

DEVELOPMENT OF INTERACTIVE DIGITAL PRACTICUM MODULE SHIP LINES PLAN METHOD NEDERLANDSCH SCHEEPBOUWKUNDIG PROEFSTATION (NSP) BASED FLIPBOOK

Zakwan Hilmy¹, Tri Mardalena², Zalmi Dzirusydi³

¹Prodi Teknik Perkapalan, Universitas Karimun, Indonesia

^{2,3}Prodi Manajemen Kepelabuhan dan Pelayaran, Universitas Karimun, Indonesia

zakwanhilmy013@gmail.com¹, mardalena.tri@gmail.com², zalmi270288@gmail.com³

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ABSTRAK

Abstrak: Pendidikan merupakan suatu kegiatan pengembangan manusia untuk menghadapi perubahan akibat perkembangan ilmu pengetahuan. Salah satu kegiatan pendidikan untuk mendapatkan pengalaman nyata adalah kegiatan praktikum. Hampir seluruh program studi khususnya berbasis Teknik menerapkan metode praktikum dalam proses pembelajarannya. Salah satu jenis praktikum yang dilakukan pada program studi Teknik Perkapalan adalah tugas merancang lines plan kapal. Untuk melakukan perancangan ini mahasiswa membutuhkan suatu pedoman atau panduan praktikum. Permasalahan yang dihadapi saat ini adalah kurangnya sumber berupa modul ajar atau pedoman praktikum lines plan kapal tersebut. Saat ini modul yang tersedia hanya berupa modul biasa yang memiliki desain kurang menarik dan substansi yang kurang informatif. Oleh sebab itu dilakukan penelitian ini dengan metode penelitian Research and Development (R&D) dengan menggunakan model pengembangan Borg dan Gall-18. Tujuan dari penelitian ini adalah untuk menghasilkan suatu modul elektronik berbasis flipbook yang interaktif untuk praktikum perancangan lines plan kapal. Hasil penilaian produk oleh validator ahli desain dan materi didapatkan nilai sebesar 85% dan 87% dengan kategori Sangat Valid. Hasil pengujian pada mahasiswa mendapatkan G-Score sebesar 0.7 dengan kategori Tinggi. Hasil uji respon mahasiswa didapatkan persentase sebesar 98% dengan kategori sangat positif. Hasil ini membuktikan modul ajar lines plan kapal berbasis flipbook ini sudah layak digunakan dan mampu meningkatkan kemampuan kognitif dan pemahaman mahasiswa.

Abstract: Education is a human development activity that addresses changes resulting from scientific advancement. Practicum activities are one of the best ways for students to gain real experience. The practicum method is used in almost all engineering-based study programs. The Shipbuilding Engineering program requires students to design a ship's line plan as part of their practicum. Students must have a guideline or practicum guide to complete this design. The problem that is faced at this time is the lack of sources in the form of teaching modules or guidelines for the practicum for the lines of the Plan of Practicum. Currently modules are simply ordinary module with an unattractive design and less informative content. This research was conducted using the Research and Development (R&D) method using Borg and Gall-18. The aim of this research is to produce a flipbook-based electronic module for ship line plan design practicum. The product was rated 85% and 87% for "very valid" by design and material expert validators, respectively. Students achieved a G-score of 0.7, which is in the high category. The results of the student response test obtained a percentage of 98% with a very positive category. These results confirm that the flipbook-based teaching module for ship lines plan design is a valuable and effective educational resource that can enhance students' cognitive abilities and understanding.

A. INTRODUCTION

Education is a long-term investment that has strategic value for world civilization. (Yuliasari, 2017). Education enables individuals to develop the capacity to adapt to changes driven by scientific and

technological advancements (Yunian Putra & Anggraini, 2016). One of the learning activities that affords the opportunity to gain practical experience is the practicum, which involves students applying the knowledge and skills they have acquired to address

real-world problems by utilizing the facts and data they have collected (Izaak, 2008). The implementation of practicum activities requires the presence of an adequate guide. The role of the guide is to provide students with the necessary resources and guidance to ensure the effective conduct of these activities.(Mastura et al., 2017). According from Nurbaeti (Nurbaeti, 2020) This practicum guide has been developed with the objective of assisting learners and teachers in the effective achievement of the activities' objectives and the fulfillment of the practicum's aim. (Handayani et al., 2016; Syamsu, 2017). Practicum is one of the learning processes that aims to provide students with a comprehensive understanding of theoretical and practical knowledge. (Nisa, 2017) according (Susanti, 2013) Practicum activities provide an opportunity for students to develop the ability to apply their knowledge, skills, and scientific understanding to the investigation of a given object of study. In order to facilitate this process, it is essential to have a module or practicum guide in place to serve as a reference for students undertaking the practical work. By (Nurdyansyah & Mutala'iah, 2015) on (Maulida, 2022) A teaching module is a learning tool designed to facilitate the attainment of defined competency standards.

One potential solution to the development of innovative teaching materials is the utilisation of e-books. The objective of employing this e-book is to digitise the existing teaching materials, thereby enhancing their flexibility. The integration of e-books represents a modification of learning activities in accordance with technological advancements. The findings of the validation conducted by experts on Saputri and Rizkita indicate that the utilisation of e-books as teaching materials is a highly viable proposition.(Rizkita & Wahjudi, 2016; Saputri & Susilowibowo, 2020). Furthermore, the utilization of costs may be diminished due to the ability of e-books to be accessed in their native format, i.e. as digital softfiles, even when the device in use lacks an internet connection. One type of e-book utilized in the learning process is the flipbook. A flipbook is capable of presenting material in the form of text, images, animations, sounds, and even engaging videos. Its appearance is analogous to that of a printed book, with pages that can be opened in a manner similar to a user turning pages in a printed book. This feature has the potential to enhance the learning motivation

of students who may find the display of e-books in general to be uninspiring.(Haryanto et al., 2020; Setiyani et al., 2022). In addition, flipbooks are also easy to use and can be accessed according to user needs on mobile phones, computers, and similar electronic devices. (Prasetyono & Hariyono, 2020). Zulkarnain dkk(Zulkarnain et al., 2015) conducted the application of electronic-based learning modules to school students. This research was later developed by Tania (Tania & Susilowibowo, 2017) using the kvisoft flipbook maker application. Similar research was also conducted by Hidayatullah (Hidayatullah, 2016) The development process was conducted on student learning media. The results demonstrated that student motivation and comprehension improved after utilizing the flipbook as a learning module.

One of the practical exercises undertaken by students enrolled in the Shipbuilding Engineering programme at Karimun University is the design of lines plans(Hilmy et al., 2023). This practical exercise has the objective of producing a design in the form of a ship's lines plan, based on the ship data provided by the lecturer. (Chandra et al., 2017; Toyyibun, 2021). The practicum process includes making body plan, sheer plan, and half breadth of the ship. (Fatwasari et al., 2021). Until now, the practicum activities of ship line plan design have not had a standardized teaching guide or module. The observation results show that there are still many students who are confused about how to work and the steps of the design work due to the source of reference that is not so detailed and monotonous. Therefore, innovation is needed in making teaching guidelines to improve student understanding.(Masykur et al., 2017). Therefore, this research was conducted to create a more effective and interactive flipbook-based practicum module to guide students in carrying out the practicum of ship line plan design.

B. RESEARCH METHOD

This category of research is classified as development research or research and development (R&D). The objective of this research is to develop effective products in the form of ideas, tools, methods, and media. The research method is a mixed method, specifically a qualitative-quantitative approach. Qualitative data is gathered through interviews, observations, and input from the

validation process by validators. Quantitative data is obtained from the results of a questionnaire used to assess the feasibility of the product. The research method aligns with the Borg and Gall-18 model. (Putri et al., 2023) where there are 10 steps of the media development process. This research uses 7 of the 10 stages that are adjusted to the needs of the research. (Amil et al., 2020) as shown Figure 1 bellow.

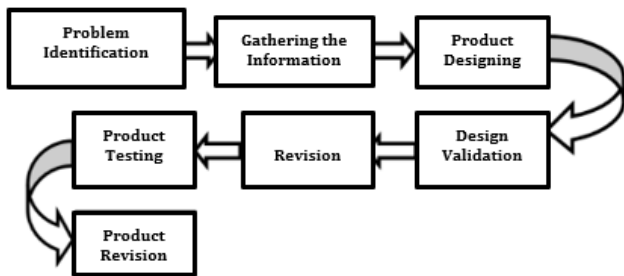


Figure 1. Research Stage

The seven stages are as follows: **The first stage** of the process entails the collection of potential issues and problems that may arise in the field. In this process, the author conducts field observations to identify the issues that arise, specifically the implementation of the practicum activities associated with designing the Ship Lines Plan. **Secondly**, the process of information analysis and research planning is undertaken. At this juncture, the author proceeds to analyze the data collected from field observations. The findings of the analysis indicate that the practicum condition of the Ship Lines Plan design lacks a standardized teaching module. This impedes the design process for students due to the dearth of reference sources and information pertaining to methodologies and work practices. **Thirdly**, the product design phase commenced. Following the acquisition of data pertaining to the identified issues and the subsequent analysis of these needs, the authors proceeded to devise a product design framework. This framework, which is to be constructed, comprises a teaching module for the ship lines plan design practicum. This module will include a series of indicators in the form of practicum outcomes, a supporting theoretical framework, detailed workmanship methods, and comprehensive workmanship video tutorials. All of these elements will be presented in a systematic, detailed, and engaging manner within a flipbook-based e-book.

Fourth, validation. At this stage, the design is validated by experts in the field of shipping, particularly those with expertise in ship design materials. The validators in this study included shipping engineering lecturers and shipping practitioners to assess the feasibility of the content of the teaching module, as well as a media expert validator to assess the feasibility of the design of the teaching module. The following criteria were used to validate the product by the validators as shown Table 1:

Table 1. Validation Criteria

Percentage	Qualification	Description
85% - 100%	Very Valid	Very Valid
75% - 84%	Valid	Valid
65% - 74%	Valid Enough	Valid Enough
55% - 64%	Less Valid	Less Valid
0% - 54%	Invalid	Invalid

Fifth, Design improvement. After the validation process by the validator, the product is revised and refined based on the validator's input. **Sixth**, Trial. After the product draft is declared valid by the validator, the next test is carried out to shipping engineering students in the practicum activity of designing the Ship Lines Plan. This trial is to see the level of student understanding of the material presented in the teaching module. The measurement system uses a performance test. Students will be asked to carry out the Pre Test (without treatment and using the old module) and Post Test (with treatment using the developed module / product). The test assessment uses a Likert scale from points 1 - 5 according to the performance achievement indicators of each question. The results of the Pre Test and Post Test are used to obtain the Gain Score with the following Formula 1:

$$g = \frac{\text{Post Test Scores} - \text{Pre Test Scores}}{\text{Maximum Scores} - \text{Pre Test Scores}} \quad (1)$$

The results of the gain test measurement are used to see the criteria for cognitive improvement using N-Gain as follows Table 2:

Table 2. N-Gain Category

Limit of Category	Category
$g \geq 0,7$	High
$0,3 \leq g < 0,7$	Moderate
$g \leq 0,3$	Low

Students are then asked to complete a response questionnaire. The weight of the assessment is shown in Table 3, and the criteria for the response scores are shown in Table 4.

Table 3. Weigh of the assessment

Criteria	Description	Weight
STS	Very Disagree	1
TS	Disagree	2
CS	Less Agree	3
S	Agree	4
SS	Very Agree	5

Table 4. Response Category

Percentage	Category
81% - 100%	Strongly Positive
61% - 80%	Positive
41% - 60%	Positive Enough
21% - 40%	Negative
0% - 20%	Strongly Negative

Seventh, The final stage of the process is the production of the final product. Once the draft has been revised and tested, it is then transformed into the final version, which is titled "Practicum Module for Ship Lines Plan Design".

C. RESULT AND DISCUSSION

First step of this research is collecting the potentials and problems in the field. In this process, the author conducted observations and interviews with lecturers in the field of naval architecture to see the problems that occurred in the process of implementing practicum activities for ship line plan design. Next, the author analyses the information and research plan. At this stage, the author analyses the data collected from field observations. The results of the analysis show that the practical condition of ship lines plan design still does not have an effective teaching module. From the results of the analysis, several important components were obtained that were needed in the practicum module such as accessibility, substance, design, and instructions that were easily understood by students. This hampers the process of design work by students due to the lack of reference sources and information related to methods and ways of working. Therefore, a flipbook-based teaching module was designed with the following several components, including: (1) Instructions regarding the fabrication of ship lines plans are presented in the format of stages, accompanied by illustrative textual descriptions; (2) A video tutorial illustrating the process of creating a ship lines plan for each stage; (3) This section includes information that is beneficial for students and helps them to understand the material more effectively and to avoid errors; (4)

Photographic examples of instruction or references that are useful for students

After the collection of data on the problem and the analysis of the needs, then the author will compile a product design framework that will be made. The product from this research as shown Figure 3 and Figure 4.



Figure 3. Flipbook book cover

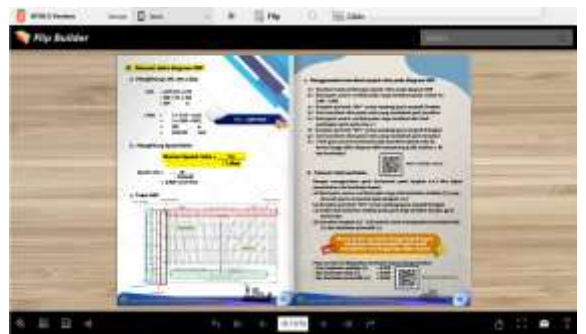


Figure 4. Material of flipbook that designed

The process of creating this flipbook-based ship lines plan teaching module has been validated by two validators, namely a material expert validator and a design expert validator. Design expert validators have provided assessment and input on the design and appearance of the teaching module of the flipbook-based ship lines plan. There are several revisions on colour design and font that used on this product. The material expert validator has provided assessment and input on the substance of the teaching module, including the content of the material, the arrangement of the material, and the accuracy of the instructional process used to create a line plan. There are several revisions on instruction and needs some hints or tips on several process. The results of the assessment conducted by the design expert validator can be seen in the Table 5 below.

Table 5. Validation Score by Media Expert Validators

Indicators	Score (%)			Average (%)	Category
	1	2	3		

I.Graphical feasibility aspect	90	86	84	87	Very Valid
II.Aspects of language appropriateness	85	82	84	84	Valid
Average				85	Very Valid

The results of the validation process, conducted by design expert validators, indicate that the average percentage score on the graphic feasibility indicator is 87%, with a very valid assessment category. This indicates that the flipbook-based ship lines in the graphic design concept of the teaching module product have satisfied the requisite criteria. In addition, the Language Feasibility indicator achieved an average percentage of 84% with the Valid assessment category, indicating that the grammar utilized in this flipbook-based ship lines teaching module product is appropriate and effective. The overall average percentage of assessment obtained was 85% with a Very Valid assessment category, indicating that the teaching module product of the flipbook-based ship lines has fulfilled the design aspects and is feasible for application to users or students. The results of the material expert validator assessment are presented in Table 6

Table 6. Validation Score by Material Expert Validators

Indicators	Score (%)			Average (%)	Category
	1	2	3		
I.Content Appropriateness Aspect	93	89	91	91	Very Valid
II.Aspects of Study Feasibility	80	80	92	84	Valid
III.Contextual Feasibility Aspects	90	90	80	87	Very Valid
Average				87	Very Valid

In table 6, it can be seen that the average percentage of the content feasibility aspect is 91% with a very valid category. This shows that the substance contained in this flipbook-based ship line plan teaching module is feasible and in accordance with the material. The average percentage on the assessment of the feasibility aspect of the study was 84% with the Valid category. This shows that the

instructions and materials have been presented properly and are suitable for use. The assessment of the contextual aspect is 87% with Very Valid criteria. This shows that this flipbook-based ship line plan teaching module is appropriate and can be applied in the world of work. Material expert validators provide an overall assessment at an average percentage of 87% with a Very Valid category so that the assessment of material aspects has met the feasibility to be used by students.

Based on the results of validation by design expert validators and material experts, it is obtained a very valid assessment category with a value of 85% for design aspects and 87% for material aspects, this is in line with previous research by (Rochsun & Agustin, 2020) where the validation results show how ready the product is to be feasible.

Furthermore, testing was carried out in the form of a post test of making ship lines plan using a flipbook-based ship lines plan teaching module. Students are asked to work on several stages of the ship's line plan based on the data that has been provided. Please note that this post test is only carried out with a sampling system for the ship lines plan work steps. The following is an example of student work before using the teaching module of the flipbook-based ship lines plan which is less precise and successfully done correctly after the application of the teaching module as shown Figure 5 and Figure 6.

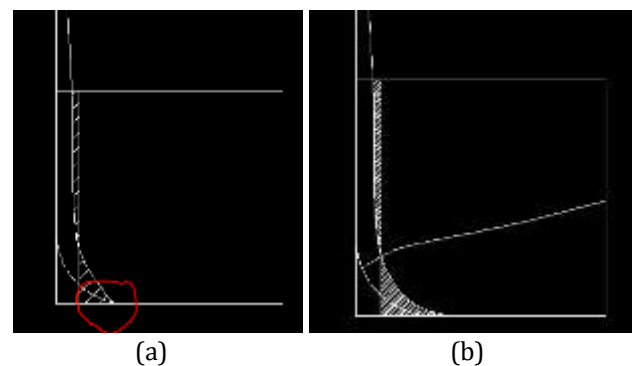


Figure 5. Result Comparison Design Before Treatment (a) and After Treatment (b)

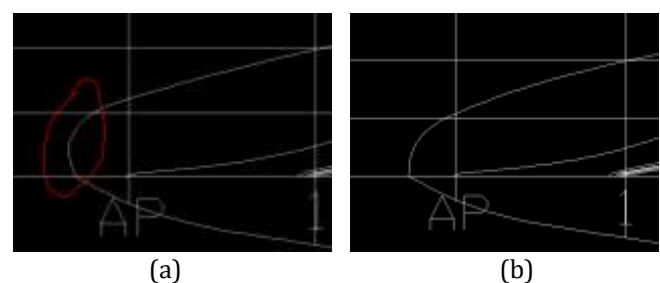


Figure 6. Result Comparison Design Before Treatment (a)

and After Treatment (b)

As illustrated in Figure 5 dan Figure 6, errors are frequently encountered when devising a lines plan. By imparting essential information and techniques within the teaching module of the flipbook-based ship lines plan, students can effectively mitigate these errors. The outcomes of the post-test assessment are presented Table 7 below:

Table 7. Pre-Post Test Results

Students	Score Test		G-Score	Category
	Pre test	Post test		
AP	50	93	0.9	High
DAP	63	94	0.8	High
GA	65	88	0.7	Moderate
JH	60	87	0.7	Moderate
NA	45	80	0.6	Moderate
RZ	65	95	0.9	High
WS	63	84	0.6	Moderate
MH	71	95	0.8	High
AA	66	85	0.6	Moderate
MRO	60	86	0.7	Moderate
Average	60.8	88.7	0.7	High

The G-Score value of each student is obtained by utilizing the assessment results obtained from the pre-test and post-test. This value is employed to ascertain the success category of students' cognitive improvement prior to and following the implementation of this flipbook-based ship lines plan teaching module. The findings indicate an enhancement in student comprehension of the process of creating a line plan subsequent to the utilization of a flipbook-based ship line plan teaching module. These outcomes are consistent with those documented by (Ilmi et al., 2021) where the application of e-modules is able to improve students' understanding. In accordance with previous research, the application of the use of electronic modules by implementing designs and subsections that are dancing and informative can increase the level of understanding and motivation of students. (Vaiopoulou et al., 2021; YANI AWATI et al., 2021).

After the post-test activity, the students were asked to fill out a product response questionnaire to see how the students were responding to the use of this practicum module. The result of responses questionnaires as shown Table 8.

Table 8. Student's responses questionnaire results

No	Description	Agreement Level				
		STS	TS	CS	S	SS
1	The flipbook-based Ship Lines Plan teaching module has an attractive design				2	8
2	The flipbook-based Ship Lines Plan teaching module is easy to use				1	9
3	The teaching module of the flipbook-based Ship Lines Plan can be accessed anywhere					10
4	The practicum instructions in the flipbook-based Ship Lines Plan teaching module make it easier for me to understand.				2	8
5	The tips in the flipbook-based Ship Lines Plan teaching module help me in the practicum process.				1	9
6	The flipbook-based Ship Lines Plan teaching module reduces the risk of errors when designing					10
7	The video in the flipbook-based Ship Lines Plan teaching module makes it easier for me in the practicum process.					10
8	The design of the flipbook-based Ship Lines Plan teaching module increases my enthusiasm in the practicum process				1	9
9	The images and examples in the flipbook-based Ship Lines Plan teaching module make it easier for				2	8

No	Description	Agreement Level				
		STS	TS	CS	S	SS
10	me to do the practicum process. The explanation in the flipbook-based Ship Lines Plan teaching module is easy to understand and improves my understanding.				1	9
Total		0	0	0	10	90
Total x Weight		0	0	0	40	450
Percentage		98% (Strongly Positive)				

In the results of the questionnaire shown in table 8, it can be seen that percentage or students responses is 98% from 10 respondent. This shows that this flipbook-based practicum module is Strongly positive (based Table 4) received by the students and is suitable for use in the ship line plan practicum. In addition, using electronic-based modules can also provide easy access for students. (Zhang et al., 2017). The results of the above analysis lead to the conclusion that the flipbook-based ship lines plan teaching module product produced in this study is suitable for use in ship lines plan design assignments across each study program and department.

D. CONCLUSION AND SUGESTION

The results of the research, as assessed by media expert validators (85%) and material expert validators (87%), indicate that the products are suitable for use in terms of design and substance. These findings are based on the application of highly valid criteria. The results of testing on students yielded a G-Score value of 0.7 with high criteria, indicating that the utilization of this flipbook-based ship lines plan teaching module is capable of enhancing students' cognitive abilities and comprehension of the process of creating ship lines plans. The results of the analysis of the students responses were 98% indicating that this practicum module has a strongly positive response and is suitable for use. In order to produce a good line plan design and minimize errors, the author recommends using this interactive digital practical module ship lines plan in practicum.

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