Comparative Study of Lecture Demo and Practical Utilization in Learning Auxiliary Machinery

Asia Pacific Journal of Maritime Education
Vol. 4 No. 1-7
June 2018
P-ISSN: 2423-2033
E-ISSN: 2467-513X
apjme@lpubatangas.edu.ph
www.apjme.apjmr.com

Ghes Abanilla, Arvin Almarez, Harold Aranas, Arnedo Manalo Jr., Ransel Ilagan, Beverly T. Caiga, Joselito P. Flores
Marine Engineering Department, Lyceum International Maritime Academy, Lyceum of the Philippines University-Batangas
abanillaghes@gmail.com, almarezarvin27@yahoo.com, haroldaranas@gmail.com, rndmanalo15@gmail.com ranselilagan1020@gmail.com

Abstract - *This research was conducted in order to provide insights and knowledge about the Comparative Study of Lecture Demo and Practical Utilization in Learning Auxiliary Machinery. This study made use of descriptive research method with 141 third year BS Marine Engineering students that were chosen on the basis of purposive sampling, is a non-probability sampling method that is based on the qualities of a population and the objective of the study. Survey questionnaires in alternate forms were used as the main data gathering instrument. Majority of the respondents ranges from 19 – 21 years old with a frequency of 73 which composes 51.80%. The results of the study showed no significant difference between two teaching strategies which are the lecture demo and the practical utilization method. Thus, it has been recommended to enhance procedures in the curriculum as well as the teaching tools to achieve a better performance of the students shown in the form of grades for the course Auxiliary Machinery.*

Keywords: *Auxiliary Machinery, purposive sampling, alternate forms*

INTRODUCTION

The utmost requirement in the training operation of the engine room simulator is the students' understanding. Teaching practice demonstrates that the training time of the engine room simulator is better included to the simulator laboratory after the students has studied the professional courses and finished the training of the Marine Engineering. This was included in practical training from knowledge learned.

One of the previous styles of teaching method was "chalk and talk method" where lecture demo is aligned to. It was first recorded from China. Here, the method makes use of teacher-centeredness where teachers are active and learners are passive. In this method, the essential qualities in learning such as independent thinking, power of observation and reasoning can be developed at hand (Donelly, 2014). Outcome-based approach of teaching and learning process provides holistic method towards the attainment of student outcomes and experiences that will serve as foundation for future and practical application of theories and knowledge-based content of instruction (Chavez et al., 2016; Chavez et al., 2014; Laguador, 2015; Velasco et al, 2015

Moreover, there are benchmarks for a lecture demonstration method to be considered effective. First, the demonstration should be planned and well-rehearsed in advance. In every operation at all field, planning and rehearsing are very essential for it gives confidence and direction in the processes to the demonstrator. Next, the teacher should be clear on the purpose of demonstration. Objectives and significance must also be cleared. Finally, the demonstration should be the outcome of the active participation of students and teachers.

On the other hand, practical demonstration involves the application of the learners in practicing and applying the necessary knowledge, skills, abilities, and etc., basically from the learning from the lecture demonstration. The learning may also be assessed through tutorials, role play, modelling, discussion, and self-assessment (Brown, 2015).

Basically, in this method, as the instructor performs the experiment in class and explains what he does, the students could actually see the apparatuses and operations to help the teacher in presenting the experiment. This applies on the principles of concrete to abstract and learning by doing which was also termed as Dewey's pragmatism, meaning reality experience (Jordan, 2003).

In Bachelor of Science in Marine Engineering, one of the major subjects required to be taken by the

students is Auxiliary Machinery. The course, Auxiliary Machinery, was being involved to all machinery and apparatuses forming non-propulsive equipment of a ship. The study is being conducted to further assess the comparisons of the lecture demonstration and the practical utilization offered in Marine Engineering students.

The researchers believe that the result of this study will show the comparison in the knowledge gained through lecture demo and practical utilization in learning Auxiliary Machinery course. Based on word of tongues, not all the students in the maritime industry have above average in practicing Auxiliary machinery skills. This is why the researchers conducted this research to assess the students learning in this course by providing several questions to be answered by the students about learning that they obtained. This will also challenge the effectiveness of teaching methods that are generally utilized in the university.

OBJECTIVES OF THE STUDY

This study aimed to compare the learning of Auxiliary Machinery course to the Marine Engineering Students of LPU-LIMA through lecture demo and through practical demo utilization.

Specifically, (1) to identify the profiles of respondents in terms of age and grades in Auxiliary machinery, (2) to determine learning through lecture method and practical utilization, (3) to compare the lecture demonstration and the practical utilization in learning Auxiliary machinery, and (4) to propose measures for enhanced learning based on the result of the study.

METHODS

Research Design

This research study makes the usage of descriptive method of research. Descriptive research, describes and interprets what is. It is concerned with conditions of relationships that exist, practices that prevail, beliefs, processes that are going on effects that are being felt, or trends that are developing. The process of descriptive research goes beyond mere gathering and tabulation of data. It involves the elements or interpretation of the meaning or significance of what is described. Thus, description is often combined with comparison and contrast involving measurements, classifications, interpretation and evaluation which fits mainly to the comparative study that the researchers want to establish in the conduction of this research (Calderon & Gonzales, 1993).

Participants

The population of the study is comprised of 141 third year students of Bachelor of Science in Marine Engineering who were selected through purposive sampling. In this technique, the respondents were selected because their qualification as cadets who have taken the course Auxiliary Machinery suits the research. It is a non-probability sampling method that is based on the qualities of a population and the objective of the study. This kind of sampling is very useful in situations in order to reach a targeted sample quickly, and where sampling for proportionality is not the major concern (Cohen, 2010).

Table 1. Demographic Profile of the Respondents Percentage Distribution of the Respondents' Profile

Profile Variables		f	%
Age			
	16 - 18 y/o	58	41.10
	19 - 21 y/o	73	51.80
	22 yrs old and above	10	7.10
Grade			
	1.00	3	2.10
	1.25	1	0.70
	1.50	2	1.40
	1.75	22	15.60
	2.00	34	24.10
	2.25	36	25.50
	2.50	29	20.60
	2.75	9	6.40
	3.00	5	3.50

Instrument

The researchers utilized a two-part questionnaire. Part 1 contains the letter from the researchers and the demographic profile consisting of age and grades. A self-made research questionnaire was used in data gathering. Part II contains self-assessment in learning Auxiliary Machinery through lecture demo and through practical utilization in separate alternate forms for each to prevent the carry-over effect in rating the items.

The questionnaire is comprised of questions modified from related researches from books and online references. Each questions formed by the researchers were made in alternate forms and was validated by the research professor. The survey is comprised of 10 questions for each category, which are related to their learning in the subject.

The content of the questionnaire was further explained to the respondents to which they are given

P-ISSN: 2423-2033 | E-ISSN: 2467-513X

ample time to accomplishment. Retrieval, tallying and interpretation followed.

The following arbitrary were gathered from the instruments collected in items in terms of learning and grades in Auxiliary Machinery. The reported data of the BSMarE students in the learning in Auxiliary Machinery are, 3.50-4.00 = Strongly Agree, 2.50-3.49 = Agree, 1.50-2.49 = Disagree, 1.00-1.49 = Strongly Disagree. This statistical tool was used according to the objectives of the study.

Procedure

The researchers utilized two methods of data collection in the study, namely the secondary and primary data collection. Secondary data collection was made through gathering materials from books, articles, and online references in order to build a comprehensive background of their study. The primary collection of data was performed through the use of valid and reliable instruments.

The researchers utilized purposive sampling method where respondents were chosen because of their acquired curriculum. The questionnaires were then disseminated to 141 BS MarE-III students. The researchers then informed the respondents that the statements should be rated honestly to the best of their knowledge.

Afterwards, tallying has been done by the researchers and computed the weighted mean per item. This was made to compare the learning gained by the respondents between lecture demonstration and practical utilization. Next, the overall mean was computed to obtain the t-value and p-value to see if there is a significant difference between the teaching methods.

Furthermore, the researchers assured confidentiality of their questionnaire sheets since the identities are not important. Participants were given time to respond and then the researchers collected the questionnaires right after the participants finished answering the survey.

Data Analysis

The needed data were tallied, encoded and interpreted using different statistical tools such as frequency distribution, weighted mean and independent sample t-test. These tools were used based on the objectives of the study. In addition to these, all data were treated using PASW version 10, a statistical software, to further analyze the results of the study while ensuring its confidentiality.

The given scale was used to interpret the result of the data gathered: Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 – 1.49 = Strongly Disagree.

RESULTS AND DISCUSSION

From the computations of weighted mean, the results in the above table states that at a composite mean of 3.32, the learning of course Auxiliary Machinery through lecture demo has been gained in the method. All items were rated agree where the item can discuss the process of basic refrigeration system, gained the highest score.

As observed in the LIMA BS Marine Engineering curriculum, refrigeration system is being tackled not just once per course. Moreover, it also overlaps the other engineering subjects which makes it easy for the respondents to learn the subject.

Table 2. Learning in Auxiliary Machinery through Lecture Demonstration

Indicators	WM	VI	Rank
1. I can fully discuss the functions of pumps in terms of their application.	3.34	Agree	4
2. I can identify the various losses in pump capacity while in operation.	3.21	Agree	10
3. I can differentiate the three main classes of pumps.	3.28	Agree	9
4. I have knowledge in the operation of pumps.	3.34	Agree	4
5 I can differentiate the types of valves according to its uses, application and function.	3.31	Agree	6
6. I can discuss the process of basic refrigeration system	3.39	Agree	1
7. I can distinguish the components of refrigeration system.	3.31	Agree	7
8. I can discuss the importance of refrigerant.	3.35	Agree	2
9. I can discuss the classification of refrigerants.	3.3	Agree	8
10. I know the difference between refrigeration, air conditioning, and ventilation.	3.34	Agree	4
Composite Mean	**3.32**	**Agree**	

P-ISSN: 2423-2033 | E-ISSN: 2467-513X

It was followed by item can discuss the importance of refrigerants which according to the respondents it is in high utility when it comes to the course that's why they were self-reinforced to learn the topic.

This is supported by Rosenthal (2012) in her article where she stated that although refrigerants have such levels of toxicity, these are less concern with some chemical and automotive industries since these are the areas where it is at its most utilization.

With the same ranking is know the difference between refrigeration, air conditioning, and ventilation. It this item, majority of the random respondents had inferences that the topic is enticing due to its proximity of work as future marine engineers.

This was supported by Aldforman (2003), stating that the differences between these subtopics are one of the major knowledge to earn in learning the course Auxiliary Machinery. This is to get to know the kind of job the students are getting into.

However, items such as can discuss the classification of refrigerant got a low score. Since this is one of the topics the students are in confusion due to one-way communication with professors, the item got a 3.3 mean.

These categories of refrigerants were somehow not clarified by the respondents from their professors due to their own learning conflict for each classification. As stated by Hawse (2006), the classification of refrigerants tends to vary in its safety, toxicity, and flammability.

The next lower item is can differentiate the three main classes of pumps (3.28) where according to the respondents is one of the incomprehensive lesson from the course Auxiliary Machinery. According to Hicks (2014), pumps can be classified by their way or process of displacements. There are two main types of pumps: positive displacement and centrifugal.

Finally, the item that got the lowest score, can identify the various losses in pump capacity while in operation, with a mean of 3.21. According to interviews conducted to random respondents, problems in the subject aroused from the difficulty of the subject itself no matter how they tried learning the topic themselves.

Trenchlesspedia.com (2017) cited that pump capacity can be defined as a term used in describing maximum flow rate through a pump at specific conditions and makes the use of unit gallons per minute (gpm) or cubic per meter per hour (m^3/h).

From the results in Table 3, it shows that all the items were rated agree, therefore, learning Auxiliary Machinery through practical utilization is an acceptable method for the students.

The item that got the highest weighted mean is knowing the difference between refrigeration, air conditioning, and ventilation.

From further investigation on the results, it was found that this subtopic for the course has been reiterated and explained on the BS MarE-III students not only once in a semester. As it was cited by Campus (2017), the main objective of refrigeration, air conditioning, and ventilation is to prepare students for direct service in the, ventilation, air conditioning and refrigeration industry, including the areas of installation, service technicians, maintenance, sales and design.

It was followed by the item can discuss the importance of refrigerant (3.38). According to random respondents, the importance of refrigerants and learning the process of basic refrigeration system were always one of the key objectives in studying the course subject, making it a must-to-know topic.

Table 3. Learning in Auxiliary Machinery through Practical Utilization

Indicators	WM	VI	Rank
1. I can identify the types of pumps generally used in ships according to their functions.	3.35	Agree	4
2. I can differentiate the different types of pumps as to its operation.	3.22	Agree	10
3. I can identify pumps in accordance to their main classes.	3.31	Agree	6
4. I can discuss pump operations.	3.3	Agree	7
5. I can discuss the uses and functions of valves depending on their types.	3.26	Agree	9
6. I can discuss the operation of Refrigeration System.	3.36	Agree	3
7. I can label the components of Refrigeration System.	3.34	Agree	5
8. I can discuss the flow of refrigerant in the Refrigeration System.	3.38	Agree	2
9. I can identify the different types of refrigerant as to its usage.	3.28	Agree	8
10. I can differentiate the uses of refrigeration, air conditioning and ventilation.	3.38	Agree	1
Composite Mean	**3.32**	**Agree**	

P-ISSN: 2423-2033 | E-ISSN: 2467-513X

As cited by United States Department of Agriculture (2015), refrigerant is of key importance in keeping foods safe, to supply a common source of cold air, etc.

The item can discuss the process of basic refrigeration system gained a mean of 3.36. Some respondents claimed that the reason why it's called basic is that it is one of the foundations of the subject to learn the next complex topic.

According to Tomczyk (2005), mastering the functions of basic refrigerant system can assist professionals like engineers by providing analytical troubleshooting skills to save time and money for both of them of the employer.

On the other hand, some items got low scores such as can identify the different types of refrigerants as to its usage (3.28) where respondents claimed that hardships were encountered learning the subject due to confusions on the topic.

As stated by Leehawke (2004), it is important to know the different types of refrigerants so as to know what happens inside a specialized refrigeration unit.

The lower item which got a mean of 3.26 can discuss the uses and functions of valves depending on their types where clarifications were left on by themselves due to confidence issues talking about the subject to the professors.

It was cited by Remington (2011) that it is important to identify the functions of valves to know their applications in the industry. Its durability and reliability across the years have been given importance.

Lastly, the item can differentiate the different types of pumps as to its operation, got the lowest score which is the same status with the other teaching method. Claims of random respondents include both the difficulty of the subject and lack of student-teacher communication.

According to Ellie (2013), some functions of pumps involve removing water from a source, maintaining pressure and circulating it in the system.

Table 4. Difference of Responses on the Learning in Auxiliary Machinery Course between Lecture Demo and Practical Utilization

	type	Mean	t-value	p-value
Result	lecture	3.32	0.015	0.988
	practical	3.32		

**Significant at p-value < 0.05*

Based from the results of the study, computed p-value is greater than 0.05 alpha level, thus, the researchers fail to reject the null hypothesis of no significant difference on the learning obtained through lecture and practical demonstration. This means that the learning using the two methods are the same.

Lecture demonstrations can be very effective for illustrating concepts in class, but can result in passive learning without careful attention to engaging students. They can provoke students to think for themselves and are especially helpful if the demonstration has a surprise, challenges an assumption, or illustrates an otherwise abstract concept or mechanism. Lecture demonstrations that use everyday objects are especially effective and require little preparation on the part of faculty. Students' interest is peaked if they are asked to make predictions and vote on the most probable outcome (Anderson B., 2011).

It is hard to imagine learning to do science, or learning about science, without doing laboratory or field work. Experimentation underlies all scientific knowledge and understanding. Laboratories are wonderful settings for teaching and learning science. They provide students with opportunities to think about, discuss, and solve real problems. Developing and teaching an effective laboratory requires as much skill, creativity, and hard work as proposing and executing a first-rate research project.

CONCLUSIONS AND RECOMMENDATIONS

Marine Engineering students agreed that both learning through lecture demo and practical utilization indicates that knowledge is being sought in both methods. There is no significant difference in learning Auxiliary Machinery using both teaching methods. A plan of action was proposed to improve the learning in Auxiliary Machinery with grades as the key performance indicator.

It is recommended that LIMA Department may review the content of the syllabus for the courses pertaining to the Auxiliary Machinery to improve the delivery of teaching and how knowledge can be assessed. The Department may provide more auxiliary machineries such as different kind of pumps to easily learn how it works and to familiarize. Provide more laboratory hours on this course is also recommended. It is recommended among future researchers to conduct their studies similar or related to the present study to an organization with a wider network of population to have a higher level of representativeness.

P-ISSN: 2423-2033 | E-ISSN: 2467-513X

Table 5. Proposed Plan of Actions to improve the performance of Marine Engineering Students in learning Auxiliary Machinery through Lecture Demo and Practical Utilization

Key Results Area	Strategies	Persons Involved
A. Lecture Demo		
1. Improved of the Student Performance in Auxiliary Machinery	Conduct a discussion group to improve learnings about auxiliary machinery. Allot more time to enable students understand the operation.	Department Chair, MarE Students, Auxiliary Machinery Professor Department Chair, MarE Students, Auxiliary Machinery Professor
2. Familiarizing about the pump operation onboard.	Provide an assessment exam before staring the lecture.	Department Chair, MarE Students, Auxiliary Machinery Professor
3. Enhance learning about Classification of Refrigerants.		
B. Practical Utilization		
1. Improvement of the Student performance in laboratory activities.	Give a lot more of time in labarotory activities to enhance their knowledge.	Department Chair, MarE Students, Auxiliary Machinery Professor
2. Familiarizing about the function of the valves depending on their types.	Emphasize more on function of the valves and the importance of it. Re orient the usage of refrigerant in Refrigeration System.	Department Chair, MarE Students, Auxiliary Machinery Professor Department Chair, MarE Students, Auxiliary Machinery Professor
3. Enhance learning about the types of refrigerant.		

REFERENCES

Aldforman (2003) Auxiliary Machinery.2nd Ed. pp. 39-45

Anderson B. (2011) The Tested Demonstrations. Retrieved from: https://goo.gl/Eqyjz5

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational researcher*, *18*(1), 32-42.

Calderon, J. F., & Gonzalez, E. C. (1993). *Methods of research and thesis writing*. National Book store.

Campus, B. (2017) Ventilation, Air Conditioning & Refrigeration Technology. Retrieved from: https://goo.gl/mneBk3

Chavez, N. H., Dotong, C. I., & Laguador, J. M. (2014). Applied Cooperative Learning Approach Employed on Industrial Engineering Laboratory Courses. *Asian Journal of Educational Research*, *2*(2).

Chavez, N. H., Dotong, C. I., Camello, N. C., & Laguador, J. M. (2016). Employability of Engineering Graduates of one Asian University as Basis for Curriculum Review. *EPH-International Journal of Science and Engineering (ISSN: 2454-2016)*, *2*(6), 18-29.

Cohen, R. (2010). Exercises in psychological testing and assessment: An introduction to tests and measurement (7th edition). New York: McGraw-Hill.

Ellie, F. (2013) Introduction to Auxiliary Machinery. 2nd Ed. pp.113-149

Hawse, Q (2006), Auxiliary Machinery and Its Basics. 3rd Ed. pp. 79- 85

Hicks, T. (2014) Improving Pumping System Performance: A Sourcebook for Industry, Second Edition, May 2006. Accessed 2015-05-22.

Jordan, A. (2003) Pragmatism. Retrieved from: https://goo.gl/SYmDqP

Laguador, J. M. (2015). Industry Skills and Training Requirements Towards Employability. *International Journal of Multidisciplinary Academic Research*, *3*(2), 7-10.

Laguador, J.M., Aguba, H. A., Dinglasan, B.L.H (2013). Correlating the Performance in Navigation II Course of BS Marine Transportation Students with Socio-Economic and Intellective Factors, Journal of International Academic Research in Multidisciplinary

Leehawke, J. (2004) Refrigerant System and Its Components.5th Ed., pp.39-48

Remington, L. (2011) Auxiliary Machinery in the Millenium. 3rd Ed. pp. 128-137.

Rescover A. (2012) "Practice" Educational Psychology. pp. 145-159

Rosenthal, E. (2012) Refrigerants. Retrieved from: https://goo.gl/CFbcPp

Tomczyk, J. (2005) Basic Refrigeration System. Retrieved from: https://goo.gl/9pUoQK

Trenchlesspedia.(2017) Pump Capacity. Retrieved from: https://goo.gl/ZFDgFf

P-ISSN: 2423-2033 | E-ISSN: 2467-513X

United States Department of Agriculture (2015) Importance of Refrigerant System. Retrieved from: https://goo.gl/SC2KRE

Velasco, A. G., Agena, E. M., Orence, A. C., Gonzales, A. A., Beldia, R. A., & Laguador, J. M. (2015). Emotional elements on learning style preference of high and low performing junior marine transportation students. *International Journal of Multidisciplinary Academic Research*, *3*(1), 1-8.

P-ISSN: 2423-2033 | E-ISSN: 2467-513X