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BLENDED LEARNING FOR VOCATIONAL HIGH SCHOOL STUDENTS

Pembelajaran Blended bagi Siswa Sekolah Menengah Kejuruan

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INFORMASI ARTIKEL

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ABSTRACT:

The aimed of this study was to develop a blended learning for vocational students of light vehicle power expertise program in the learning process as a learning strategy to overcome the problem of lack of face-to-face time in class. The procedure for developing blended learning used was PEDATI model (learning, deepening, applying, measuring) as design instructional for blended learning. Data collection techniques used were observation, interview, and questionnaires. Data analysis techniques used was descriptive qualitative. The development of blended learning through the PEDATI model will be very effective for the achievement of learning objectives optimally and efficiency in learning time in class.

ABSTRAK:

Tujuan penelitian ini adalah mengembangkan blended learning bagi siswa SMK program keahlian tenaga kendaraan ringan dalam proses pembelajaran sebagai suatu strategi pembelajaran untuk mengatasi masalah kekurangan waktu tatap muka di kelas. Prosedur pengembangan blended learning dengan model PEDATI (Pelajari, Dalami, Terapkan, dan Evaluasi) sebagai model desain pembelajaran blended learning. Teknik pengumpulan data melalui observasi, wawancara, dan kuesioner. Teknik analisis data yang digunakan adalah deskriptif kualitatif. Pengembangan

blended learning dengan prosedur PEDATI akan sangat efektif untuk pencapaian tujuan pembelajaran secara optimal dan efisiensi waktu pembelajaran di kelas.

INTRODUCTION

Currently, education has entered the digital era in every learning activity. One of the demands of the digital era is applying the Information and Communication Technology (ICT) in learning activities. The implementation of information and communication technologies in the learning activities are expected to change in the process of learning, where it becomes more effective, efficient, enjoyable, and innovative (Koesnandar, 2020; Mukarom & Rusdiana, 2016). The implementation of ICT should be done creatively and innovatively by teachers to develop and improve students' cognitive, affective, and psychomotor abilities.

Today, the applying of ICT in learning activities could be implemented by using media and internet are presented in the form of digital books, audio, video, computer-based learning, web-based learning (e-learning), computer-aided learning (CAI), multimedia-based learning, presentation-based learning, and video conferencing.

One of the educational institution which certainly should apply the ICT in the learning activity is vocational high school. The existing resources both technological and human in vocational high schools are optimaly for implementing ICT in learning activities. Even though, there are still some obstacles caused by lack of technology facilities or the unavailability of competent human resources in ICT (Husain, 2014).

Even though the technological resources are adequate and the human resources both teachers and students of vocational schools able to use existing technology, but learning occurs in the classroom is not optimal. It happens because some vocational schools in the Java area are still one-roof schools with other schools, it makes lacking of learning time in class, especially for expertise matter subjects. Thus, to overcome the problem, it is necessary to develop a learning strategy in teaching. One of learning strategy by using ICT that suitable to be applied for vocational students is blended learning.

Blended learning is a strategic combination of online and face-to-face learning (Akkoyunlu & Soylu,2008; Garrison & Vaughan 2017; Graham, Borup, Short, & Archambault, 2019). Blended learning should gives students some control over time, place, path, and/or speed (Graham et al, 2019). This means that learning time is no longer limited to school days, the place of learning is no longer limited in the class, the learning path is no longer limited to the pedagogy used by the teacher. Learning with a blended strategy can streamline time and can do the learning process with more time portions (Darmawan, 2015).

So, it can be synthesized that blended learning is the right combination of face-to-face strategy and online learning to create an optimum learning experience to enhance the learning outcomes effectively (Arham & Dwiningsih, 2016).

Dewantara vocational school is one of the one-roof school models in Java, especially in Cikarang, West Java Province. Learning that takes at the school based on school scheduled is five hours per week for all subjects. So, there are many shortages of learning time in class. Therefore, blended learning is one of the learning strategies to solve this gap based on the needs analysis.

The blended learning development was conducted by PEDATI model as a blended learning design. This model consist of learning, deepening, applying, and measuring (Chaeruman, 2017). Cognitive subject matter such as understanding, conceptual, and procedures will be studied online by students. While the psychomotor materials will be studied face-to-face in class.

Banggur, Situmorang, & Rusmono (2018), using Dick and Carey model to conduct the blended learning development. Aeni, Prihatin, & Utanto (2017), using Dick and Carey models which are simplified into three stages; analysis, development, and product evaluation. Arham & Dwiningsih (2016), using Borg and Gall models to conduct the blended learning development.

The blended learning will be developed by combining precisely and systematically by face-to-face and online learning strategies to create students learning experiences. Therefore, it is expected that by implementing a systematic learning strategy, using the precise technology, and applying the suitable pedagogical models in learning will achieve the learning objectives optimally as well as efficient in face to face learning time.

PEDATI model was used to conduct the blended learning

development. The PEDATI model consists of five stages; (1) Formulating learning objectives, (2) Mapping and organizing learning materials, (3) Selecting and determining synchronous and asynchronous learning activities, (4) Designing asynchronous learning activities, (5) Designing synchronous learning activities.

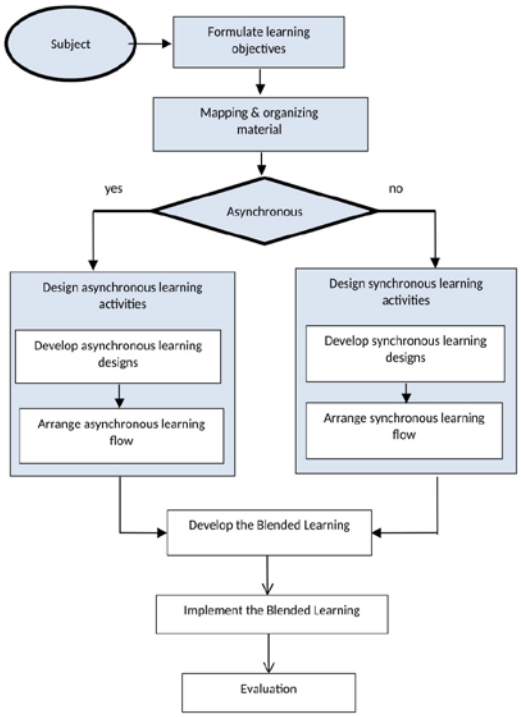

Figure 1. Flowchart of PEDATI Model

RESEARCH METHODS

This study is a research and development (R&D) which is a systematic process in designing, developing, validating and evaluating a product used in certain learning. This study was conducted for second-grade students of Light Vehicle Power Expertise Program at Dewantara Vocational School, West Java Province for Chassis Maintenance and Light Vehicle Power Transfer Subject.

Data were collected by observation, interview, and questionnaires. Observation was made with the aim of obtaining preliminary data about learning activities, learning facilities and infrastructure, learning environment activities, and student characteristics. This observation was carried out at the pre-research stage.

Interviews were conducted with the subject teacher of Chassis Maintenance and Light Vehicle Power Transfer and the Head of the Light Vehicle Engineering Program. This interview was conducted at the analysis stage. The purpose of this interview is to identify gaps in learning.

The questionnaires were used at the stage of learning needs analysis and student analysis to obtain data about learning needs and characteristics.

The data analysis technique used is descriptive qualitative analysis technique. This data analysis technique is done by grouping the information from qualitative data through observation, interviews, and questionnaires.

RESULTS AND DISCUSSION

Blended Learning Development

The blended learning development for Chassis Maintenance and Light Vehicle Power Transfer begins with the activity of designing learning, then continuing to produce the blended learning. The development of blended learning is a process of systematically translating design into physical form (Seels & Richey, 1994).

The blended learning development combine with flipped classroom model. Through the flipped classroom, cognitive materials such as understanding, conceptual, and procedural are learned online by text media, Power Point Presentation, infographics, animation, and video (Butt, 2014; Mohanty & Parida, 2016; Wallace, 2014).

The Development of Blended learning with the flipped classroom for Chassis Maintenance and Light Vehicle Power Transfer is regularly scheduled by the teacher. Staker & Horn (2012) classifies the flipped classroom model as a rotation model because it requires students to rotate within the schedule set by a teacher among learning modalities, at least one of them is online learning.

Develop the Blended with PEDATI Design

The process of developing blended learning for Chassis Maintenance and Light Vehicle Power Transfer based on the PEDATI model stages. PEDATI model is blended learning design for creating learning product that used in self-directed learning and collaborative (Chaeruman, 2017). According to Branch & Dousay (2015), development of product-oriented model focused on creating learning products are used for self-directed learning and collaborative learning.

The following table is the results of the blended learning design for Chassis Maintenance and Light Vehicle Power Transfer carried out by PEDATI model stages.

Table 1. Blended Learning Design

Subject	:	Chassis Maintenance and Light Vehicle Power Transfer
Learning Outcomes	:	Students able to perform proper and correct the Chassis Maintenance and Light Vehicle Power Transfer

Learning Objectives	Main Topics	Sub Topics	Learning Materials	Learning Activities		
				Synchronous		Asynchronous
				Live	Virtual	
Students able to perform maintenance of the brake system properly	Brake system maintenance	The function of Brake system maintenance	The function of brake system	-	-	√
			The working principle of the brake system	-	-	√

			Brake system classification	-	-	√
			Drum brake and disc brake	-	-	√
			Master cylinder components	-	-	√
		How to maintain the brake system	Brake system maintenance procedures	-	-	√
			How to check the brake system	-	-	√
			Perform regular maintenance of the brake system	√	-	-
			Check the results of brake system maintenance	√	-	-
Students able to perform maintenance of the steering system and power steering properly	Maintenance of the steering system and power steering	Maintenance functions of the steering system and power steering	Steering system function	-	-	√
			Steering system mechanism	-	-	√
			Power steering system	-	-	√
			How the steering system and power steering works	-	-	√
		How to maintain the steering system and power steering	Procedure for removing components of the steering system and power steering	-	-	√
			How to check the steering system and power steering	-	-	√
			Perform maintenance on the steering system and power steering	√	-	-
			Check the results of maintenance of the steering system and power steering	√	-	-
Students able to perform clutch maintenance properly	Clutch maintenance	Clutch maintenance function	Clutch function and the main parts of the clutch	-	-	√
			How the clutch works	-	-	√
			Types of clutch	-	-	√
			Clutch disc spring	-	-	√

		How to maintain the clutch	Clutch overhaul maintenance procedure	-	-	√
			How to check the clutch overhaul	-	-	√
			Perform the clutch maintenance	√	-	-
			Adjusts the clearance of the clutch pedal	√	-	-
Students able to perform manual transmission maintenance properly	Manual transmission maintenance	The function of Manual transmission maintenance	Manual transmission function	-	-	√
			The main parts and types of manual transmissions	-	-	√
			How the manual transmission works	-	-	√
			Types of manual transmission shift gear	-	-	√
			How to calculate the manual transmission shift gear	-	-	√
		How to maintain the manual transmission	Manual transmission maintenance procedure	-	-	√
			How to check manual transmission components	-	-	√
			Perform manual transmission maintenance	√	-	-
			Adjusts the manual transmission lever motion	√	-	-
Students able to do propeller shaft maintenance properly	Propeller shaft maintenance	Propeller shaft maintenance function	Propeller shaft function	-	-	√
			Propeller shaft components	-	-	√
			Independent axle drive	-	-	√
			Rigid axle drive bearing	-	-	√
		How to maintain the propeller shaft	Propeller shaft maintenance procedure	-	-	√
			How to check the propeller shaft	-	-	√

Perform propeller shaft maintenance	√	-	-
Check the results of propeller shaft maintenance	√	-	-

The stages of the learning design for Chassis Maintenance and Light Vehicle Power Transfer are as follows: 1) Formulating learning outcomes and objectives, learning outcomes is the final competencies that must be mastered by students while the formulation of learning objectives is based on five competencies that must be mastered by students; 2) Mapping and organizing learning materials, purpose to determine the main topic, sub topic, and learning materials; 3) Choosing asynchronous and synchronous learning, asynchronous learning materials in the form of cognitive materials, while synchronous learning materials are in the form of skills materials (physic motoric); 4) Designing asynchronous learning activities, determining the materials to be presented online; and 5) Designing synchronous learning activities, determining face-to-face materials in class.

The following is the implementation of PEDATI stages for Chassis Maintenance and Light Vehicle Power Transfer.

Table 2. Implementation of PEDATI in Online Learning

Main Topics	Meetings	Learning Materials	Learning	Deepening	Applying	Measuring
Brake system maintenance	1st meeting	The function of brake system	Online text	Discussion of how to maintain the brake system	Online assignment about the working principle of brakes	Open quiz
		The working principle of the brake system	Animation & Online text			
		Brake system classification	Online text			
		Drum brake and disc brake	PDF file			
	2nd meeting	Master cylinder components	PPT File	Discussion of drum brakes, disc brakes, and master cylinder components	Online assignment about the working principle of drum brakes and disc brakes	Open quiz
		Brake system maintenance procedures	Word file			
	3rd meeting	How to check the brake system	Info graphics	Discussion of brake system maintenance and how to check the brake system	Online assignment on how to check brake	Objective test
		The function of brake system	Video			
Maintenance of the	4th meeting	Steering system function	PPT file	Discussion of the steering system	Online assignment about the steering system	Open quiz

steering system and power steering	5th meeting	Steering system mechanism Power steering system How the steering system and power steering works	PDF file Online text and Word file Animation	Discussion of the steering system mechanism, power steering system and how it works	Online assignments on how the steering system and power steering work	Open quiz
	6th meeting	Procedure for removing components of the steering system and power steering How to check the steering system and power steering	Info graphics Video	Discussion on how to maintain the steering system and power steering	Online assignments on how the steering system and power steering work	Objective test
Clutch maintenance	7th meeting	Clutch function and the main parts of the clutch How the clutch works Types of clutch Clutch disc spring	Online text, PDF file, and PPT file Animation and Word file PPT file PDF fie	Discussion of how the clutch works	Online assignment on how the clutch works	Open quiz
	8th meeting	Clutch overhaul maintenance procedure How to check the clutch overhaul	Info graphics Video	Discussion on how to check the clutch	Online assignment on how to check clutch	Objective test
Mid-Test	9th meeting	Material for the 1st to 8th meetings	-	-	-	Objective test
Manual transmission maintenance	10th meeting	Manual transmission function The main parts and types of manual transmissions How the manual transmission works	Online text PPT File and word file Animation and PDF file	Discussion of how the manual transmission works	Online assignment on how manual transmission works	Open quiz
	11th meeting	Types of manual transmission shift gear How to calculate the manual transmission shift gear	PPT File and Info graphics PDF file	Discussion on how to calculate the gear ratio in a vehicle	Online assignment on how to calculate gear ratio in a vehicle	Open quiz
	12th meeting	Manual transmission maintenance procedure How to check manual	Info graphics Video and PPT file	Discussion on how to check manual transmission maintenance	Online assignment of manual transmission maintenance	Objective test

		transmission components				
Propeller shaft maintenance	13th meeting	Propeller shaft function Propeller shaft components	Online text and Animation PDF file and PPT file	Discussion of the components on the propeller shaft	Online assignment about the functions of propeller shaft components	Open quiz
	14th meeting	Independent axle drive Rigid axle drive bearing	PDF file Word file	Discussion of independent axle drive and rigid axles	Online assignment of independent axle drive and rigid axles	Open quiz
	15th meeting	Propeller shaft maintenance procedure How to check the propeller shaft	Info graphics Video and PDF file	Discussion of propeller shaft maintenance procedures	Online assignment on how to check the propeller shaft	Objective test
Final Exam	16th meeting	Material for the 10th to 15th meetings	-	-	-	Objective test

There are four cycles of asynchronous learning in PEDATI: 1) learning, through digital materials such as text, audio, video, animation, simulation, and games; 2) deepening, through online discussion forum activities; 3) applying, via online assignment; and 4) evaluation (measuring), through online quizzes and objective tests. Learning and deepening are part of self-directed learning asynchronous, while applying and measuring are part of collaborative asynchronous learning. Online learning is learning that can be accessed flexibly anywhere and anytime and allows students to determine the time and place in learning. Online learning materials are presented in the form of text, document files, PDF, PPT, info graphics, animations, and videos (Cole & Kritzer, 2009).

The development of the blended learning consisting of learning activities and material contents from Chassis Maintenance and Light Vehicle Power Transfer developed using Moodle platform version 3.8.1 as a learning technology. The instructional strategy used collaboration and self-directed learning through asynchronous learning. While the pedagogical model used a virtual learning environment. The results of this study are expected to be very effective and efficient in the learning process for Dewantara vocational school students both towards learning outcomes optimally and efficiently in managing the limited learning time in class as well as a learning resource for students.

Following is the display of blended learning development for

Chassis Maintenance and Light Vehicle Power Transfer.

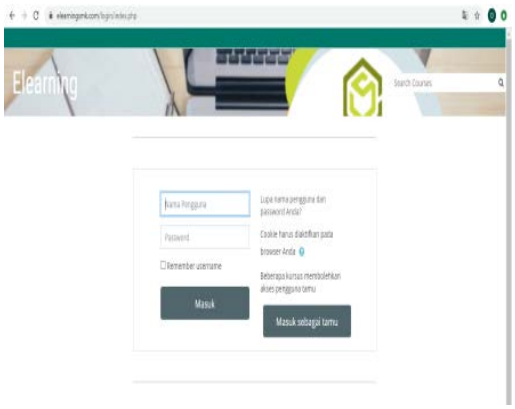

Figure 2. Login Page

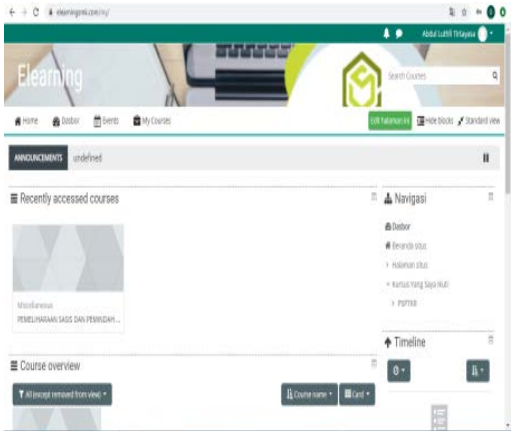

Figure 3. Home Page

CONCLUSION

The development of blended learning for Chassis Maintenance and Light Vehicle Power Transfer helps students and teachers in the learning process as a learning strategy in overcoming the problem of lack of face-to-face time in class, improves students learning outcomes, and as a learning resource for self-directed learning and collaborative learning.

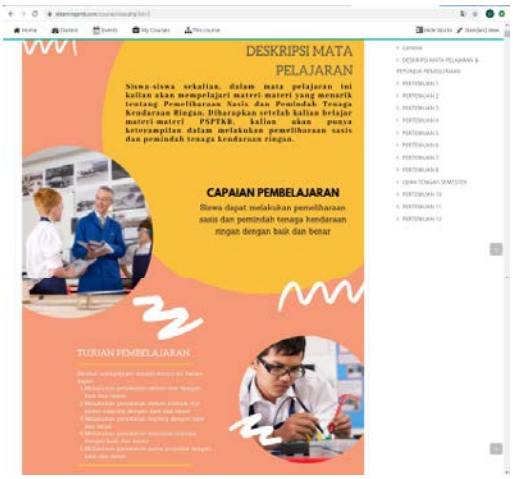

Figure 4. Course Page

The product excellence of blended learning development for Chassis Maintenance and Light Vehicle Power Transfer subject are carried out systematically by formulating learning objectives, mapping and organizing learning materials, selecting and determining synchronous and asynchronous learning activities, designing asynchronous learning activities, and designing synchronous learning activities.

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