

Analysis of the Use of Dynamic Fluid Learning Media

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ABSTRACT

Advances in ICT technology support by presenting various forms of innovative media. This study aimed to obtain a profile of schools' most widely used learning media. This research method was quantitative, using surveys to collect data. The respondents of this study were 1095 students from six schools. Questionnaire instruments were used to collect data for students with the help of Google Forms. The results showed that the learning media widely used by smartphones was 14%, PhET was 23%, PowerPoint Was 18%, computers were 17%, and others consisted of flip PDF and video were 28%. Media use in dominance is carried out directly in the classroom in the learning process. This study's findings indicate that using smartphones as a learning medium still needs to be improved. Therefore, these results allow researchers to develop learning media that utilize smartphones, especially in fluid learning materials.

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Introduction

In this 21st century, technology has experienced a very significant development. The presence of technology provides innovation in presenting a variety of facilities and infrastructure to support the learning process. Various forms of technology provide convenience and freedom in obtaining knowledge. Different forms of teaching materials, media, and supporting equipment for the learning process have been widely implemented by utilizing technology. Therefore, in learning activities, supporting facilities are needed to convey information effectively, one of which is through learning media.

Learning media has a vital role in the learning process. Media is a tool used as an intermediary for delivering messages (Hasan et al., 2021). In the learning process, learning media can clarify concepts that are difficult to understand. In addition, using media in learning aims to motivate students to learn (Puspitarini & Hanif,

2019), save time delivering material, and make it easier for teachers to explain it.

The use of ICT media in learning provides flexibility in interacting efficiently and unlimited access between individuals and groups (Lawrence & Tar, 2018). Digital technology and internet networks support the learning process anytime, anywhere, without limits (Clark, 2020; Rice, 2006). Technology supports various forms of ICT media utilization for more effective and efficient knowledge transfer in 21st-century learning (Van Laar et al., 2017).

Learning media consists of several types: audio, video, visual, audio-visual, and interactive multimedia (Mufit et al., 2023). Meanwhile, media based on its form consists of print and electronic media. Technological advances bring electronic learning media software and hardware. Developers have widely developed ICT learning media to support the learning process.

Media development and the use of ICT media have various types. Audio media are developed in various forms, such as podcasts, lecture recordings, instructional audio, discussion audio, and audiobooks. In physics learning, audio recordings and interviews related to physical and natural phenomena are the dominant media used. In addition, audio interactivity is used to invite listeners to understand the content of the learning material presented. Audio media is generally delivered through radio, smartphones, and computers.

Video media is a media that combines image and sound. This media is presented in various versions of learning. Video feeds can be presented as tapes, uploaded online on social media, and available online on YouTube. This media is popularly used in learning by presenting images and audio that are familiar to users and related to surrounding phenomena. Video media is developed in various forms and ways, including recordings or animations made with the help of computers.

In learning, using many media is integral to supporting material delivery. The incorporation of popular media utilized by users must generate user interest and engagement with media known as interactive multimedia. Interactive multimedia contains various information presentations in images, audio, text, and video. This media was developed using smartphones. This variety of media is developed in various versions and forms that spread along with technological advances, both in websites and applications.

In physics learning media, there are variations in the use of media. The advancement of ICT encouraged the development of previous media. In learning, both media, such as smartphones and computers, become a familiar part of daily activities. In smartphones and computers, teachers present various forms of media to students in various forms, such as images, sound, video, and text. Popular smartphone learning is developed through various applications and websites that contain interactivity between users and media.

PowerPoint is a media intermediary source for delivering familiar information to present material. This piece of computer software focuses on presenting material as bullet points. The simple presentation of information in PowerPoint is integral to concisely conveying information. Learning with PowerPoint can present simple animations that attract user interest.

In physics learning, one form of media popularly used as a simulation media is PhET. PhET is one of the media available on computers and smartphones. This media is a virtual laboratory of physics. PhET is a

substitute for real experimental media that is limited in number and availability in schools.

ICT as a medium has been widely developed in dynamic fluid materials to support learning. The forms of implementation of ICT media on dynamic fluid materials include e-books, props, videos, animation, multimedia, and PhET (Aldi et al., 2022; Hermansyah et al., 2022; Mayefis et al., 2019; Samsudin et al., 2020; Syahrowardi & Permana, 2016). Each media has a different function according to the goals to be achieved. A learning media developer can use various forms of software. You can use a professional flip pdf to develop learning media in the form of e-books on dynamic fluid material (Kholiq & Khoiriah, 2021; Kusyanti, 2021; Pratama et al., 2019). The presentation of dynamic fluid simulation in obtaining experimental data is supported by utilizing PhET (Yusri et al., 2023). Dynamic fluid animation and simulation feeds can be developed via Adobe or Flash (Serevina & Kirana, 2021; Yulianty et al., 2021). The presence of various forms of supporting software for learning media developers provides space for teachers to use and develop learning media. An investigation into the use of learning media in schools needs to be conducted to determine the implementation of technology in modern education. Therefore, this study aims to determine the use of learning media in dynamic fluid materials.

Methods

This is a quantitative descriptive research through a survey of the intended subject. The respondents consisted of 1095 students coming from 6 different schools. The target students targeted by each school are at least 50 students. Each school is given an identity in the form of SHS A, SHS B, SHS C, SHS D, SHS E, and SHS F. This study aims to determine the use of learning media often used in static fluid materials. This study aims to determine the learning media used in the student learning process regarding dynamic fluid material. This research was disseminated through questionnaires to students using Google Forms. Google Forms are used as a medium to collect data because the display is simple and popular among respondents. Student questionnaires contain questions related to media used in learning, learning resources, and ways of learning. In these questionnaires, students can choose more than one answer as needed. The questions presented are related to the use of media in learning and how to learn to use the media. This research data analysis uses quantitative descriptive analysis with two stages: identifying the number of students who use smartphones, Phet simulation,

PowerPoint, computers, and other media. Implementation of media use is calculated by determining the percentage of total media use according to variations, namely smartphone, Phet simulation, PowerPoint, computer, and others.

Result and Discussions

The number of respondents consisted of students from six different schools. Data on the number of respondents was collected through questionnaires using Google Forms. The number of respondents from each school is presented in Table 1. Most respondents came from SHS D, and the least from SHS F. All data obtained become a source of reference

to reveal the use of popular media in schools. The collection of questionnaires is provided for one week for students. Information related to the use of learning media obtained in each school is shown in Table 2.

Table 1
Number of Student Respondents in Each School

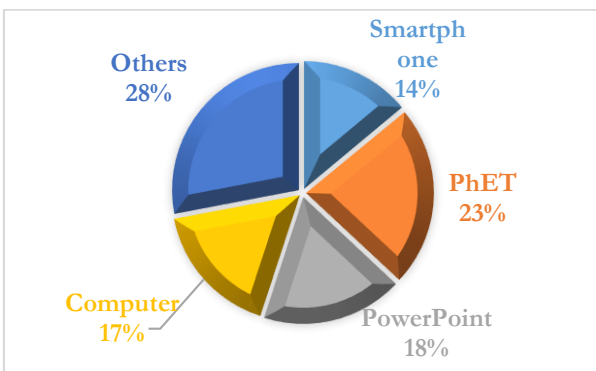
Code	Schools	Total
SHS A	SMAN 8 Tebo	171
SHS B	MAN 1 Padang	152
SHS C	SMAN 2 Kaur Bkl	137
SHS D	SMAS Al-Istiqomah	342
SHS E	SMAN 3 Lubuk Basung	180
SHS F	SMAN 8 Tebo	113
Total		1095

Table 2
The Number of Uses of Various Media in Each School

School	Number of Students Using Media				
	Smartphone	PhET	Power Point	Computer	Others
SHS A	0	76	0	0	96
SHS B	50	29	50	13	11
SHS C	23	27	10	17	60
SHS D	64	100	100	78	0
SHS E	2	2	11	71	95
SHS F	13	20	20	10	50
Total	152	253	191	188	311

Based on the results of Table 2, the famous media students use smartphones, PhET, PowerPoint, computers, and others. Figure 1 shows the percentage of learning media usage data from the total number of students in all schools.

Figure 1
Percentage of Media Use



The media most widely used by students in learning is PhET as a simulation media in studying dynamic fluid material. The percentage of smartphone use is the lowest value in terms of its use as a learning medium.

Computer learning media is used in learning in schools based on its availability. The data revealed that schools

already have computer equipment supporting the learning process. This condition reveals that the availability of computer media is well-applied in schools. The form of computer media utilization is shown in Figure 2.

Figure 2
Computer Media

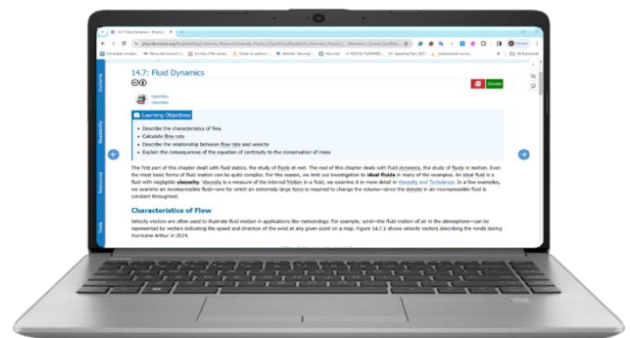


Figure 2 shows the shape of the computer media dynamic fluid material used. Computer media can be both laptops and desktop computers. Laptops dominate their use and can be used in learning, while desktop computers are used in the laboratory. In fluid material, computers are used as a medium to access information from the web or applications available

specifically in learning, which are inputted on the computer. Learning by utilizing computers is relatively limited due to their availability and amount. This learning is predominantly carried out only in the learning process at school.

Figure 3
Smartphone Media



In dynamic fluid learning, smartphones become a familiar part of everyday life. Mobile media is a technology that conveys and receives information only with a grip in hand. The form of the smartphone media display is utilized in the fluid defense shown in Figure 3.

Figure 3 shows the form of smartphone media in learning. Android applications dominate the form of smartphone media. The application becomes part of media development integration inputted on the smartphone. The use of smartphone media has advantages in its development. This condition is supported by programming capabilities to develop applications in physics learning and incredibly fluid materials. So, smartphone application development has become an opportunity to be used in learning.

PowerPoint is becoming a popular media tool used by teachers for learning. This media acts as a presentation medium. PowerPoint media conveys fluid material more concisely. PowerPoint can display information more simply and excitingly than presentations using whiteboards. The PowerPoint media utilization form is presented in Figure 4.

Figure 4
Power Point Media

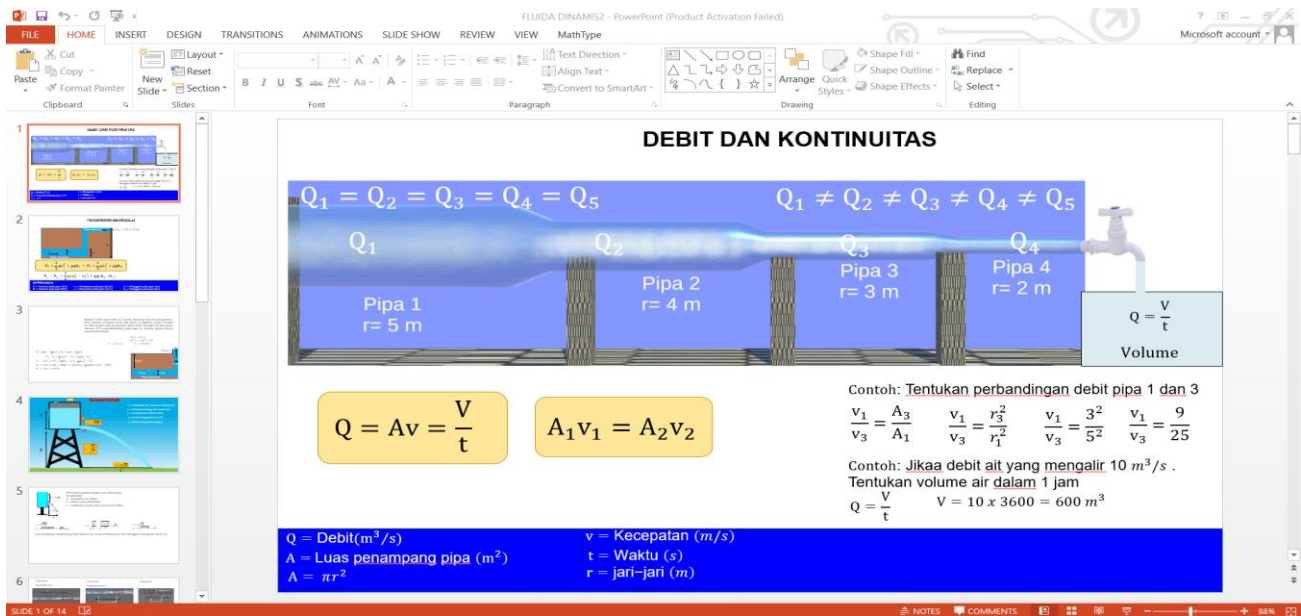


Figure 4 shows PowerPoint media shapes used on fluid material. PowerPoint presents information in various shapes, including images, text, and videos. Media presentation with PowerPoint utilizes computer assistance and is focused on displaying it in the

learning process. This media is widely used because its manufacture is simpler and easier to learn.

A popular medium used as a simulation in learning fluid matter physics is PhET simulation. PhET simulation displays various media options that

describe the condition of the phenomenon in a two-dimensional simulation. This form of media allows users to perform activities interactively. The dynamic

fluid media presentation in the form of PhET is presented in Figure 5.

Figure 5
Percentage of Media Use

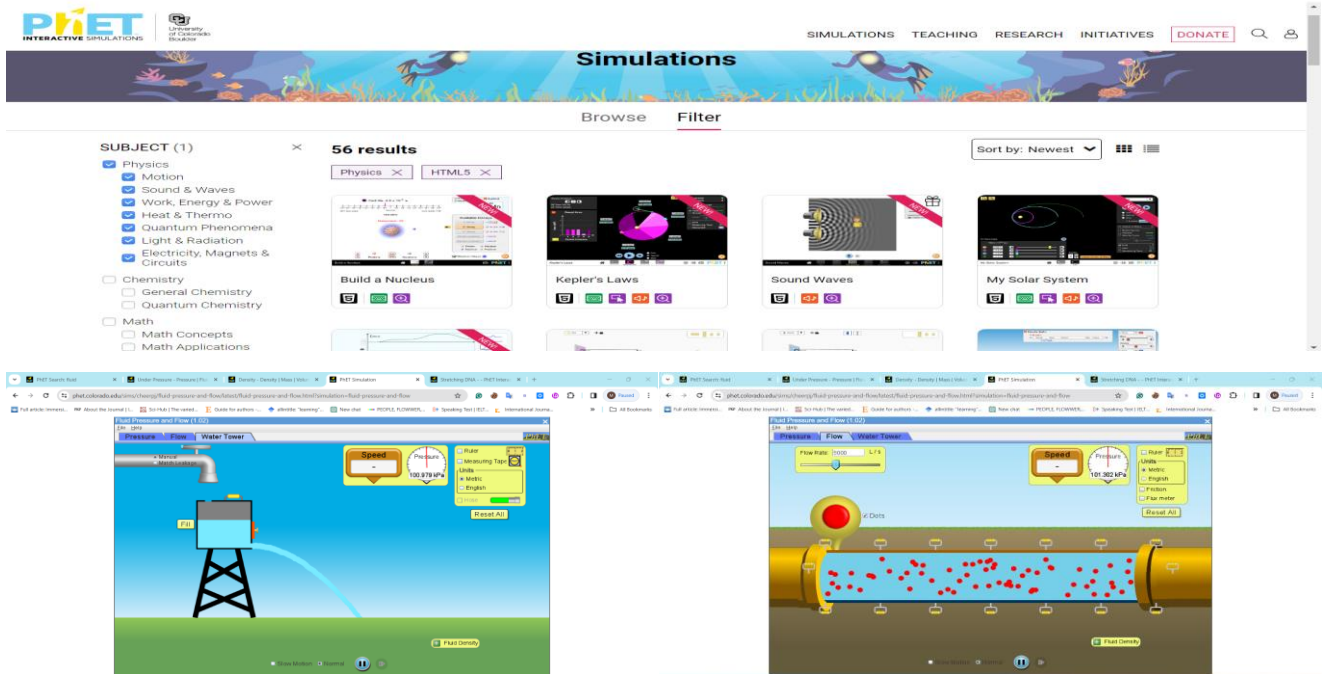


Figure 5 shows the PhET media used to learn dynamic fluid matter physics. PhET media presents various forms of simulation, including physics. In Dynamic Fluids, the simulation shown is Bernoulli's and Toricelli's equations. PhET is familiar and widely used in learning to simulate these two dynamic fluid phenomena.

Another media most widely used in learning is videos. This media presents a simulation picture and explanation of fluid matter. Video media presents information by accompanying sound as a lighter for students to learn. The form of video media presentation is presented in Figure 6.

Figure 6
Video Media

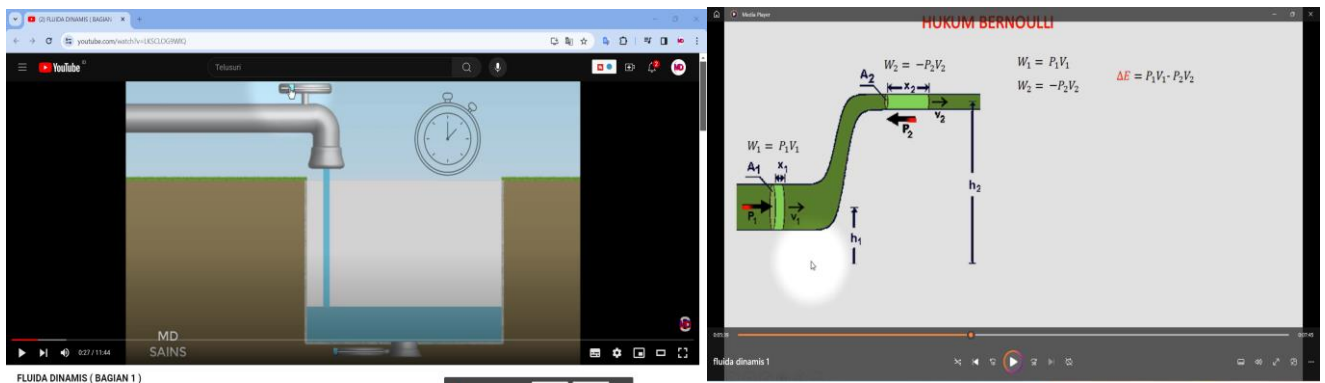


Figure 6 shows the fluid learning media in the form of videos. This learning media is commonly used to learn

through videos played directly on smartphones or disseminated via the web. Learning videos are an alternative to presenting material that is limited in explanation time if done in classroom learning. Familiar video media is used to deliver material in the

form of tutorials that are predominantly uploaded and widely disseminated through social media and YouTube in learning. Utilizing media in the learning process is presented in several forms. In the learning process, media is presented directly in a primary environment and utilizes social media. Table 3 shows the percentage of media serving.

Table 3

Media Implementation

Implementation	Percentage (%)
Class	55
Youtube	36
Video	39
Observation	23

Table 3 shows the application of media in the learning process in the classroom and through social media. The use of learning media in the classroom obtained a percentage of 55%, which revealed the use of media presented and delivered directly to explain the material. In the use of learning media with the help of social media, 45% were obtained. This utilization reveals the presentation of learning materials disseminated through social media to students as references and tasks in learning. This presentation of information reveals the use of learning media directly in the classroom and disseminated in learning, which has a similar percentage. This condition reveals that learning has begun to be evenly distributed by utilizing digital technology. The use of media in the classroom is dominated by the use of PowerPoint and computers in conveying material information, while in social media in the form of video media presentations, YouTube, web, and fluid material applications.

Five popular media are used in the learning process at school, including smartphones, PhET, PowerPoint, computers, and flip book pdf. PhET learning media is widely used in schools by teachers and students in learning. PhET is widely combined with various supporting applications in learning. Flip PDF containing videos, PhET, and Quizziz links in support of distance learning (Kholiq & Khoiriah, 2021; Kusyanti, 2021). In addition, PhET and flash are widely combined in the learning process (Cioc et al., 2019; Samsudin et al., 2020; Serevina & Kirana, 2021; Yusri et al., 2023). Using videos in learning can present physics problems and support students' critical thinking skills (R. S. Sari & Desnita, 2023; Tamrin & Desnita, 2023). Presentation in the form of media that can be accessed on smartphones provides time and cost efficiency in presenting it to the learning process (Mayefis et al., 2019)

Learning media is carried out through computers in computer laboratories or laptops at school. Computer learning media includes media used in learning. However, computer media use is only focused on basic applications such as video, images, writing, and sound used by teachers in schools. A laptop or computer can be developed to support the use of interactive multimedia (Khamzawi et al., 2015).

Autoplay Studio provides an engaging percentage view for students (Nisa et al., 2017). An e-book with videos can be accessed online (Syahrowardi & Permana, 2016). Video learning presents dynamic fluid phenomena (Agustin et al., 2017; Aldi et al., 2022; Kusumawardhani et al., 2022). Props like a waterwheel can be used to teach students about the concept of dynamic fluids (Najikhah et al., 2021). Information obtained from teacher questionnaires shows that ICT-based learning media has yet to be widely used in schools.

Many previous studies have developed media that consists of e-books, videos, animation, quizzes, and interactive multimedia. E-books and E-Modules developed using flipbook markers specialize in training problem-solving skills (Ananda & Usmeldi, 2023; Ramli & Serevina, 2021; D. E. Sari et al., 2023). Dynamic fluid is also developed using Adobe Flash animation (Yulianty et al., 2021). In addition, Adobe Flash is also used for interactive multimedia development (Masyithah & Pathoni, 2017).

Some media in the form of E-Books, E-Modules, and interactive multimedia accompanied by the application of models in the preparation of material and learning activities on these media (Asrizal et al., 2020; Dhanil & Mufit, 2021; Hidayah et al., 2022). Thus, developing learning media related to ICT can be an opportunity to be developed by researchers. Based on the preliminary analysis results, it show that the implementation of ICT learning media in schools still needs to be improved. The media teachers use in explaining dynamic fluid material is dominated by PowerPoint and PhET media. The latest innovative learning media, such as augmented reality, virtual reality, interactive multimedia, and websites, still need to be implemented in schools. Thus, the learning media has the opportunity to be developed to explain dynamic fluid material to make it more interesting, efficient, and practical.

Conclusions

Based on data information obtained from students, popular learning media used in schools in the learning process consist of several types, namely smartphones,

PhET, PowerPoint, and computers. Media that is still little used and developed in fluid teaching is still low and provides opportunities for researchers to develop smartphone-based media on fluid materials.

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