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THE DEVELOPMENT OF E – LEARNING MODEL WEB-BASED MATHEMATICS STUDENT WORKSHEETS (LKPD) TO INCREASE LEARNING MOTIVATION OF VOCATIONAL SCHOOL STUDENTS

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ABSTRACT

This research is based on the observations of researchers, that the use of student worksheets (LKPD) as a learning resource still dominated at the SMK level. The use of LKPD which is still classical makes the class atmosphere monotonous, passive, and boring. This can be seen in the low level of student motivation. Currently, there is a learning model that utilizes information and communication technology in learning called e-learning. The problems in this study are (1) What are the stages of developing a web-based e-learning model of e-learning mathematics learning media? (2) What is the feasibility of the web-based e-learning model of the mathematical LKPD product? This research was development research (R & D) with research subjects in class XI SMK YWKA Medan. This study used several instruments including lesson plans, validation sheets, and learning motivation questionnaires. The conclusion of this research is that the development of a web-based e-learning model of mathematics worksheets can increase students' learning motivation. We can find out how the process of making a web-based e-learning model of mathematics worksheets. Based on the conclusions of the results of this study, it is recommended: (1) the purpose of developing this LKPD is to introduce to students that mathematics is not a boring subject but a fun and interesting subject. (2) The development of these student worksheets must be developed again, to find out whether the development is in accordance with all the characteristics of the material and the characteristics of the students.

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1. INTRODUCTION

The Covid-19 pandemic has affected various sectors of life in every country, including Indonesia. Various efforts have been made by the Indonesian government to prevent the rapid spread of the Covid-19 virus. One of the sectors that are most affected the human life is the education sector. During the initial period of the Covid-19 pandemic, every school in the red zone was required to carry out BDR (Learning from Home) activities. Along with the development of the spread of the Covid-19 virus, now there are several areas that have been able to be in the orange, yellow, and green zones. In areas with yellow and green zones, face-to-face schools can already be carried out by paying attention to health protocols, limiting the number of students in class, and the number of meetings in a week.

This is stated in the Joint Decree of the Minister of Education and Culture, Minister of Religion, Minister of Health, and Minister of Home Affairs of the Republic of Indonesia Number 03/Kb/2020 Number 612 of 2020 Number Hk.01.08/Menkes/502/2020 Number 119/4536/Sj. Based on the limitation of the number of students in the class and the number of meetings, face-to-face learning carried out during the New Normal period is still collaborated with online learning. Students who do not take part in face-to-face learning activities because of the division of learning sessions due to restrictions on the number of students in class, continue to carry out online learning activities. Learning mathematics online has become a challenge for every teacher so that the learning carried out can achieve the predetermined goals. This is in accordance with research conducted by Mailizar, et al (2020) and Rasmitadila, et al (2020).

Mathematics which contains abstract study objects certainly requires appropriate learning methods in order to help students learn mathematics more meaningfully. The most frequently encountered problem is the limited ability of teachers to utilize technology in compiling effective learning carried out online or face-to-face. Kamsurya (2020) states that in online learning activities, it is necessary to create a learning device of good quality in terms of preparation, facilities and infrastructure, teaching materials, and learning methods used therefore learning is carried out online in the New Normal era and can still take place. effectively. The role of technology and information as online learning instruments really needs to be developed by education actors. Yazdi (2012) states that in creating harmonization and dynamics of creative and interactive learning, it is necessary to play the role of Information and Communication Technology (ICT/ICT) as an interactive learning technology instrument, one of the ICT tools that can be used in learning is WEB-based learning or can also known as e-Learning. Situmorang (2016) also explained that E-Learning can be seen as an innovative approach by utilizing the use of internet technology to be used as a good delivery media design, user-centered, interactive, and as a learning environment that has various facilities for anyone, anywhere and anytime. One of the online learning activities is WEB-based learning. Pages from the WEB are usually accessed through a URL which is usually called the Homepage. This URL manages the readers and tells them the overall structure and how this information flows.

Kumalasari (2013) states that with WEB learning media, abstract things can be demonstrated by means of visualization, animation, and simulation, so that students are expected to be able to communicate actively and better with the subject matter, and in the end, it is hoped that their learning achievement will be better. One of the people who have been affected during the Covid-19 pandemic is SMK students. Before the pandemic, vocational students often had difficulties in learning mathematics, even though the learning activities were carried out face-to-face. Most SMK students consider mathematics as an unimportant subject to be learned in SMK. This is because vocational students for each skill cluster generally assume that studying in vocational schools is productive learning, such as learning how they can improve their productive skills to be accepted in the industry (Maharani, 2015). During the Covid-19 pandemic, mastery of math material for vocational students become increasingly difficult to achieve. Online learning requires students to be more independent in learning. Based on the data obtained from the distribution of questionnaires to the students of the Private Vocational School of the Medan Kereta Api Women's Foundation, it could be seen from the 51 respondents who answered the questionnaire given by the researcher, it was known that 80% of the students do not like learning mathematics. They did not feel that learning mathematics will help their area of expertise. Thus, based on interviews with mathematics teachers, it could be seen that many students often did not take mathematics lessons for various reasons. Based on the data obtained from the teacher, it was known that student learning outcomes in mathematics were very low, only a small number of students' scores got above the KKM in mathematics. Of the 30 students in a class, only 5 people scored above 70. This indicates that the mathematics learning process is less successful in making students understand what is being studied.

Mathematics is a universal science that underlies the development of modern technology, has an important role in various disciplines, and develops the power of human thought. Mathematics subjects need to be given

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to all students starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively as well as the ability to work together (Depdiknas, 2006:387).

When studying mathematics, students must understand and actively build new knowledge from experience and previous knowledge. The National Council of Teachers of Mathematics (2000) outlines that in learning mathematics students not only depend on "what" is taught but also depends on "how" mathematics is taught, or how students learn.

The basis of learning is the process of communication between teachers and students. The communication process that occurs does not always run smoothly, even the communication process faces the material being studied. Many learning models have been developed that can be applied by teachers to make students develop the concepts being studied, encouraging students to learn independently.

Student Worksheet (LKPD) is one of the means to assist and facilitate teaching and learning activities so that effective interaction will be formed between students and educators, so as to increase student activities in improving learning achievement. Widjanti (2008:1) said that the student worksheet (LKPD) is one of the learning resources that can be developed by educators as facilitators in learning activities. The prepared LKPD can be designed and developed according to the conditions and situations of the learning activities encountered. Meanwhile, according to the Ministry of National Education (2008), LKPD is sheets containing tasks that must be done by students. Activity sheets are usually in the form of instructions, and steps to complete a task. The advantage of using LKPD is that it makes it easier for educators to carry out learning, for students to learn independently, and learn to understand and carry out a written task.

The internet is a program that uses computers. The use of the internet in the world of education offers various facilities and benefits for students and educators. The characteristics and features of the internet as a teaching medium that is rich in information, effective, flexible, and interesting are the reasons why it needs to be used. In addition, based on the research of Akhirni (2006), the implementation of the website as a learning media in learning activities in class XII SMA Negeri I Inderalaya is able to streamline. With effective and efficient learning activities, it is hoped that the use of web-based LKPD can make the learning carried out successfully, this success can be seen from the completedness of student learning outcomes.

2. METHODOLOGY

This type of research was research and development (R&D). Research and development is one of the research methods used to produce certain products and test their effectiveness of these products. The product that will be developed and tested for its effectiveness in this study is a problem-based student worksheet on algebraic form material. This research was conducted at SMK YWKA Medan. The subjects of this research were students of class XI for the academic year 2020/2021.

3. RESULTS AND DISCUSSION

This research was conducted with the aim of knowing the process of developing a web-based e-learning model of mathematical LKPD to increase student motivation in SMK. The development used was the Plomp development model. The procedures carried out in the LKPD development research included 4 phases: (1) the investigation phase preliminary investigation, (2) the design phase, (3) the realization phase, and (4) test, evaluation, and revision phase (test, evaluation, and revision).

The Process of Developing Web-Based E-Learning Mathematical Worksheet Models to Increase Learning Motivation of Vocational High School Students in the preliminary investigation phase was found that in the mathematics learning process it is necessary to support the availability of adequate LKPD in increasing students' motivation to learn algebraic function derivatives and resulting in an increase students' mathematics learning outcomes. The use of LKPD is expected to increase the independence of students in learning, confidence, disciplined, responsible, and ability to make decisions. LKPD can also be used at the stage of increasing learning motivation. The use of LKPD at the stage of increasing learning motivation means that LKPD is used to study a topic with the aim of deepening knowledge about the topics that have been studied in the previous stage, such as increasing learning motivation. The tasks or activities presented in the LKPD are based on Core Competencies (KI) and Basic Competencies (KD) in accordance with the 2013 Curriculum (K13).

LKPD that was being developed was web-based on the subject of derivative algebraic functions adapted to the stages of the e-learning model, which were (1) orientation of students to problems, (2) organizing students to learn, (3) guiding individual/group experiences, (4) developing and presenting the work, and (5) analyzing and evaluating the problem-solving process. These five stages were contained in each student activity presented

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in the developed LKPD. Each sub-chapter began by presenting a problem related to that sub-chapter. Through these problems, students could recognize various problems in everyday life that could be solved using the concept of derivative forms of algebraic functions. Furthermore, the activities in the LKPD directed students to solve the problems presented previously in groups and the teacher guides students either individually or in groups. In addition, student activities in LKPD also directed students to develop and present the results of their respective group discussions. The closing of the students' activities was to make conclusions about the material they have learned. In the final part of each sub-chapter in the LKPD that was developed were a number of problems related to the sub-chapters material as the exercise. The exercise train students to analyze and evaluate the problem-solving process. The following is an example of the LKPD page that was developed and the LKPD currently used by class XI students at SMK YWKA Medan:

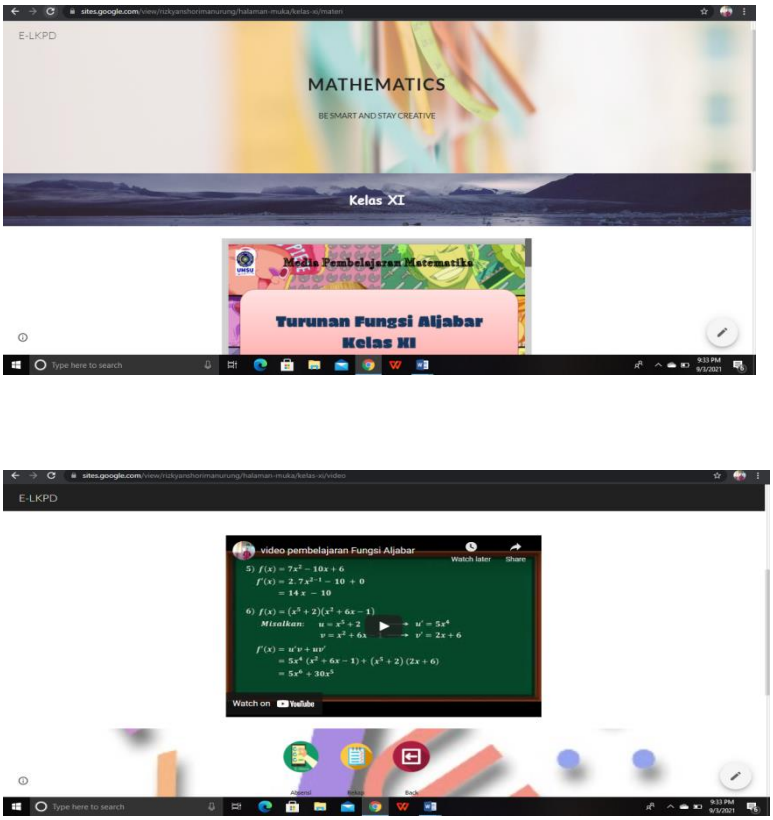

Figure 4.1
LKPD appearance

The LKPD developed is different from the LKPD currently used by class XI students at SMK YWKA Medan. In general, tasks or activities in LKPD used questions with content that were less related to problems in everyday life. For example, the worksheet used contains activities in the form of asking students to determine the derivative results of algebraic functions by presenting algebraic forms directly, without being preceded by problems related to everyday life. In addition, the lack of student assignments or activities that demand to be completed in groups. This means that in general, tasks or activities in LKPD are only completed independently (individually). Tasks or activities on LKPD on certain subjects were not in accordance with the material presented in the textbooks they used, thus making students feel lazy to use the LKPD. There are still fewer pictures that can increase the willingness of students to use the LKPD.

Quality of Development of LKPD Mathematics Model E - Web-Based Learning to Improve Learning Motivation of Vocational High School Students.

Validity

Based on the results of LKPD validation, the quality of the developed LKPD has been met and deserves to be tested with a valid category according to the validator's assessment. LKPD elements and the language used in the LKPD are in accordance with the Indonesian language rules, and the LKPD design is attractive and easy to understand. It can be concluded that the web-based LKPD is in accordance with the appropriateness of the content, presentation, language, and graphics which are the eligibility standards of the LKPD.

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Practicality

Practical data analysis is based on the observation sheet data on the implementation of LKPD, and students and teacher response questionnaires. Based on the results of practicality data analysis, the quality of the developed LKPD can be said to be practical in its use. This means that LKPD is easy to use to understand the material, and learning time is more effective. Using LKPD also can be understood clearly and easily. It can be concluded from the results of the questionnaire and interview guidelines that web-based worksheets are practical in terms of ease of use, time, interpretation, and equivalence.

Effectivity

The effectiveness data analysis was based on the activity data of students and teachers as well as the results of the ability test to increase the learning motivation of the derivatives of the algebraic function of the XI grade students of SMK YWKA Medan. Based on the results of practicality data analysis, the quality of the developed LKPD can be said to be practical in its use. This means that the use of problem-based worksheets that have been developed is effective in increasing the ability to increase students' motivation to learn mathematics.

4. CONCLUSION

This research was conducted with the aim to find out how to develop web-based LKPD learning media products and to obtain information about the feasibility of web-based LKPD learning media products used to increase student motivation that is valid, effective, and practical. The development model used is the Plomp development model. The procedures carried out in LKPD development research include 4 phases: (1) the preliminary investigation phase, (2) the design phase, (3) the realization phase, and (4) the test, evaluation, and revision phase (test, evaluation, and revision).

In the Preliminary Investigation Phase, of this study, an analysis of student needs, curriculum analysis, and analysis of teaching materials was carried out. The design stage was carried out by compiling a map of LKPD needs, determining the structure of the LKPD, compiling research instruments, and validating research instruments by expert lecturers. The stage of the Realization phase consists of 3 kinds of processes, which are LKPD writing, LKPD validation, and LKPD revision. The test, evaluation, and revision (test, evaluation, and revision) phases were a trial on 27 students of class XI SMK YWKA Medan, and an analysis of practicality data and LKPD effectiveness data was carried out. The average validity of the validator's assessment of the LKPD's graphic feasibility for aspects of the size of the LKPD in the valid category, the design and cover aspects of the LKPD were in the valid category and the content design aspect in the LKPD was in the valid category. Practicality, (1) the average of all observation aspects of LKPD was partially implemented, (2) the average percentage of all aspects of the positive category, and (3) the average percentage of all aspects of the positive category. Effectiveness, (1) the average percentage of student activities for the entire learning meeting was in the learning activity category good, (2) the average of all aspects of teacher activity is in a good category (3) the level of ability to increase the learning motivation of the derivatives of the algebraic function of the students was completed classically and the average ability to increase the learning motivation of the derivatives of the algebraic function of the students increased from the low category to the high category. So, it can be concluded that the web-based LKPD has met the quality requirements of being valid, practical, and effective.

5. REFERENCES

Abidin, Z, dan Saputro, TME. (2011). Upaya Meningkat- kan Motivasi dan Pemahaman Siswa pada Ma- teri Geometri dan Pengukuran Melalui Kegiatan “Remase” di SMP 33 Semarang, Kreano, Jurnal Matematika Kreatif-Inovatif, 2(2), 133-141.

Afifah, N., Batubara, I. H., & Harahap, T. H. (2021). Pengembangan Bahan Ajar Berbasis Pendekatan Investigasi Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Mahasiswa Prodi Pendidikan Matematika. *EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial*, *7*(2).

Andriati, Y., & Susanti, L. R. (2016). Pengembangan Me- dia Powtoon Berbasis Audiovisual Pada Pembe- lajaran Sejarah. CRIKSETRA: Jurnal Pendidikan Sejarah, 5(9), 60.

Annisa, N., Akrim, A., & Manurung, A. A. (2020). Development Of Teacher's Professional Competency In Realizing Quality Of Human Resources In The Basic School. *IJEMS: Indonesian Journal of Education and Mathematical Science*, *1*(2), 91-95.

Annisa, N., Akrim, A., & Manurung, A. A. (2020). Development Of Teacher's Professional Competency In Realizing Quality Of Human Resources In The Basic School. *IJEMS: Indonesian Journal of Education and Mathematical Science*, *1*(2), 156-160.

Asyifa, S.M. (2018). Pengembangan Video Pembelajaran untuk Mengembangkan Kemampuan Pemaha- man Konsep Matematis Siswa Sekolah Dasar. (Doctoral Dissertation). Serang: Universitas Sul- tan Ageng Tirtayasa.

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DOI : http://dx.doi.org/10.30596%2Fijems.v3i2.11083

Barnawi dan Arifin. (2012). Etika dan Profesi Kependidi- kan. Yogyakarta: Ar-Ruzz Media.

Batubara, I. H. (2020). Pengaruh Model Pembelajaran Guided Discovery Learning terhadap Hasil Belajar Pengembangan Silabus Pembelajaran Matematika pada Masa Pandemic Covid 19. *Jurnal Penelitian, Pendidikan.*

Batubara, I. H. (2020). Peningkatan Kemampuan Pemecahan Masalah Matematik Melalui Metode Penemuan Terbimbing Berbantuan Sofware Geogebra. *Journal Mathematics Education Sigma [JMES]*, *1*(1).

Batubara, I. H., & Ammy, P. M. (2018). Pengaruh Model Pembelajaran Berbasis Masalah Terhadap Hasil Belajar Mahasiswa. *Biblio Couns: Jurnal Kajian Konseling dan Pendidikan*, *1*(2), 43-53.

Febriani, C. (2017). Pengaruh Media Video terhadap Mo- tivasi Belajar dan Hasil Belajar Kognitif Pembe- lajaran IPA Kelas V Sekolah Dasar, Jurnal Prima Edukasia, 5, 13-14.

Harahap, T. H., & Manurung, A. A. (2019). The Influence of Three Stage Fishbowl Decision Learning Method On Mathematical Learning Ability.

Harahap, I. H., & Manurung, A. A. (2022). Analisis Pengaruh Resilensi Terhadap Kemampuan Pemecahan Masalah Matematis Siswa DI MTs Ruhul Islam Sialambue. *EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial*, *8*(1), 94-97.

Hasbulah. (2018). Peningkatan Hasil Belajar Kognitif Biologi Menggunakan Model Problem Base Learning Berbasi Powtoon Siswa Kelas XII IPA 7 SMA N 1 Metro Semester Ganjil Tahun Pelajaran 2017/2018, BIOEDUKASI (Jurnal Pendidikan Biologi), 9(2), 124-131.

Maisyarah, M., Afriyanti, D., & Manurung, A. A. (2021). PENERAPAN MODEL PACE DALAM MENINGKATKAN HASIL BELAJAR MATEMATIKA SISWA SMP NURUL ASANAH. *Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP*, *2*(1).

Maisyarah, M., Afriyanti, D., & Manurung, A. A. (2021). Penerapan Model Pace Untuk Meningkatkan Hasil Belajar Matematika Siswa Pada Smp Nurul Hasanah. *Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP*, *2*(1), 81-99.

Manurung, A. A., & Gulo, F. F. (2021). Application of Problem Based Learning Model on Pythagorean Theorem Material to Improve Student Learning Outcomes for Class VIII SMP Negeri 2 Mandrehe. *IJEMS: Indonesian Journal of Education and Mathematical Science*, *2*(2).

Manurung, S. H., & Aspia, A. (2016). Upaya Meningkatkan Kreativitas dan Hasil Belajar Matematika Siswa dengan Menggunakan Model AIR (Auditory, Intellectually, Repetition) pada Siswa Kelas VIII MTs Negeri RantauPrapat TP 2014/2015. *EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial*, *2*(1).

Manurung, A. A., & Gulo, F. F. (2021). Application of Problem Based Learning Model on Pythagorean Theorem Material to Improve Student Learning Outcomes for Class VIII SMP Negeri 2 Mandrehe. *IJEMS: Indonesian Journal of Education and Mathematical Science*, *2*(2), 92-102.

Manurung, A. A., & Rohmah, M. (2021). THE EFFECT OF USE OF POWER POINT LEARNING MEDIA ON STUDENT LEARNING MOTIVATION AT SMK BINA ISLAM MANDIRI KERSANA. *Al'adzkiya International of Education and Sosial (AIoES) Journal*, *2*(1), 54-57.

Manurung, A. A. (2020). Design and Simulation of Indonesian Language Application Exam with Mobile-based End User Development Method. *Al'adzkiya International of Computer Science and Information Technology (AIoCSIT) Journal*, *1*(1).

Manurung, A. A. (2012). Media Pembelajaran "Berbasis Tergologi Informatika".

Manurung, A. A., & Laoli, D. (2021). The Effect Of Problem Based Learning Model On Learning Motivation And Understanding Of Mathematical Concept Students Of SMP Negeri 2 Tuhemberua. *Al'Adzkiya International of Education and Sosial (AIoES) Journal*, *2*(2), 170-196.

Manurung, A. A., Nasution, M. D., & Nisah, K. (2021). PENGEMBANGAN LEMBAR KERJA PESERTA DIDIK (LKPD) MELALUI STRATEGI BELAJAR SMALL GROUP WORK PADA MATERI BANGUN RUANG SISI DATAR. *Numeracy*, *8*(2), 83-89.

Manurung, A. A. (2021). Matematika dan Seni Antara Estetika dan Logika Berpadu. *Al'Adzkiya International Mathematics Journal (AIMJ)*, *1*(2).

Makmur, A., & Aspia, A. (2015). Efektifitas Penggunaan Metode Base Method dalam Meningkatkan Kreatifitas dan Motivasi Belajar Matematika Siswa SMP Negeri 10 Padangsidempuan. *EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial*, *1*(01).

Simamora, A., & Manurung, A. A. (2021). Mengatasi Kesulitan Belajar Siswa Pada Pokok Bahasan Lingkaran Dengan Menggunakan Model Pembelajaran Kooperatif Tipe Numbered Heads Together Di Kelas VIII SMp Negeri 1 Galang Tahun Pelajaran 2019/2020. *Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP*, *2*(2), 169-180.

Wirani, N., & Manurung, A. A. (2020). The importance of using a web-based learning model to prevent the spread of covid 19. *Al'adzkiya International of Education and Sosial (AIoES) Journal*, *1*(1), 16-24.