

INTERACTIVE LEARNING MEDIA IN THE FIELD OF MECHANICAL ENGINEERING: A CASE STUDY OF ENGINEERING DRAWING SUBJECTS

Rizky Adi Zuliansah¹, Najmy Qolby 'Alya², Risma Aprillia³, Shofya Azzahra Muttaqin⁴, Husni Hamdani⁵

¹²³⁴Mechanical Engineering Education, Faculty of Technology and Vocational Education, Indonesian Education University, Bandung, West Java, Indonesia

⁵Education Administration, Faculty of Science Education, Indonesian Education University, Bandung, West Java, Indonesia

Email: rizkyadizuliansah@upi.edu

Abstract

This study aims to find out whether the methods in interactive learning media that have been applied are appropriate or not. The application of interactive learning media methods to engineering drawing learning can improve learning efficiency, strengthen concept understanding and improve students' practical skills in mechanical engineering learning. This study uses a quantitative descriptive method with case studies as the main method. Data is collected through questionnaires and in-depth analysis so that it becomes a whole sentence as a whole. The results of the research that has been carried out show that the most effective learning media uses the practicum model in engineering drawing subjects. In addition, teaching aids also affect students' understanding of teaching materials in engineering drawing subjects. Thus, teachers must be able to make an interactive learning so that students understand the technical drawing material to the maximum.

Key words: Learning Media, Engineering Drawings, Interactive, Mechanical Engineering

INTRODUCTION

Interactive learning media can basically create students' enthusiasm in carrying out the teaching and learning process, with interactive learning media can also increase students' comprehension ability in a material that may be quite difficult to understand. With the creation of interactive learning media, students are not passive and bored during the learning process. Learning media is certainly very important in the teaching and learning process in the hope that it can run effectively and students can understand the material well, for that educators must be able to know and understand innovations in the world of education, especially knowing how to create interactive learning media for students.

This is also motivated by the rapid creation of science and technology (IPTEK), especially in the field of education itself, which is a challenge for students and educators (Arwanda, et al., 2020:193). Therefore, students must adjust to existing developments. As an educator, it is also required to have a significant role in following technological updates, especially in the field of education, which is needed to create *agents of change* that have advantages and are highly competitive in world civilization.

Media is a tool as well as an intermediary used by educators in supporting the learning process in the classroom. Meanwhile, learning media is a means of conveying information through an educator which can later stimulate students in understanding the learning material. Therefore, as an educator or facilitator, you must understand and

innovate in making learning media because it makes students more active and creative in carrying out a learning process, both inside and outside the classroom so that the goals expected by educators or facilitators are achieved. For example, if there is no learning media in an institution or school, this has an impact on the sense of boredom in the learning process (Isnaeni, 2020:148). Thus, the rapid creation of science and technology (IPTEK) will have an impact on the field of education which is increasingly varied and interesting, especially in innovating learning media that will be delivered by educators to students in the hope of achieving a learning goal and motivating students in learning.

Learning is an activity planned by educators so that students can learn and achieve the required qualifications, therefore before completing learning, educators must prepare a curriculum to achieve the expected goals (Widiyanto, and Wahyuni, 2020:18). The learning system is the center of attention in the discussion of media as one of the components of learning. The use of media must be a part that needs attention in all learning. But in fact, this part is often overlooked for several reasons. The reasons that often cause this are expensive costs, wasted time in preparing lessons, difficulty finding the right media, lack of funds and so on (Febrita, Y., & Ulfah, M., 2019:182). Thus, learning is a process in which individuals experience a change in attitude comprehensively through interaction with their environment. Communication between learning resources, educators, and students is part of this process. Learning emphasizes

the manipulation of learning resources to create an effective learning process in students. In addition, learning also includes collaboration between students, educators, and other staff in order to achieve the desired educational goals.

Learning media can be said to be a form of a varied and interactive learning process that can increase the enthusiasm for learning of students. Learning is one of the efforts that make students learn or it can be said that educators are trying to learn students. In its own use, teaching media should be paid more attention by an educator so that the goals in the teaching process are achieved. Therefore, educators must better understand in managing learning media to be more interactive and optimal.

Vocational or vocational schools are formal schools based on competency (Friatna, et al., 2022: 19). At the vocational school level, students' skills are developed through basic skills and habits training towards the world of work which is seen as skills training (Tridiana and Rizal, 2020:222). Engineering drawing is one of the vocational school subjects that is included in the productive category, which focuses on mastering the basics according to field practice. The subject of engineering drawing is usually divided into theory and practical drawing, and the material includes the basic principles of mechanical engineering drawing, which can be applied to practical engineering drawing that will later be implemented in the classroom (Putri, M. R., & Aswardi, A., 2023:536). This subject is also mandatory for students of Vocational High Schools (SMK) in the field of Mechanical Engineering where there are learning materials that can improve students' competencies both in cognitive, affective, and psychomotor forms. In terms of cognitive, engineering drawing subjects such as, being able to recognize various kinds of teaching aids and manual drawing equipment, knowing various kinds of lines, and projections. In addition, from an affective point of view, this ability prepares a standard data source for machine drawing techniques, the ability to determine the right drawing technique for drawing, and the maintenance of manual drawing equipment and devices. Finally, psychomotor skills are developed through activities such as making objects in the form of isometric and oblique drawings and drawing objects that match the projections studied. In achieving this psychomotor aspect, students are required to have the ability to read engineering drawings to make it easier during the work process.

Therefore, this research aims to find out whether what is applied to interactive learning media, especially in technical drawing subjects, is appropriate or not. In addition, this can be an eval-

uation material for educators in designing the learning media it self so that students can also understand the subject well to the level of application.

METHODS

The method in this study is a quantitative descriptive method which is carried out by processing the data that has been collected. The descriptive data collected quantitatively is used to provide an overview of the real situation, as well as to answer questions related to the state of the research object (Sulistyawati, 2022:70). The sources used in this study are from data that has been processed and other relevant references. The data obtained is processed in depth with the hope of achieving a complete idea as a whole to get conclusions and suggestions.

The instruments used in this research include questionnaires which will later be distributed to vocational high school (SMK) students who experienced the events mentioned in this research.

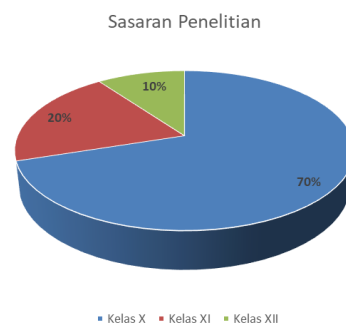


Figure 1. Research Objective Diagram

After receiving the data, the researcher integrates the data and selects important data related to the research indicators. This is done to facilitate the display of data and avoid inaccurate data. The data is then presented in the form of descriptions, diagrams, and relationships between indicators so that it is easier for others to understand and more structured (Agustina et al., 2022:9182). This data will also be processed into a complete idea so that the final result of the implementation of the interactive learning media will be known.

RESULTS AND DISCUSSION

The use of learning media has a positive impact on the learning process of students. In addition, learning materials serve as an additional layer of support that is important and fundamental for effective teaching (Harsiwi, 2020:1105). In the educational process at vocational schools, engineering drawings play an important role in shaping the basic thinking and skills of mechanical engineering students (Rizky, 2023:75). So that students are

required to be able to understand and learn engineering drawings, technical drawings as a basis for reading are also needed to meet the needs of the production process in the industry. In the learning process, engineering drawing theory is needed to meet the needs of students in studying all machine components. Not only learning theory, vocational school students with a machining major are required to be able to draw according to the needs of the industry that has been determined.



Figure 2. Learning Model Diagram

In learning technical drawings, not only the theory is given by the teacher to the students, it is also necessary to have hands-on practical activities in drawing techniques so that students understand the entire material given. There were 97.5% of students who filled out the questionnaire agreed that learning with practice is easier to understand and master than just providing material. Not only that, the students admitted that with practice they had an easier time reading the given engineering drawings. Vocational school students who study this technical drawing must not only be good at drawing, need to be reliable in reading is also one of the keys to successful learning. Because, in the manufacturing industry, workers who have good image reading skills are needed. So that consumer needs through the production process can be obtained to the maximum.



Figure 3. Diagram of the use of teaching aids

Engineering drawing is one of the lessons that requires several tools in the process. One of them is the ruler and the term. The creation of im-

ages from symmetrical to irregular has functions, methods and even rules for making them. The use of props will produce a good picture and is in accordance with the picture it should be. So, it will produce images that are in accordance with the rules and good results. The survey results obtained 52.5% who agreed that the existence of teaching aids would make the process of engineering drawings and making assignments at vocational schools easier in addition to the process, in the results of which these teaching aids also helped and made it easier for students to do exercises or engineering drawing assignments.

The learning media used in vocational school subjects in mechanical engineering drawings are in the form of appropriate teaching aids, exercises, and learning processes that provide procedures for the work. So, vocational school students who do assignments can complete optimally. Not only looking at the results obtained, the process is also needed to assess whether the SMK student is able to do the assignment or not.



Figure 4. Interesting Learning Media Usage Diagram

Learning Media is one of the tools or teaching materials that can help students in understanding the material, either directly or indirectly, which is used as an intermediary between a teacher and students (Mahardika, A. I., dkk, 2021:276). Therefore, teachers are required to be able to develop learning media as attractively as possible so that students better understand the learning effectively and efficiently. In the subject of Engineering Drawing, interesting learning media should be created so that it is easy for students to understand. In addition, the improvement of the quality of learning also needs to be improved where Science and Technology (IPTEK) is increasingly developing from time to time. Teachers as facilitators in education providers are very influential in a teaching and learning process (Yuniati, 2021:38).



Figure 5. Diagram of Student Interest in Engineering Drawing Subjects

The existence of these interesting learning media allows students to have a sense of interest in learning engineering drawing subject matter. Based on the results of a survey that has been carried out by students at the Vocational High School (SMK) level, they strongly agree with the number of 40% percentage, proving that students are interested in the subject of engineering drawing with learning media that is easy to understand and also interesting to learn.

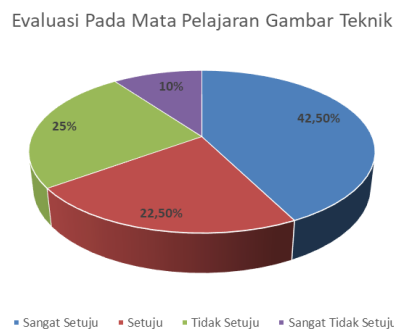


Figure 6. Evaluation in Engineering Drawing Subjects

Evaluation is a fairly systematic and continuous stage in the learning outcomes that have been carried out, this aims to determine the effectiveness of learning, which will be a benchmark for students when conducting the next learning (Putri & Dwijayanti, 2020:1042). With this evaluation, a teacher can reflect on his skills in thinking and understanding the relationship between information and learning media based on the perspective of looking at practical problems (Narassati, N. A., dkk, 2021). Based on the diagram above, it shows that the evaluation of learning in this engineering drawing subject is very important to be carried out in order to find out how far the students understand the subject matter of engineering drawing well. Understanding the concept of assessment *Higher Order Thinking Skills* (HOTS) is greatly influenced by the teacher's ability to make HOTS (Widana, I. W., 2020). Therefore, teachers should be encouraged to further develop their ability to improve

learning in the classroom and also to further train their skills in developing skills-based learning outcome assessment tests *Higher Order Thinking Skills* (HOTS). Teachers as facilitators can account for the results of the assessment by making valid and reliable tests.

The implications of this research are expected to be an evaluation of teachers who are facilitators for students, especially in providing interactive and interesting learning media, especially in the subject of engineering drawings, learning media or teaching materials that are structured and organized as one of the factors in making a teaching material.

CONCLUSIONS

In the process of learning mechanical engineering drawings, many interesting learning media are needed, one of which needs a practical process that uses teaching aids so that not only do vocational school students understand and understand the material, but can master how to make engineering drawing assignments directly. Giving practical assignments is one of the learning strategies that produces students to understand and master the overall engineering drawings.

The use of media in learning, especially in the context of vocational schools, has a significant positive impact in making it easier for students to understand. Learning media such as props and hands-on practice are essential in engineering drawing subjects, as they help students not only master theory but also practical skills relevant to industry needs. The majority of students agree that the practice method is more effective than just receiving theoretical material, because through practice, it is easier for them to understand and master the skills of drawing techniques as well as read the technical drawings that are essential in the production process in the industry.

In learning engineering drawings, the use of props such as rulers and rulers greatly helps students in producing good drawings and in accordance with industry standards. These props not only make the drawing process easier but also improve the final results of the assignments that students are doing. With the right combination of learning media, structured exercises, and hands-on learning, vocational vocational students majoring in machining can achieve the competencies needed to meet the demands of the manufacturing industry. A comprehensive learning process ensures that students are not only able to complete tasks well but also understand the entire process of work, which is an indicator of the success of machine engineering learning.

REFERENCE

- Agustina, N. S., Robandi, B., Rosmiati, I., & Maulana, Y. (2022). Analisis Pedagogical Content Knowledge terhadap Buku Guru IPAS pada Muatan IPA Sekolah Dasar Kurikulum Merdeka. *Jurnal Basicedu*, 6(5), 9180-9187.
- Aprilman, D., Prasetyo, T., & Irawan, B. P. (2022). Teknis Media Animasi Dalam Pembelajaran Pemahaman Gambar Teknik Mesin Di Politeknik Raflesia. *Jurnal Teknik Mesin*, 8(2), 12-13.
- Arwanda, P., Irianto, S., & Andriani, A. (2020). Pengembangan media pembelajaran articulate storyline kurikulum 2013 berbasis kompetensi peserta didik abad 21 tema 7 kelas IV sekolah dasar. *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah*, 4(2), 193-204
- Febrita, Y., & Ulfah, M. (2019). Peranan media pembelajaran untuk meningkatkan motivasi belajar siswa. *Diskusi Panel Nasional Pendidikan Matematika*, 5(1).
- Friatna, Y., Purwadhi, & Andriani, R. (2022). Manajemen Pengembangan Program Berbasis Kompetensi Untuk Meningkatkan Life Skill Siswa Smk PGRI Jatisari Kabupaten Karawang. *Service Management Triangle: Jurnal Manajemen Jasa*, 4(1).
- Mahardika, A. I., Wiranda, N., & Pramita, M. (2021). Pembuatan media pembelajaran menarik menggunakan canva untuk optimalisasi pembelajaran daring. *Jurnal Pendidikan Dan Pengabdian Masyarakat*, 4(3), 275-281.
- Narassati, N. A., Saleh, R., & Arthur, R. (2021). Pengembangan alat evaluasi berbasis hots menggunakan aplikasi quizizz pada mata pelajaran mekanika teknik dalam pembelajaran jarak jauh. *Jurnal Pendidikan Teknik Sipil*, 3(2), 169-180.
- Harsiwi, U. B., & Arini, L. D. D. (2020). Pengaruh pembelajaran menggunakan media pembelajaran interaktif terhadap hasil belajar siswa di Sekolah Dasar. *Jurnal Basicedu*, 4(4), 1104-1113.
- Isnaeni, N., & Hildayah, D. (2020). Media pembelajaran dalam pembentukan interaksi belajar siswa. *Jurnal Syntax Transformation*, 1(5), 148-156.
- Juhaeni, J., Safaruddin, S., & Salsabila, Z. P. (2021). Articulate storyline sebagai Media pembelajaran interaktif untuk peserta didik Madrasah Ibtidaiyah. *AULADUNA: Jurnal Pendidikan Dasar Islam*, 8(2), 150-159
- Putri, M. R., & Aswardi, A. (2023). Efektifitas Penerapan Model Project-Based Learning Berbantuan Autocad Terhadap Kualitas Pembelajaran Gambar Teknik Listrik. *Jurnal Pendidikan Teknik Elektro*, 4(2), 535-542.
- Putri, Y. D., & Dwijayanti, R. (2020). Pengembangan Alat Evaluasi Berbantuan Aplikasi Android pada Mata Pelajaran Penataan Produk Kelas XI BDP di SMKN 10 Surabaya. *Jurnal Pendidikan Tata Niaga*, 9(1), 1041-1047.
- Rizky, R., Aprianto, A., & Putra, M. E. (2023). Pelatihan Membaca Gambar Teknik bagi Siswa Jurusan Teknik Otomotif di SMKN 7 Pekanbaru. *ABDIMAS Lectura: Jurnal Pengabdian Kepada Masyarakat*, 1(1), 74-79..
- Sulistiyawati, W., Wahyudi, W., & Trinuryono, S. (2022). Analisis motivasi belajar siswa dengan menggunakan model pembelajaran blended learning saat pandemi covid-19 (deskriptif kuantitatif di SMAN 1 babadan Ponorogo). *Kadikma*, 13(1), 68-73.
- Tridiana, R., & Rizal, F. (2020). Keterampilan Guru Abad 21 di Sekolah Menengah Kejuruan (SMK). *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, 4(2).
- Yuniati, I., Suyuthi, H., & Hakim, M. (2021). Pelatihan Pemanfaatan Media Youtube Dalam Pembelajaran Bahasa Indonesia di SMA IT Kota Bengkulu. *Jurnal Pendidikan dan Pengabdian Masyarakat*, 4(1), 39-47.
- Widana, I. W. (2020). Pengaruh Pemahaman Konsep Asemen HOTS terhadap Kemampuan Guru Matematika SMA/SMK Menyusun Soal HOTS. *Jurnal Emasains: Jurnal Edukasi Matematika Dan Sains*, 9(1), 66-75.
- Widiyanto, I. P., & Wahyuni, E. T. (2020). Implementasi perencanaan pembelajaran. *Satya Sastraharing: Jurnal Manajemen*, 4(2), 16-35.