; National Science Foundation 2010; U.S. Department of Education 2016). The teaching in STEM paradigm proposed that student to literate and to learn ways to build the skillset for STEM literacy.

The educational paradigm relate to engineering teaching – learning technique have to be relevant, attractive and connected, preparing students for lifelong learning (Garces & Forcael, 2019). firstly the project learning for exposing the student to engineering concepts using audio/visual media i.e. internet, e-book, video. Secondly, engineering/science engineering student learn the theory through real-life such as the problem-based learning. Third the student collaborate in group-based project for to utilize their knowledge attained from the previous steps by group-based project requiring the student to utilize knowledge attained from the previous steps. Fourth, student communicate with the presentation the content knowledge. Fifth, Students have to tested or examin the concept, resolving problem-based concept and engineering design.

Maritime industry employers are located in most over the world unexceptional for Indonesia which is archipelago state and has potentially in maritime transportation. Indonesia itself has large maritime sector that encompasses more than 60% the sea territory. So Indonesia's archipelagic and territory waters together form about three-fifths of the country's sovereign territory. It also has a vast Exclusive Economic Zone in the Pacific and Indian Oceans and the South China Sea. Fishing, the extraction of oil and gas from offshore deposits, and shipping all make important contributions to Indonesia's economy. Indonesia's maritime sector also occupies a central place in the idea of "tol laut" to accelerate the maritime transportation and the logistic maritime distribution.

From some research studies Drewry (2014) that the officer skill projected need 38,500 skilled by the end of 2018. Base on IMO which is endorsing the Maritime Education and Training reported it should be focused on soft skills, analytic skill, practical skill, and improving the qualified human resources. The STCW Code amendments newly concern for digitalization mode of methodology Maritime Education and Training (MET). It strongly recommended for distance learning and web-based learning in acquiring knowledge and upgrading for seafarers' learning. So the Learning System Management

(LMS) based-web can facilitate the seafearer for distance learning (Bauk et al., 2013)

Since the revolution industry 4.0 has emergence in the industry, the technological advancement required for workplace maritime competence. Such as integrating digital data, software, and information technologies (Sener & Elevli, 2017). So, MET faced the technological advancement and globalization to change seafarers' role and ships operations proficiently. So, MET system has to take lead in outcome in digitalization skill set over the necessary workplace in maritime industry. Such as the automation on the vessel, smart port like in Singapore (Port of Singapore), Netherland (Port of Rotterdam) and Indonesia Port no exception. Additionally, the case of COVID-19 pandemic has reached over the world included in Indonesia and influenced the MET sector.

There for Maritime workplace has undergone rapid technological advancement. STEM qualification in the maritime industry careers for employers have increased related technological advances and mathematics for the marine, nautical science and marine engineering. The representative qualification for employers there are:

a. Deck Officer

Responsible for controlling navigation and communications using the latest technological systems, including satellite communication with ships, ports and offices worldwide. Technical and mathematical ability is important, together with good team working, communication skills and self-reliance.

b. Engineer Officer

Operating and maintaining all the mechanical and electrical equipment throughout the ship at sea. A real interest in mechanical, electrical and electronic systems is important, together with a willingness to learn about new technology and adapt skills to its use.

c. Marine Contracting

Skills in engineering, science, IT or mathematics could provide the passport to opportunities such as constructing the next generation of offshore installations for the international oil and gas industry; working in a team operating technically advanced offshore construction, installation and support vessels or remotely operated vehicles; charting the sea and oceans; laying telecommunications cables; or playing a vital role as a life support technician to an offshore diving team.

STEM approach can emphasize integration of real-life knowledge, skill, and competency incorporating maritime and transportation industry background, real-life scenarios and career. STEM can help meet National or International Standard curriculum while providing students preparation future career and relevant future occupational competencies.

The teaching and learning in MET must able to use technology as well as in the maritime academy Suaka Bahari. Using LMS in Maritime Academy Suaka Bahari for teaching and learning activities include for training education. We develop LMS-based which mentioned it as DIGILEARN and STEM Prala. For communication and videoconferences activities between lecture and student used WhatsApp and Zoom are being held in mostly. In order to outbreak of the COVID-19 pandemic for health protect between lecture and student and prevent the spread of the disease.

2. Method

Research design this study use the combination research encompasses qualitative research. A qualitative research used to describe opinions of participants on course and to assess activity of learning and content on STEM Prala base on web learning. Nassaji (2015) argue that the goal of descriptive research is to describe a phenomenon research and its characteristics.

To express cadets' perceptions of the use of web-based multimedia in the Prala STEM application, a questionnaire with several questions with a linkert scale consists of 4 scales, namely (1) Strongly Disagree (STS), (2) Disagree (TS), (3) Agree. (S), (4) Strongly Agree (SS).

3. Result and Discussion

The case has founded from many instructors in STEM education teach to show and explain something subject matter to student in the course encompass reading, watching, and writing. Additionally, the perception of lectures has successfully thought the course when they has finished the syllabus in their teaching. They defined the course content, design, administrated while teaching and they done the assessment and test. That model has much implemented in STEM higher education for long time over the world.

Learner-centered teaching (LCT) act the teaching to cause to know something. The students are active to receive information, responsibility doing they own learning, and completing their task of learning. Student motivated themselves to improve the skill of reading, writing, calculating

and problem solving to acquire the knowledge and skill. The lecture must do the teaching to facilitate student learning process not as the sole source of wisdom and knowledge to them.

The completion activity and content in the course on STEM Prala web intended for responding technological advancement. As in digitalization era that the challenge cadet's competence and skill for autonomous machine, navigation, control center in ship operation. The Maritime Academy Suaka Bahari has become contributor for cadet need and role. This indicate that skill and competencies in the future development on curriculum of Maritime Academy Suaka Bahari matched of the maritime workforce, which is can involve of cognitive skills and knowledge for ship operation digitalization and safe navigation. The preparation work practice on cadet in Maritime Academy Suaka Bahari required a well-trained and highly educated workforce as maritime industry needed. Since the revolution 4.0 the shipping industry has already initiated the integration of digitalization into navigation onboard and shore-based shipping operations. The responding future knowledge and technical competencies has big attention for Maritime Academy Suaka Bahari based on regulation in the STCW Convention and Code. Because the maritime industry still plays the role for cadet in their career for short and long terms. On the other hand, technological advancement, computing and information technology skills, e-navigation on shipping operation will be essential competencies for the future seafarers faced with emerging challenges in STEM discipline for Academy Maritime Suaka Bahari.

4. Discussion.

The results of cadets' perceptions of the use of Web-based multimedia in the Prala STEM application are shown in table 4.5. From the table it is found that the cadets are able to use their intellectual abilities in remembering the material 41.5% Strongly Agree, understand the material 53% Strongly Agree, analyze concepts 48.8% Strongly Agree, can improve critical attitude 48.8% Strongly Agree, can find new ideas 44%, problem solving skills 44% Strongly Agree, and predictability 41.5% Strongly Agree. While the attitude of cadets gained confidence in doing the task well 46.5% Agree, cadets are more focused on learning 31.7% Strongly Agree, enthusiasm in learning 43.9% Agree. While the use of multimedia becomes more conducive to learning 41.5% Strongly Agree, 46.3% more fun learning. However, there were 31.7% of cadets who strongly agreed that they were not enthusiastic about participating in the use of web-based multimedia in the Prala STEM application.

Web-based multimedia in the STEM Prala application can be used as a learning medium for understanding material for theory and practical simulations but not yet on practical skills aspects. It is necessary to further develop web-based multimedia teaching materials on marine practice skills for cadets to be in line with the results of previous research on psychomotor abilities (Sadevi, 2019) that the effect of using web-based learning media. In additional, online learning teaching materials are very practical to use in lectures because they can be downloaded and read anywhere (Adijaya, 2018).

Tabel 1. Perception of Web-Based Multimedia Use in STEM Prala (Andromeda et al., 2022)

No	Questions	STS	TS	S	ST
1	The use of web-based multimedia in the Prala STEM application makes it difficult for me to understand nautical science material or ship engineering in preparing marine practice.	14,7%	31,7%	26,8%	26,8%
2	The use of web-based multimedia in the Prala STEM application makes it easier for me to gain knowledge of nautical sciences or ship engineering in preparing marine practice.	0,0%	14,6%	31,7%	53,7%
3	The use of web-based multimedia in the Prala STEM application makes it difficult for me to prepare marine practice	22,0%	31,7%	29,3%	17,0%
4	The application of web-based multimedia in the STEM Prala application is able to analyze the concepts of nautical sciences or ship engineering in preparing marine practice.	0,0%	14,6%	36,6%	48,8%

5	The application of web-based multimedia in the Prala STEM application becomes more conducive to learning	0,0%	19,5%	39,0%	41,5%
6	Web-based multimedia in the Prala STEM application can improve my critical attitude to the concept of nautical sciences or ship engineering in preparing marine practice	2,4%	19,5%	29,3%	48,8%
7	By using web-based multimedia in the STEM Prala application, I am challenged and confident that I can do my job well	0,0%	12,5%	45,0%	42,5%
8	Learning with web-based multimedia in the Prala STEM application becomes more fun	2,5%	14,6%	36,6%	46,3%
9	I am more excited to learn materials and concepts from the nautical sciences or ship engineering using web-based multimedia in the Prala STEM application compared to the literature method.	2,5%	14,6%	43,9%	39,0%
10	For me, the use of web-based multimedia in the Prala STEM application can connect communication between lecturers and cadets	0,0%	14,6%	31,7%	53,7%
11	The application of web-based multimedia in the Prala STEM application makes it easier for me to understand nautical science material or ship engineering in order to prepare marine practice	0,0%	19,5%	36,6%	43,9%
12	Web-based multimedia learning in the Prala STEM application makes the material easy to remember in preparing marine practice	5,0%	12,0%	41,5%	41,5%
13	I am not enthusiastic about participating in web-based multimedia learning on the Prala STEM application	17,0%	24,5%	26,8%	31,7%
14	I can focus when the material is given through the application of web-based multimedia in the Prala STEM application	0,0%	17,0%	41,5%	41,5%
15	The use of web-based multimedia in the Prala STEM application encourages me to find new creative ideas to prepare marine practice	0,0%	14,5%	41,5%	44,0%
16	I have problem solving skills after using web-based multimedia on STEM Prala	0,0%	22,0%	34,0%	44,0%
17	I always think analytically and critically in every decision making after using web-based multimedia in STEM Prala	0,0%	24,5%	34,0%	41,5%
18	I have the ability to think logically to find accurate facts and predict risks after using web-based multimedia in STEM Prala	2,5%	17,0%	39,0%	41,5%
19	I can't immediately answer quickly and swiftly about nautical science material or ship engineering after using web-based multimedia on STEM Prala	5,0%	39,0%	31,5%	24,5%

20	After using multimedia in the STEM Prala application, it did not make me more critical and analytical in solving problems of nautical science or ship engineering.	12,2%	26,8%	31,7%	29,3%

Based on the results of the study obtained some perceived shortcomings in this study so it is necessary to make recommendations for further research are as follows:

1. The material presented is in accordance with the competency needs of Industry which is the target of marine practice.
2. The use of multimedia needs to be developed with various types of learning media so that it can increase the enthusiasm of cadets in studying teaching materials.
3. There is still a lack of multimedia teaching materials from teaching material sources so that innovation from instructors is needed to be felt directly by cadets in preparing their competencies.

5. Conclusion

Conclusions. Web based learning in STEM Prala aplication for course in preparation of cadets' cognitive domain used to prepare their work practice before onboard on the ship. The n-gain score has obtained in low category. Teaching a course for this is a first time, so we faced challenging standard projects on STEM approach for cadet competency has to be improved. Perceptions of the use of web-based multimedia in the Prala STEM application, on average, strongly agree at 53% in making it easier to understand the material. Meanwhile, 31.7% of cadets enthusiastically stated that they strongly agreed that they were not enthusiastic about using web-based multimedia in the Prala STEM application.

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