

The Development of Maritime English Learning Model Using Authentic Assessment Based Bridge Simulator in Merchant Marine Polytechnic, Makassar

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ABSTRACT

Bridge simulator constitutes a very fundamental and vital tool to trigger and ensure that seamen or seafarers possess the standardized competence required. By using the bridge simulator technique, a reality based study can be presented easily and delivered to the students in ongoing basis to their classroom or study place. Afterwards, the validity training and testing as well as the consistent and precise teaching materials could be carried out to all students. One of the challenging issues encountered nowadays, particularly in the sphere of education, more specifically at the Merchant Marine Polytechnic in conjunction with the Maritime English learning model for the ANT II Program is that the Maritime English Learning System conducted or carried out remains teacher-centered where the teachers still play major and more dominant role and function as the primary source of information which is considered not effective. Therefore, the main thing to figure out is how to create an effective Maritime English Learning Model in relation to the education and training of seafarers level II at Merchant Marine Polytechnic. This research was *Research and Development* by using the research model advanced by Borg & Gall. The validity, practicality, and effectiveness of the product were determined using the developed tables. In addition, the learning outcomes were analyzed using the Wilcoxon Signed Rank test to analyze the significance of differences both groups. The research proves that this model is valid, practical and effective to use in learning. Therefore, it can be concluded that this model can be applied in the maritime English learning.

KEYWORDS

Maritime English, learning model, authentic assessment

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Introduction

Education is the phenomenon that has brought about for a long time. The majority of learning activities at Marine Education and Training institute

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remains conventional. Each and every aspect of the learning process there still needs to be developed since they are deemed weak and contra productive instead, particularly in terms of students' competence enhancement and their personal development.

The biggest issued faced and encountered by many of marine industries nowadays is regarded to placing and assigning the seafarers and their competence to best suit and meet the position offered in the trading industries and vessels. Long time ago, the seafarers were assigned directly on board, without any prior training required, hoping that they would learn quickly based on their own experience and other senior seafarers' experience as well.

In order to meet the competence required, the bridge simulator was introduce and utilized in the Marine and seafaring education and training. Bridge simulator constitutes a very essential tool and equipment to ensure that the seafarer possess the standardized competence required. By using bridge simulator technique, a reality based study can be easily presented and delivered to the students in ongoing basis in their study place.

One of the challenging issues encounter nowadays One of the challenging issues encountered nowadays, particularly in the sphere of education, more specifically at the Merchant Marine Academy, Makassar in conjunction with the Maritime English learning model for the ANT II Program is that the maritime English learning system conducted or carried out remains teacher centered where the teacher still play major and more dominant role and function as the primary source of information. The reality revealed that in teaching learning activities particularly in marine and seafaring education and training, the teacher with their experience tend to describe themselves as the expert, superior, almost super human and serve as the primary source of information and skills.

Troubleshooting

Based on the background stated earlier, the troubleshooting of this research is primarily on how to find the most effective maritime English learning model for the mariners and seafarers Education and Training level II (Nautical Expert Level II) in Merchant Marine Academy, Makassar.

Maritime English in the Marine Education and Training

Marine and seafaring safety could be implemented when the marines and seafarers are capable of undertaking and implementing all the marine protection function and supported by the area in which the sea and marine protection is conducted. This concept is very profound important to be completely apprehended that a vessel could only be navigated with high safety standard if it's navigated by the seafarers holding standardized competence with secured vessel or ship navigation environment. It doesn't mean that the high competence seafarers are accident and risk free individuals. Kobayashi (2009) stated that the safety sailing could only be occurred and achieved particularly depending on the seafarers' competence and skills as well as the situation in which the vessel sailed.

This concept is again, very vital and paramount important to be comprehended that the vessel environment and the seafarers' competence are the main factors of safety sailing. The seafarers holding poor competence and skills navigating in the tough sea areas could potentially bring about sea accidents. This

implies that even if the seafarers possess high level competence is not accident and risk free individuals and could potentially lead to sea accident as well.

One of the conditions and requirements on how to achieve the competence level in the Marine and Seafaring Education and Training is that the standard performance is fully achieved as well as the standard of training certification and watch keeping (STWC) amendment 2010, part A I/I code A (p.5).

Standard of the performance can be meant as the ability, competence and skills level in doing the job which is acknowledged internationally. This performance could also show the knowledge understanding and skills level of the seafarers on board.

Standard Marine Communication Phrases (SMCP)

Navigation and communication on board, among the vessels crews with the VTS (Vessel Traffic Service), pilot station, or with other vessels must be done through the correct and accurate, simple, and no ambiguous terms and sentences so as to avoid misinterpretation and misunderstanding. Standard marine communication phrases (SMCP) is an indispensable prerequisite as an anticipation toward the phenomenon where a ship or vessel is manned by the crews from the ones that are different in languages and countries. Without any clear standardized communication, misunderstanding could occur and this would lead to threatening the safety sailing, vessel lost, people load and sea pollution.

In 1973, IMO safety committee in the twenty seventh meeting brought up the discovery on the difficulty of communication in marine and seafaring. Based in the result of the meeting and convention, it has come to conclusion that the language used for Marine and seafaring is English and in Marine Education and Training is well known as Maritime English. The marine and seafaring communication standard is then called as Standard Marine Vocabulary (SMNV). This standard is issued in 1977 and amended in 1985.

In 1992, IMO safety committee in the sixteenth meeting particularly in IMO subcommittee on safety of navigation revealed the concept SMNV which had been developed previously. This concept was later on replaced by the new concept called Standard Marine Communication Phrases (SMCP) replacing the old SMNV.

Maritime English and Bridge Simulator

The regulator I/12 STCW clarifies and points out ways on how operate the simulator in the marine and seafaring competence testing and training STWC in 1978 amendment 2010 annex 2010.

By using the assessment descriptor, the examiners could easily assess the students' knowledge and skills more consistently. Popham (2003) stated that if the assessment descriptor could be eventually achieved then the descriptor should be communicated comprehensively to all the instructors who gave the assessment so the students can get the picture on the output and outcome that should be accomplished in the assessment process.

Coutrubis (2000) revealed the 3 factors that should be taken into account on terms of organizing the assessment descriptor. i.e. (1) range statement, which specifies the context, activities, process and equipment to which the descriptors applies in respect to which the competence is developed. (2) Actual competence, often described as the learning outcome. (3) Performance criteria, statements which specifies how evidence should be gathered to demonstrate that the competence has indeed been acquired.

Here is the assessment descriptor that is arranged and organized by paying more serious attention on the things mentioned and stated earlier.

Table 1. Assessment Descriptor with Bridge Simulator

Descriptor				
Criteria	Very Skillful (Point = 4)	Skillful (Point= 3)	Not Skillful (Point = 2)	Really Not Skillful (Point = 1)
Procedure	Procedure is suitable with the situation given	Procedure is suitable with the situation given	Procedure is not suitable with the situation given	Procedure is not suitable with the situation given and threatens the marine and seafaring safety.
Action	The action taken in suitable with the order of procedure	Mistakes occurred within the order of procedure	Take no action	Take no procedural action and threaten the marine and seafaring safety.
Communication	Communication using SMCP	Communication using SMCP	Not using SMCP	Not using SMCP
	Communication done properly	Comprehensible yet required repetition	Mistakes occurred in order of words and continuously happened.	The communication is hardly understood and continuously happened.

With regard to the communication among vessels, the ship or vessel's navigation activities simulation is organized in scenario shown up in bridge simulator using COLREG 72-part B, rule 13 to 18. The situation related particularly the one in article 13 to 18 is illustrated in the following Figure 1.

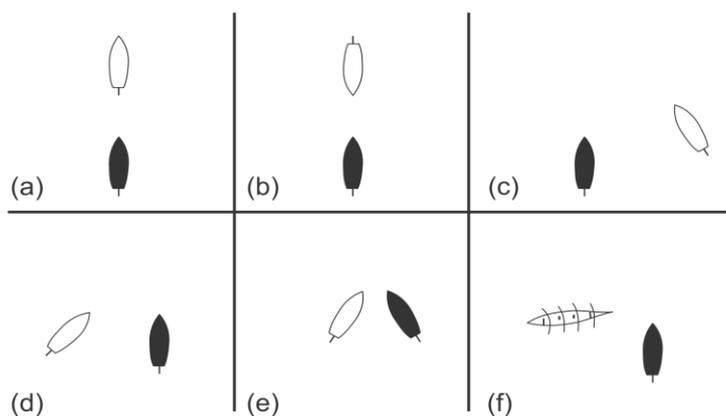


Figure 1. The vessels' position in the restricted sailing area (Source: T. N. Blakey (1987) English for Maritime Studies.)

Authentic Assessment

An authentic assessment constitutes a kind of task or duty that pushes the learners to show the real productivity and performance in the real world as a realization and implementation of the essence of knowledge and skills (Mueller, 2008).

According to Hart (1994) the authentic assessment can be defined as an assessment in order to get the students to do the important, meaningful, authentic tasks. According to Hart (1996) there are several authentic assessment types, they are (1) productivity assessment (2) questions and observations (3) presentation and discussion (4) project and investigation and (5) portfolio and journal.

According to John Mueller (2008) authentic assessment is a kind of assessment where the students are asked to present the task or assignment given on reality based study which describes and demonstrates the realization and implementation of the useful skills and knowledge. Similar opinion is as well stated by O' Malley and Pierce (1996) who defined authentic assessment as an evaluating process which involves several measurement and assessment of performance reflecting the learning process, achievements, motivation and attitude of the students particularly in the relevant learning activities.

David W. Johnson and Roger T. Johnson defined the authentic assessments a dispensable prerequisite which requires the students to demonstrate the procedure and skills in the real world context. Therefore, to ensure the consistency of assessment particularly or authentic assessment, the rubric or section is used.

Table 2. Learning Outcome Assessment Section

Subject		Score			
SMCP	A	B	C	D	
	80 - 100 Very Good Proper procedure, proper terminologies, properly well- communicated	70 - 79 Good Proper procedure, proper terminologies, properly well- communicated yet requires repetition.	60 - 69 Enough Not using SMCP. Wrong terminologies and keep repeating yet still understandable.	50 - 59 Below Average Not using SMCP. Keep repeating and hard to be comprehended.	

The score equivalence of the table above in comparison to the marine or seafaring students' productivity and performance assessment scores can be summarized as follows:

Authentic Assessment Learning Model Effectivity

Effectivity can be defined as how an organization successfully obtain, use and utilize the natural resources possible in an attempt realize the operational goals. (Mulyasa, 2004).

Learning effectivity according to Robert E. Salvin (1980) consists of four (4) indicators i.e. (1) learning quality (2) learning level appropriateness (3) students' motivation (4) learning time.

**Table 3.** Learning Outcome Equivalence toward the Performance Level

Subject	Score			
SMCP	A	B	C	D
	80 - 100	70 - 79	60 - 69	50 - 59
	Very Good	Good	Enough	Below Average
	Very convincing performance and very useful.	Very convincing performance and useful.	Less convincing performance and less useful.	Not convincing performance and Not useful.

Besides the opinions stated earlier, according to Egger and Kauchak, quoted by Sinaga (1999), learning process is considered effective when the students are involved actively in the organizing and finding the information (knowledge) process. The more active the students are, the greater the learning exhaustiveness achieved.

Research Method

Research Model

The research conducted is research and development based using the development model developed by Borg and Gall (2003). The research model is in line with the research objective i.e. to create Maritime English Learning Model using authentic assessment based bridge simulator in order to enhance and improve the students' competence in Maritime English.

There are four (4) steps on how to build a better research and development (R and D) which then modified by proposing the learning model elements developed (stated) by Joyce Bruce, Weil Marsha and Calhoun Emily (2011). They are: syntax, social system, reaction principle, and supporting system as well as instructional impact and supporting impact which finalized by Nieven (2007) with the quality criteria of the product.

Research Instrument

Model Implementation Observation

The model implementation observation is utilized to get the data on the model practicability. The observation is carried out to observe the developed model implementation. The result of the observation is categorized into four categories i.e. all achieved, mostly achieved, partially achieved, and not achieved.

Learning Outcome Assessment

Learning Outcome Assessment sheet constitutes an instrument used to find out the model effectivity. The marine and seafaring simulation is conducted in four (4) scenarios. The assessment covered three aspects i.e. (1) marine and seafaring communication procedure (2) terminologies used in the marine and seafaring communication (3) the usefulness of utterance.

Data Analysis Technique

The students' learning outcome effectivity data in learning process using MEBS Model can be observed from 3 aspects i.e. (1) normalized gained average

(2) minimal exhaustiveness criteria (KKM) and (3) classical exhaustiveness or completeness.

Normalized gained average analysis result before and after the learning activates using MEBS Model is processed in order to know the improvement and progress of the students. The quantity of the progress or the number of increase before and after the learning activities is counted and calculated using Wilcoxon Signed Rank Test this kind of test was carried out as an alternative test from pairing test or t-paired test or examination whenever the normality assumption is not achieved.

The distribution of the values (scores) is presented in the form of frequency distribution after being converted by scale i.e. 5 under the following categories, study the table below:

Table 4. The Category of the Students' Learning Outcome

Score Interval	Category
80 - 100	A = Very Good
70 - 79	B = Good
60 - 69	C = Enough
50 - 59	D = Below Average
0 - 59	E = Poor

The criteria of program minimal completeness or exhaustiveness is minimally 70 i.e. the minimal score set in QSS (Quality Standard System) in the marine and seafaring Education and Training Implementation Guideline no. 2162 year 2010.

Based on the criteria stated earlier, whoever student achieves the score over 70 wins the learning outcome completeness or exhaustiveness, while the classical completeness or exhaustiveness is determined by the number of students who achieve the score minimally 70. The students' learning outcome is considered effective when the minimal classical completeness or exhaustiveness achieved is 85% from the total students who get the score at least 70.

Results

The Assessment of the Learning Style Simulation in Tanjung Perak, Belawan, Balikpapan and Malaka Strait

The analysis result or outcome with SPSS that the average score for negative rank is 0 (zero). While for the positive rank has the average point for as much as 15 with the quality of ranking is 435. The value is 5, 166 with the probability as much as 0,000.

The probability value 0,000 is below $\alpha = 0.01$. Then it can be concluded that there is a significant difference in the learning result or outcome between the MEBS Model before and after.

There is a significant improvement in the outcome of the students' learning activities after using the MEBS Model. This can be seen from the difference or value gap which describes the difference in treatment before and after MEBS.



Out of 30 students being observed in Tanjung Priok, 29 of which experience progress and 1 of which remains still and no student experience lost or decline. The increase and progress as well as improvement and development after applying the MEBS Model is enormous i.e. 96.7% and merely 3.3 % of the students experience regular learning result or outcome.

The analysis result using Cross Tabulation showed that the value of Chi Square Person of Significance is 0,000. This reveals that there is a strong correlation between the students learning score and the MEBS Model.

In addition, the minimum exhaustiveness or completeness criteria for the ANT II program is minimally 70 (based on the PM no. 2162 year 2010). According to the rule of criteria, whoever students could reach the score over 70 considered pass and complete the learning activities.

While classical exhaustiveness or completeness result is considered or deemed effective when the classical exhaustiveness or completeness falls under minimum number of 85% of the students.

The students who passed the learning result exhaustiveness or completeness and possess the score more than 70 are approximately 26 people. The students who hold the score over 70 or exceeding 70 are around 86.7%.

This percentage bigger than 85% required to be considered and deemed pass the classical exhaustiveness or completeness. This analysis proves that the learning model is considered **effective** based on the result of the learning taken from 4 (four) different scenarios.

The Interview of the Students' Responses

Based on the average percentage value from 30 respondents on the eight (8) questions addressed, it is found that 91.7% of the students responded with the average value 4.9. The value showed that the students gave response very positively toward the use of the MEBS Model.

This score is bigger than 70% of the minimum prerequisite of a model to be categorized effective. While the average response of the respondents for negative category merely around 8.3 %. This score (value) is smaller than 30% of the MEBS Model to be categorized ineffective.

This overview and explanation shows that based on the interview result, it can be stated that the MEBS Model is an **effective** model.

Discussion

The discussion over the analysis result and outcome is carried out in this stage in order to find out whether or not the MEBS Model can be categorized valid, practical and effective. The discussion of validity is done toward the MEBS Model and learning tools or instruments (such as RPP, LKPS, and SMCP Modul). The discussion is conducted and carried out on the basis of the result of the statistical analysis as what is stated earlier in the research result stage.

Based on the analysis of the students' learning result or outcome, it's found that the average value of the student who hold the score more than 70 is bigger than the minimum prerequisite of a learning result to achieve classical completeness or exhaustiveness.

This analysis proves that based on the learning result from the four (4) different scenarios, it can be stated that the learning model applied is **effective**.

According to Indonesian Big Dictionary (1994) the word effective means that it has brought into effect (result, influence, impression, etc.) which leads to deliver the best result and resourcefulness expected possible.

The MEBS Learning Model shows that classical exhaustiveness or completeness is achieved. There is a synchronization between the students who did the navigation and the communication as well as the target or goal directed. This success in learning is line with what Mulyasa (2004) said that effectivity can meant and defined as how an organization can successfully obtain the resources in pursuit of the operational goals.

The effectivity of the MEBS learning model can be seen by the improvement or progress in the learning quality which measured by the success of the students in understanding the lessons given and mastering the skills taught in the learning process.

Based on the interview result analysis toward the students, it's found that the average percentage value showed that the majority of the responded **very positively** toward the use of MEBS Learning Model. Therefore, it can be summarized that the use of MEBS Model is **effective**.

Conclusion

The level of practicability is measured based on the model exhaustiveness or completeness, while effectivity level is valued based on the analysis result of the learning and interviewing. The analysis of syntax practicability in the learning phase using Bridge Simulator, social system, and other supporting system all come down to one single word i.e. **very effective**.

All of the model components used practically could be properly used with the assistance of the MEBS Model. The MEBS Model Based Learning is proven to be helpful for the students to accomplish their learning result or outcome completely. The percentage of all students' learning result particularly in conjunction with utilizing and applying the MEBS Model is considered classically completed.

Having seen all of the students' analysis result particularly on learning and interviewing, it can be concluded that the MEBS Model is proven to be an **effective** model. By using bridge simulator, the students demonstrated the skills and knowledge which are useful, interesting, relevant and meaningful especially in relation to their lives or occupation as students of the trading seafarers.

Merchant Marine Academy, Makassar as the authorized institute that has received the official approval statement to conduct and carry out the education program of ANT II. It is strongly recommended to apply and realize the bridge simulator method as a learning tool or instrument in Maritime English using the model developed in this research. Therefore, it is recommended to add more of two (2) bridge simulators since the existing model installed currently is deemed far from being enough still particularly to facilitate all the similar educational programs or the like with the same level or the same nature.

Disclosure statement

No potential conflict of interest was reported by the authors.

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