Evaluation of Experiential Learning Implementation in Vocational Education Based on Student Learning Style

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Abstract

The main problem faced by students in the vocational field is the lack of specificity in the scientific field that focuses on mastering the knowledge, skills, and attitudes needed in the world of work. In addition, the emphasis on learning by doing the role of the student-centred learning approach becomes less attention from educators. This study aims to develop and implement an experiential learning design in the nautical science program through student worksheets based on the Kolb experiential learning stages by considering the Felder- Silverman student learning style and analyzing student attitudes and responses after participating in learning activities. We used the field case study method (case study research) with qualitative descriptive data analysis techniques. The results showed that the learning style preferences of nautical science students from the learning style categories: (1) 87.41% were categorized as active; (2) 84.44% were categorized as visual; (3) 81.48% were categorized as sensing; and (4) 57.04% were categorized as sequential. The results also show that the experiential learning design is feasible for using learning models and learning material assessments. The implementation of experiential learning activities was carried out very well. Learning activities are carried out on force based on the stages of concrete experience, reflective observations, abstract conceptualization, and active experimentation. Students' attitudes and responses are positive towards the experiential learning design. Experiential activities help students learn Basic Mechanical Engineering Design (cognitive), and they like to participate in learning activities (affective). The experiential design is practical in learning, canin learning, career theory and practice learning. H o w e v e r , some students respond that experiential learning activities are less challenging and too much of a task because they prefer to avoid many tasks.

Keywords: Experiential Learning, Learning Style, Nautical Science.

Published by:

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1. Introduction

Efforts to increase student interest, motivation and learning outcomes can be made by developing learning methods tailored to the conditions at school. Therefore, educational engineering is needed to create a learning environment where students more actively participate in the learning process, focus on problems and design challenges and collaborate to complete learning activities (Samaniego et al., 2024). The *experiential learning* method can bridge conceptual knowledge with skills adapted to the real world ofwork (Park et al., 2018; Samaniego et al., 2024). The learning approach used is *student-centred learning* with the premise that the best way to learn is from experience or *learning by doing* (Morrison et al., 2020).

Some previous research findings provide diverse views regarding *experiential* learning methods. *Experiential learning* aims to influence learners by changing cognitive structures and student attitudes and expanding existing skills (Samaniego et al., 2024). Student experience plays a central role in the learning process (Morrison et al., 2020). In addition, there must be strong motivation and willingness in students to succeed in learning, and this *experiential* method pays attention to the uniqueness of students through their learning styles and personality types (Star & Stylianides, 2013). *Experiential learning* can be implemented in an educational environment (Park et al., 2018). The learning process, with direct practice following the competence *of* expertise, will facilitate students' *transfer of knowledge* (Astutik, 2020).

This learning method provides opportunities for students to build knowledge and experience independently and gainnew knowledge and skills. *Experiential learning* is based on students' experiences insolving problems using their knowledge and experience. *Experiential learning* can be used as one of the learning innovations to meet current educational needs (Misfeldt & Zacho, 2016). *Experiential learning* provides benefits such as students are more able to learn (Rilexen S P Mulder et al., 2024), independent learning increases (Ansari & Lyons, 2016), learning readiness increases, and 75% of knowledge learned through experiential can be mastered, while only 5% of conventional learning can be mastered (Fulford, 2013). With *experiential learning*, student *output is* expected to be superior in affective, cognitive, psychomotor and competitive abilities. The results of research by Samaniego et al., (2024) stated that the application of *experiential learning* active learning modules in *heat transfer* learning using the finite element method with *Solidwork* helped students in learning, and the average student score increased by 30%.

Learning activities for basic concepts in nautical science study programs are usually carried out by providing textbook theory, and students solve related problems. Although this method can provide an understanding of basic theory through practice problems, students only get a general overview without understanding or gaining direct experience of how it is applied in real life (Wickstrom, 2014). Therefore, a learning concept is needed that contains a series of learning activities for basic engineering conceptsthat involve students actively by linking them to the context of real applications.

Based on these things, *experiential learning* methods can be implemented in vocational education in the nautical science study program. Difficulties encountered in complex learning materials in the engineering field can be overcome by involving students in learning activities. The *experiential learning* approach will help inspire and motivate students to learn, making students educated with a more exciting learning process (Bernardus et al., 2023). The active involvement of students in the experiential learning process has a positive and sustainable impact on students' emotions, especially their level of optimism, as well as increasing students' critical thinking skills (Mayer & Schwemmle, 2023).

This research will evaluate the implementation of *experiential learning* in vocational education in the Nautical Science Study Program as a case study. The research is conducted by designing and developing *student worksheets* that consider students' learning styles. Implementing the *experiential learning* method using *student* worksheets aims to support the concept of *student-centred learning*. This student worksheet is expectedto be used in the active learning process to provide students with experience directly in applying basic mechanical engineering concepts or concepts of knowledge.

Importance of the Problem

Several previous studies have identified the significant impact of *experiential learning* methods. *First, the experiential learning* methods helped improve learning outcomes and students' activeness in following the lesson (Rahayu et al., 2019). *Second,* applying *experiential learning* through module assistance significantly impacts student learning outcomes (Fromm et al., 2021). In addition, we also highlight the extent to which students experience failure in information management caused by the mismatch between the learning styles of students and teachers (Helate et al., 2022). This is in line with other research findings (Bernardus et al., 2023; Mayer & Schwemmle, 2023; Samaniego et al., 2024; Xu, 2023), which revealed that every learning method is influenced by the way students learn, personality and ability. Therefore, teachers should pay attention to and consider the diversity of students' learning styles. Based on the results of previous studies, the researcher will evaluate the implementation of *experiential learning* design through student worksheets by considering students' learning styles. *Experiential learning* is explained by designing student worksheets as a research case study. This worksheet aims to assist students in constructing knowledge and is expected to increase their interest and motivation to learn through experiential learning.

We focus on how far **to** evaluate the implementation of *experiential learning* design, which consists of four stages: *concrete experience, reflective observation, abstract conceptualization,* and *active experimentation* in learning activities. The research question is:

1. What are the learning style preferences of nautical science students?
2. To what extent is *experiential learning* designed for nautical science students?
3. How far is the implementation of *experiential learning* in vocational education for nautical science students?
4. To what extent are students' attitudes and responses after participating in *experiential* learning activities?

The results of this research contribute by producing *student worksheets* that vocationally productive teachers and students can use in learning activities. These results provide convenience in designing *experiential learning that* can be applied to other practice-based vocational education.

2. Metode Penelitian

Design Research

This study aims to analyze the implementation of *experiential learning* design using *student worksheets* by considering students' learning styles that allow students to explore the relationship between learning and practice. The research used a field case study method with qualitative and quantitative approaches. Activities carried out in this study include designing active *student worksheets* based on Kolb's *experiential learning*, analyzing students' learning styles, implementing *experiential learning* design, data collection, and data analysis. Data analysis was conducted using qualitative descriptive analysis. This research aims to implement an *experiential learning* design by developing *student worksheets* that consider students' learning styles. Designing *experiential learning-based student worksheets* uses the ADDIE model development concept stages: *analysis*, *design*, *development*, *implementation*, and *evaluation*.

Participant (Subject) Characteristics

The research data needed in implementing *experiential learning* design are data analysis of student learning styles (*Index et al. by Felder & Solomon*) and student responses and attitudes (after participating in *experiential learning* activities. In addition, teacher responsesrelated to the design implementation and observations during learning activities took place. The data are quantitative and qualitative. Quantitative data includes the results of the student learning style questionnaire and the student attitude and response questionnaire. Meanwhile, qualitative data was obtained through observation while implementing learning activities. Qualitative data was obtained to overview the implementation of *experiential learning* design stages in each learning activity.

Qualitative data are learning documents in the form of lesson plans, documents on the implementation of learning activities in the form of student worksheets, notes on the implementation of learning by the plan, documentation of the learning process, notes on student comments during learning activities and an overview of the student learning process and the teacher's teaching process. Data sources were obtained from 28 students of theNautical Science Study Program. Sampling as a case study was carried out using *the purposive sampling* technique, which is a sampling technique based on specific objectives, not on strata, random or regional.

The determination of informants is based on the relevance and depth of information following the research topics and conditions in the field, not on representing a population.

Procedures

The data collection methods used in this research are observation, questionnaire, interview, and documentation. *First,* we made observations during the learning process. The purpose of observation is to observe the four stagesof Kolb's cycle to get a clear picture of each activity or learning process related to implementing *experiential learning-based* student worksheets. Observation uses an observation reference as a *checklist* by affixing a *checklist* mark on the sheet. In addition, researchers also observed the behaviour and activities carried out by students during the learning process.

Second, a questionnaire method was used to obtain data in the form of a student learning style questionnaire and student attitude and response questionnaire after following *the experiential learning* design *using a student worksheet*. Evaluation of student learning styles was carried out based on the *Felder-Soloman* learning style index questionnaire. The learning style index can be accessed *online* through Richard Felder's *website* at *https://www—webtools.ncsu.edu/learningstyles/* managed by *North Carolina State University*. The instrument, explicitly developed for learning in the engineering field, is a questionnaire to measure 4 (four) groups of learning styles. Each learning style consists of 11 questions, and the answers to each question are used to determine the student's primary learning style. Each student. All questions in the learning style index questionnaire instrument were presented in Bahasa Indonesia.

Third, we conducted *open-ended* and *in-depth interviews*. The interview technique used unstructured interviews that did not use interview guidelines that had been arranged in an organized manner. The interview guideline used the attitude and response questionnaire results and problems related to implementing *experiential learning* design. Interviews were conducted with students who aimed to determine their attitudes and responses to implementing *experiential learning* design using studentworksheets. The interview results will then be analyzed and correlated with students' learning styles. It aimsto determine students' attitudes and responses to the *experiential learning* method.

Fourth, we document authentic evidence that can be accounted for and analyzed regarding the problem under study. Documentation can be in the form of syllabus documents, lesson plans, student worksheets, and other relevant documentation.

Instruments

The research instruments used included Felder-Solomon's learning style questionnaire, model and materialvalidation instruments, observation sheet instruments, and student attitude and response questionnaires. *First, the* learning style questionnaire used Felder & Soloman's (1999) learning style index. The questionnaire contains learning style questions: *active*, *reflective*, *sensing*, *intuitive*, *visual*, *verbal*, *sequential*, and *global.* This questionnaire has been translated into Bahasa Indonesia. The components and grids of student learning styles consist of 44 statement items shown in the following Table 1.

Table 1. Felder-Silverman Learning Style Questionnaire Grid

No.	Indicator	Item
1	*Active*	1. Group work. 2. Explaining to others. 3. Discussion.
2	*Reflective*	1. Individualized learning. 2. Silent and just listening to information to find solutions and understand 3. Information.
3	*Sensing*	1. Likes factual things. 2. More practical and cautious in working. 3. Favoring memorization.
4	*Intuitive*	1. Work faster. 2. Innovative. 3. Love science.

No.	Indicator	Item
5	*Visual*	1. Remembers well from what is seen. 2. Liked the material with lots of pictures, diagrams and maps.
6	*Verbal*	1. Remembers well 2. Prefers lectures and reading written texts
7	*Sequential*	1. Prefers a coherent sequence of steps. 2. Work sequentially and incrementally tocomplete the task.
8	*Global*	1. Looking thoroughly or in outline first, then Pointing out the details. 2. Work randomly or out of sequence to complete tasks.

Second, the attitude and response questionnaire aims to obtain data on student responses and attitudes after participating in a series of *experiential* learning processes or activities. The questionnaire comprises 15 statement items (Hoover, 1975; Chavan, 2011).

Data Analysis

Data analysis was carried out by looking at the relationship between students, teachers, learning objectives, teaching materials, materials, learning methods, and the process of implementing learning activities and student learning styles. Data from the learning style questionnaire results, student attitudes and responses were qualitatively correlation analyzed. Correlation analysis was used to analyze the implementation of *experiential learning* using *student worksheets* in each learning style. *First, the* analysis of student learning style data for each answer to each question item is that the selected item gets a score of 1, and the item that is not selected gets a score of 0. All statement items on the questionnaire are optional, with nocorrect or wrong answer choices. The categorization of students' learning style tendencies is divided into three categories, namely the *strong category (strong)*, the *moderate* category (*moderate*), and the *balance* (*balance*) shown in Table 2.

Table 2. Student Learning Style Tendency Categorization

Correlation Coefficient	**Category**
9 - 11	*Strong*
5 - 7	*Moderate*
1 - 3	*Balance*

Second, a product design review was conducted by *reviewers*. Lecturers of linear study programs with the Nautical Science Study Program conducted the review. A product review is necessary for a valid experiential *learning* design that meets the eligibility criteria. *Third,* data analysis of student attitudes and responses was done by quantifying the *checklist* results by giving scores according to the predetermined value weights, tabulating the data and calculating the percentage of each sub-component. *Fourth,* field test data analysis was conducted to determine how the *experiential learning* design is feasible to be used on a broader scale. The field test was conducted by observing the learning implementation process. The learning implementation process was analyzed descriptively as a percentage of the learning implementation observation results.

3. Results

Learning Style Analysis

This study involved 135 responses who filled out a learning style questionnaire. Respondents are students of the Nautical Science Study Program. The learning style questionnaire aims to determine mechanical engineering students' dominant learning style preferences.

Table 3. Student Learning Styles by Class

Grade	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
X	46 (93,88%)	3 (6,12%)	36 (73,47%)	13 (26,53%)	38 (77,55%)	11 (22,45%)	23 (46,94%)	26 (53,06%)
XI	41 (87,23%)	6 (12,77%)	40 (85,11%)	7 (14,89%)	42 (89,36%)	5 (10,64%)	30 (63,83%)	17 (36,17%)
XII	31 (79,49%)	8 (20,51%)	34 (87,18%)	5 (12,82%)	34 (87,18%)	5 (12,82%)	24 (61,54%)	15 (38,46%)
Total	118 (87,41%)	17 (12,59%)	110 (81,48%)	25 (18,52%)	114 (84,44%)	21 (15,56%)	77 (57,04%)	58 (42,96%)

Students' Learning Style Preferences Based on the data processing results of the data questionnaire, it shows that students' overall learning style preferences are *active* (87.41%), *visual* (84.44%), *sensing* (81.48%), and *sequential* (57.04%).

Students with *active* learning styles prefer working in groups, explaining to other friends, and having discussions rather than studying individually, being silent, and only listening to information from others. *Sensing* learning style means that students prefer facts and practical things, tend to be careful in learning and like rote learning that is explained visually with many pictures, diagrams, and maps compared to lectures or written readings, and students can remember well from what they see rather than what they hear. Meanwhile, students with *sequential* learning styles prefer *sequential* learning stages, in other words, completing learning tasks sequentially or gradually rather than having to see an outline and learn randomly in completing their learning tasks (Felder & Soloman, 1999).

Table 4. Students' Learning Style Tendency

Style Learn	Trend
Active	More like learning by try, doing practical activities, learning in groups, explaining to other friends, and discussion
Sensing	Prefers factual things (concrete material), and practical things, likes detailed explanations, solves problems using predetermined methods, tends to be cautious in learning, and loves memorization.
Visual	Prefer learning materials that are explained in Visuals with pictures, diagrams, videos, and flowcharts
Sequential	Prefers linear learning stages, uses organized steps to achieve learning objectives, and explores material sequentially, in other words, in completing learning tasks. Is done sequentially or in stages

The re*view of* learning materials from the fundamental aspects of design selection considerations and aspects of learning system components show that learning with *experiential learning* design is very feasible to use in learning implementation. So, *experiential learning* design using Student Worksheets (LKS) that accommodates student learning styles in learning based on the results of the learning model *reviewer* assessment is included in the very feasible category with an average percentage of 91.48% and the results of the learning Material *reviewer* assessments are included in the very feasible category with an average percentage of 88.75%.

Learning Implementation Observation Results

Observation during experiential learning activities or processes in Basic Mechanical Engineering Design subjects includes observation of teachers or students starting from introductory, core, and closing activities.

Table 5. Percentage of Observation Results of *Experiential* Learning Process

Activity Aspect		Maximum Score	Observation Score	Observation Result		Keterangan	
		Teacher	Student	Teacher	Student		
Introduction Activity	40	38	37	95,00	92,50	Very good	Very good
Core Activities	88	80	80	90,90	90,90	Very Good	Very Good
Activities Cover	24	23	22	95,83	91,66	Very Good	Very Good
Overall Activities	152	141	139	92,76	91,44	Very Good	Very Good
Average			92,09			Very Good	

The data shows that teachers and students have implemented experiential learning activities with a percentage of observations of learning implementation of more than 90%. Observations were made during experiential learning activities in introductory activities with a percentage of 95.00% (for teachers) and 92.50% (for students) for core activities for teachers. Students reached the same percentage of 90.90%, while the percentage in closing activities was 95.83% (for teachers) and 91.66% (for students). Overall, experiential learning activities achieved a percentage of results of 92.76% (for teachers) and 91.44% (for students). Overall, the percentage of observation results of implementing experiential learning design in learning using Student Worksheets is 92.09%. This shows that this experiential learning activity was carried out very well.

Student Attitude and Response

Data on attitudes and responses to the implementation of Kolb cycle-based experiential learning activities in Basic Mechanical Engineering Design subjects are carried out by students after they take part in learning. Kolb cycle-based experiential learning activities using student worksheets start from concrete experience, reflective observation, abstract conceptualization, and active experimentation. The evaluation analysis of students' attitudes and responses became the basis for determining the effectiveness of experiential learning, allowing students to explore the relationship between theory and practice learning. Students' attitudes and responses were measured from answers to a 15-item statement questionnaire, and interviews were conducted with several students regarding their experience in terms of knowledge (cognitive) and attitude (affective). The results of the student attitude and response questionnaire are shown in Table 6.

Table 6. Results of the Student Attitude and Response Questionnaire

No	Question Item	Value
1	Engaging learning	4,43
2	Satisfactory learning	4,21
3	Informative learning acquires related knowledge basic mechanical engineering design basic mechanical engineering design	4,43
4	Realistic learning activities (by the circumstances real) and relate to the context of everyday life.	
5	Simple (uncomplicated) learning process	4,39
6	Learning activities help develop my skills	
7	The learning process is related (appropriate) to development of my own knowledge and skills	4,18

No	Question Item	Value
8	I feel actively involved in learning	4,54
9	I feel the learning activities challenge me	
10	I like participating in this learning activity	4,29
11	There is a change in the level of confidence and My knowledge	
12	*Experiential* learning *activities (activities and assignments)* help me to integrate or relate to the subject matter	3,93
13	I feel that learning requires me to conduct self-assessment	4,14
14	I learn things I didn't know from the activities This learning	4,25
15	I am happy to have participated in the activities *experiential* learning	4,14

Student responses and attitudes stated that 98.8% of student responses showed a positive response after participating in *experiential* learning activities with an average score of 4.23 on a maximum scale of 5. The results of student responses can be interpreted as follows: *experiential learning* activities help them learn basic mechanical engineering design, and they like to participate in learning activities. A total of 1.2% responded that *experiential* learning activities were less challenging and had too many tasks because they liked only a few tasks.

In general, students responded to the application of experiential learning based on Kolb's cycle using student worksheets.

a. LKS is very helpful in learning because there is material that is easy to understand and serious learning but also not too tense (relaxed).
b. Learning using LKS is easier to understand, and there are opportunities to work in groups and discussions, making it, more straightforward to know and understand.
c. Learning is easier and more interesting because the teacher's explanation is easy to understand.
d. Learning in class is engaging and fun; there is humour in learning and it makes students think more, especially if it is done with practice and if theory alone, it will be more challenging to understand the material.
e. The lessons can be applied to everyday life and encourage students to be more active in learning.
f. Students prefer to learn with something that is shown directly and because they use LKS learning media as well as schoology applications so it is not dull.
g. Learning increases student knowledge and makes students more independent in learning and doing every assignment given.
h. Learning challenges students to understand the lesson better.

Overall, students' attitudes and responses were positive towards *experiential learning* activities. Students' positive responses were assessed based on the average score of the questionnaire results, which was 4.23. Thepositive attitudes and responses of 98.8% of students reinforce the opinion that *experiential learning* activities help students in learning (cognitive) and that students like to participate in learning activities (affective). The results of this research on student attitudes and responses are based on Chavan (2011), who statesthat 96% of students say *experiential learning* helps students learn and that they like to participate in *experiential* learning activities.

4. Discussion

Motivation and Appreciation for Students

Based on observations and interviews with students, some students need more confidence or confidence in their abilities. This can adversely affect students' learning motivation. Therefore, students' motivation becomes very important in the learning process for all students, especially those who feel less confident. Motivation aims to increase students' self-confidence, so increased self-confidence will make students more active in learning and more confident and able to assess their abilities. In addition, appreciation also needs to be given to students who are enthusiastic and active inlearning. Appreciation aims to arouse their enthusiasm for learning so that they become more passionate about participating in every learning activity. Appreciation done proportionally can increase students' self-confidence, and they will feel confident in their ability to capture the subject matter presented.

Teacher Factors in Learning

Students responded to the teacher's presentation or the teacher's way of teaching by saying that the teacher's explanation was easy to understand, learning was relaxed, simple and not boring. Students feel happy and interested in following a series of learning activities. In addition, the selection of simple words also impacts student understanding, so students more easily understand the information or material the teacher conveys. Therefore, the role of the teacher is vital in the learning process. In addition to being a teacher in the classroom, the role of the teacher is also a motivator to increase student interest and motivation to excel.

The dominant factor of the teacher's role as a motivator is indicators of delivering learning objectives, learningcomfort, and various learning approaches that make students happy in learning and affect student motivation to achieve motivas (Kosiol et al., 2019). Students' interest in learning activities is strongly influenced by instructional factors from the teacher who teaches (Bicer et al., 2018). The most critical instructional factors are the teacher's ability to explain learning concepts clearly, the teacher's ability to assist students in understanding the subject matter, and the ability to show the relevance of the material presented in the natural context. International studies highlight that teacher quality has a significant influence on student achievement.

Humour in Learning

Based on the results of interviews with students, there is a positive response from students to *experiential* learning activities, saying that "*learning is relaxed, not tense, and there is humour"*. Students consistently enjoy and appreciate the use of humour in class. In addition, when students are asked towrite down the characteristics of a good teacher, students often mention that "a good sense of humour" is essential (Engelbrecht et al., 2020). Teachers judged to have good teaching skills usually express their teaching philosophy by including and emphasizing the importance of humour. Students also feel they learn more when humour is incorporated into classroom learning and understand what they are learning (Morris, 2020).

Although students generally like humour in learning, there is little research data on the ability of humour to foster interest in learning. Students liking humour may mean that they enjoy the humorous version of the teacher's lecture or explanation in class about the subject matter being taught. Humour is seen to have a significant positive effect on learning. Research results show that material presented in a humorous way can be remembered better. In addition, exposure to humorously presented material is also correlated with better engagement with the material and positive affect. Humans need humour and to be as authentic as they need to be in order to communicate.Humour, a form of social play, has many positive effects. As cited in Berk (2001), the psychological benefits of humour include anxiety reduction, tension reduction and stress reduction. Humorous content was found to have better outcomes than unpleasant content in learning paradigms. Humorous sentences are remembered better than unpleasant sentences. Humorous information can beremembered better and is able to activate deeper processing leading to a stronger connection between humorous content and the material to be created. Conflicting results suggesting that humour may only indirectly affect learning by relieving learners' anxiety. However, humour, with all its positive effects on learning, should still be given or presented proportionally and not excessively.

Changes in Student Learning Style

Students' learning style preferences can change. Changes in learning style preferences are possibledue to different approaches used in learning, different assessment strategies, and learning experiences gained by different students in different learning locations (Bernardus et al., 2023). Learning styles should be considered a valuable tool to support communication between students and teachers, encouraging students to reflect on theirlearning experiences and actively seek ways to improve them (Argarini, 2018). Each learning style is unique and has its strengths and weaknesses (Aji Silmi & Hamid, 2023). This means that assisting students to adjust and act in the learning style that may be most uncomfortable for them is very important. Students donot necessarily have to use all learning styles but choose the learning styles that are more appropriate, better and more feasible to use in class in different learning environments, and all should know that students with any learning style preference have the opportunity to be successful with any effort made (Ferdiani & Harianto, 2024).

The learning process in engineering subjects is mainly based on design diagrams, but some sub-teachingmaterials are based on theory. Teachers, in this case, need to reform teaching styles based on students' learning style preferences so that better student academic performance can be achieved. In this study, students' learning preferences are strong in *active, sensing, visual,* and *sequential* learning. This can be used as a basis for teachers to focus more on the learning environment according to the strengths of these learning styles sothat students can quickly learn. Which in turn has an impact on improving their academic performance.

Teachers' teaching styles and students' learning styles are closely related. The mismatch between teaching and learning styles can impact students' academic performance. Findings from several previous studies state that when teachers teach according to or consider students' preferred learning styles, studentsperform and follow the learning process well, and it has an impact on increasing students' academic performance. There is no difference between subjects in engineering, meaning that they are naturally different, but students' learning preferences are identical. Therefore, learning methods must be flexible and adapted to the subjects taught (Helate et al., 2022).

Learning in engineering can be done by considering using teaching materials with many graphic visuals. In addition, teachers must also be able to create an active and fun learning atmosphere for students. This can be done with discussions, cooperative *learning*, demonstrations, *brainstorming*, *problem-based*, or *project-based learning.* Most engineering subjects involve procedures. Therefore, the teacher must be able to deliver instructions systematically, from the easy things to the problematic things. Next, the teacher starts the lesson by emphasising the details of the teaching material, followed by experiments (practising directly) conductedby the teacher and students to help students respond to new knowledge. Giving examples, conducting experiments, and practising directly will help students connect the activities carried out in class with the typeof work in the real context of the engineering field. Kolb himself argues that different individuals can exhibit different learning styles in different situations and that learning styles can develop over time.

5. Conclussion

Based on the research results and discussion that has been stated, the following conclusions can be drawn to answer the research questions. *First, the* learning style preferences of nautical science study program students as a whole are *active* (87.41%)*, visual* (84.44%)*, sensing* (81.48%) and *sequential* (57.04%). *Second, experiential learning* design was developed by developing Kolb cycle-based student worksheets by considering the learning style preferences of *active, sensing, visual,* and *sequential* students using the ADDIE development model. The percentage of learning model assessment results is 91.48%, and the percentage of learning material assessment results is 88.75%, which means that *experiential learning* design is included in the category of very suitable for use in learning. *Third, the* observation results of the implementation of *experiential learning* design showed a percentage of 92.09%, which means that *experiential* learning activities were carried out very well. *Fourth*, students' responses and attitudes *were* favourable towards *experiential* learning activities. 98.8% of students responded positively, with an average score of 4.23. *Experiential learning* activities help students explore the relationship between theory and practice learning. However, some students respond that *experiential* learning activities are less challenging and have too many tasks because they dislike many tasks. The results of this study provide theoretical implications by knowing students' learning style preferences. The concept of learning for students can be designed in such a way that it fits the type of learning style of students. Each individual can show different learning styles in different situations, and each individual's learning style can develop or change over time. Then, the practical implication shows that *experiential learning* is appropriate and can adjust to the characteristics emphasising mastering knowledge, skills, and attitudes that emphasise *hands-on experience* and *learning by doing.* Vocational education is process-oriented (in the form of learning experiences and activities) and product-oriented (the result of learning experiences and activities). The ultimate goal of vocational education is measured through grades and the results of these achievements in the form of work performance. One way to achieve the goal of vocational education is by implementing *experiential learning* in the vocational learning process. Further research should be directed to discover how *experiential* learning can improve 21st-century skills or competencies*,* namely *creative thinking and innovation, critical thinking and problem-solving, communication,* and *collaboration.*

REFERENCE

Aji Silmi, T., & Hamid, A. (2023). URGENSI PENGGUNAAN MEDIA PEMBELAJARAN

BERBASIS TEKNOLOGI. Inspiratif Pendidikan, 12(1). https://doi.org/10.24252/ip.v12i1.37347

Ansari, D., & Lyons, I. M. (2016). Cognitive neuroscience and mathematics learning: how far have we come? Where do we need to go? ZDM - Mathematics Education, 48(3), 379–383. https://doi.org/10.1007/s11858-016-0782-z

Argarini, D. F. (2018). Analisis Pemecahan Masalah Berbasis Polya pada Materi Perkalian Vektor Ditinjau dari Gaya Belajar. MATEMATIKA DAN PEMBELAJARAN, 6(1). https://doi.org/10.33477/mp.v6i1.448

Astutik, E. P. (2020). SCAFFOLDING DALAM PEMBELAJARAN MATEMATIKA BERBASIS KEARIFAN BUDAYA OSING BANYUWANGI UNTUK MENINGKATKAN REPRESENTASI MATEMATIS SISWA. Jurnal Teknodik. https://doi.org/10.32550/teknodik.v0i2.686

Bernardus, D., Murwani, F. D., Aji, I. D. K., Radianto, W. E. D., Padmawidjaja, L., Jatiperwira, S. Y., Hitipeuw, I., & Jacob, G. H. (2023). Do Entrepreneurial Characteristics Moderate the Relationship between Experiential Learning and Entrepreneurial Mindset? Journal of Educational and Social Research, 13(1). https://doi.org/10.36941/jesr-2023-0010

Bicer, A., Perihan, C., & Lee, Y. (2018). The Impact of Writing Practices on Students' Mathematical Attainment. International Electronic Journal of Mathematics Education, 13(3), 305–313. https://doi.org/10.12973/iejme/3922

Engelbrecht, J., Llinares, S., & Borba, M. C. (2020). Transformation of the mathematics classroom with the internet. ZDM - Mathematics Education, 52(5), 825–841. https://doi.org/10.1007/s11858-020-01176-4

Ferdiani, R. D., & Harianto, W. (2024). Honey and Mumford learning style: creative thinking process in solving statistical problems. International Journal of Evaluation and Research in Education , 13(1). https://doi.org/10.11591/ijere.v13i1.25347

Fromm, J., Radianti, J., Wehking, C., Stieglitz, S., Majchrzak, T. A., & vom Brocke, J. (2021). More than experience? - On the unique opportunities of virtual reality to afford a holistic experiential learning cycle. Internet and Higher Education, 50. https://doi.org/10.1016/j.iheduc.2021.100804

Helate, T. H., Metaferia, T. F., & Gezahegn, T. H. (2022). English language teachers' engagement in and preference for experiential learning for professional development. Heliyon, 8(10). https://doi.org/10.1016/j.heliyon.2022.e10900

Kosiol, T., Rach, S., & Ufer, S. (2019). (Which) Mathematics Interest is Important for a Successful Transition to a University Study Program? International Journal of Science and Mathematics Education, 17(7), 1359–1380. https://doi.org/10.1007/s10763-018-9925-8

Mayer, S., & Schwemmle, M. (2023). Teaching university students through technology-mediated experiential learning: Educators' perspectives and roles. Computers and Education, 207. https://doi.org/10.1016/j.compedu.2023.104923

Misfeldt, M., & Zacho, L. (2016). Supporting primary-level mathematics teachers' collaboration in designing and using technology-based scenarios. Journal of Mathematics Teacher Education, 19(2–3), 227–241. https://doi.org/10.1007/s10857-015-9336-5

Morris, T. H. (2020). Experiential learning–a systematic review and revision of Kolb's model. In Interactive Learning Environments (Vol. 28, Issue 8). https://doi.org/10.1080/10494820.2019.1570279

Morrison, J., Frost, J., Gotch, C., McDuffie, A. R., Austin, B., & French, B. (2020). Teachers' Role in Students' Learning at a Project-Based STEM High School: Implications for Teacher Education. International Journal of Science and Mathematics Education. https://doi.org/10.1007/s10763-020-10108-3

Park, D. Y., Park, M. H., & Bates, A. B. (2018). Exploring Young Children's Understanding About the Concept of Volume Through Engineering Design in a STEM Activity: A Case

Study. International Journal of Science and Mathematics Education, 16(2), 275–294. https://doi.org/10.1007/s10763-016-9776-0
Rahayu, N., Karso, K., & Ramdhani, S. (2019). Peningkatan Kemampuan Pemecahan Masalah Matematis dan Keaktifan Belajar Siswa Melalui Model Pembelajaran LAPS-Heuristik. IndoMath: Indonesia Mathematics Education, 2(2). https://doi.org/10.30738/indomath.v2i2.4536
Rilexen S P Mulder, W., Syaipul Hayat, M., & Khoiri, N. (2024). Effect of Digitalization of Web-Based Science Learning Media with the STEAM Approach to Student's Creative Thinking Abilities. KnE Social Sciences. https://doi.org/10.18502/kss.v9i6.15259
Samaniego, M., Usca, N., Salguero, J., & Quevedo, W. (2024). Creative Thinking in Art and Design Education: A Systematic Review. In Education Sciences (Vol. 14, Issue 2). https://doi.org/10.3390/educsci14020192
Star, J. R., & Stylianides, G. J. (2013). Procedural and Conceptual Knowledge: Exploring the Gap Between Knowledge Type and Knowledge Quality. Canadian Journal of Science, Mathematics and Technology Education, 13(2), 169–181. https://doi.org/10.1080/14926156.2013.784828
Wickstrom, M. H. (2014). An Examination Of Teachers ' Perceptions And Implementation Of Learning Trajectory Based Professional Development. Theses and Dissertations. Paper 87.
Xu, Y. (2023). An ocean of intercultural experiential learning. Sport, Education and Society, 28(1). https://doi.org/10.1080/13573322.2021.1979952