

The influence of the use of website-based learning media on engineering drawing materials

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Abstract

The era of digitalization actually offers various conveniences. Learning can be done through various methods, not only conventional methods. The widespread use of the internet network must be utilized optimally in various fields. So that digital technology is very functional today to do online learning. The influence of the production of learning media with website-based technology on responses to the learning activities of the Engineering Drawing course, Mechanical Engineering Education Department. Learning media used through the web aims to be used as alternative teaching materials in the learning process in the hybrid learning era. The technology used allows users to access it on any device that has an internet network without having to eat up storage on the device, because the media only uses the internet network to access it. In the research conducted using quantitative descriptive methods. The results showed that the media user response results obtained a percentage of 80.54% which could be categorized as very good. Based on the conclusions of the research results, this web-based learning media is feasible to use because it can help the teaching and learning process both offline and online

Keywords: *influence, learning media, digitalization era, website, technical drawing.*

INTRODUCTION

The effect of Web-based learning at this time can be done without understanding the meaning of coding. ICT experts have succeeded in creating software that can be directly used as a website-based learning medium, one of which is the iSpring Suite. The iSpring Suite learning media is capable of being a complete e-Learning solution for fast course writing. It works as a Microsoft PowerPoint add-in, which makes the course development

process fast and hassle-free. ISpring Suite has been widely researched by researchers in various fields of science, social and technology so that iSpring Suite can be made and used as a learning medium. From one study with a sample of 542 learning environments using the Web can meet the needs of the teaching and learning process, especially for online discussion forums because it provides a space for students and teachers to share knowledge and experiences related to teaching and learning (Hamzah et al., 2017). Engineering Drawing is a graphical representation of an object, or part of it, and is the result of creative thinking by an engineer or technician. By sketching a rough map can be used to provide directions to other people which can be referred to as graphic communication in web-based learning. Website learning media, whatever its purpose, is to help convey messages, instructions, or ideas involved in graphic communication, so that it can develop graphic communication which can involve the use of visual materials to connect ideas, pictures, photos, slides, transparencies, and sketches (Taffesse & Kassa, 2005). Technological developments in changes in the field of education are able to change the way a person obtains information. The use of instructional media in the field of education is one part that is thought to affect the quality of an education. Information systems and communication technology can now be used as interactive learning media. So that the use of websites that contain learning content can be developed according to the learning design model with five steps, namely analysis, design, development, application, and evaluation.

Website content developed generally includes video lectures, case studies on ADRs, information on individual drugs, and FAQs on ADRs. From the research results, a nurse who learns through the website can increase her knowledge about ADRs, self-efficacy, and monitoring practices compared to the control group. Sharing and communicating through an open website encourages clinical nurses to practice ADR monitoring and enable voluntary reporting, leading to a safer medication culture in hospitals (Kim & Hwang, 2022). Engineering design and construction graphics is perhaps the most important course of all studies for an engineering or engineering career. The undeniable reason why graphics or drawings are so important is because it is the language of designers, technicians, sanitarians and engineers, used to communicate design and construction details to others. Graphic language is written in the form of pictures that represent the shape, size, and specifications of physical objects. Language is read by interpreting images so that physical objects can be constructed exactly as originally conceived by the designer (Taffesse & Kassa, 2005). The methods used in the teaching and learning process equipped with ICT in conveying material or information to students from various studies show more effective results compared to using non-ICT media. This is one of the new learning media that has been used during teaching and learning activities due to the Covid-19 pandemic which is popularly known as online learning and is very effective and efficient to use during the COVID-19 pandemic, which aims to avoid gatherings and maintain distance. Website-based learning media for learning can also be called e-learning websites. The use of the website as a school digital platform has now been built according to their creativity and needs.

Long-distance activities to avoid potential crowds carried out by the World Health Organization (WHO) have provided recommendations for efforts to prevent the spread of the Covid-19 outbreak. The guidelines for implementing the learning process during the pandemic as outlined in the Decree of the Minister of Education and Culture Number 03/KB/2021 can be carried out in teaching and learning activities for higher education institutions in Indonesia starting in early 2022, limited to face-to-face meetings while still adhering to the applicable health protocols. Education is one of the efforts to make humans able to survive in their environment and in all situations of life. Students and students must be able to learn in all circumstances that occur, therefore learning must be continuous in all conditions (Redja, 2004).

Website- E-learning is a learning model that is currently quite popular such as Zenius, Udemy, Niagahoster Course and many more that can be accessed on various mobile and desktop communication devices. The site of teaching materials in engineering drawing lessons is not widely known by the public. The most well-known digital platform for technical drawing is AutoCAD. AutoCAD is software that requires knowledge of understanding coding, so it cannot be directly used to understand the concept of understanding technical drawings. With the COVID outbreak around the world, it is a big challenge in providing technical drawing learning so that it can adapt to developments in ICT technology so that learning technical drawing concepts can support the learning

process not only on computers and laptops offline but can also be done through computer-based learning websites or laptops, smartphones, cellphones and others that are usually owned by students to be used as learning tools or media. So that learning activities can be done anywhere and anytime. Especially when information and communication technology connectivity has almost reached all corners of Indonesia. The quality of education that has been successfully improved is education that is able to adapt to technological developments (Rusman, 2012). The web has existed more than 20 years ago and today it has become a continuous medium of communication, commercial and education since the covid pandemic. In fact, now it continues to be developed to become a learning medium for all sciences, technology, social and arts. ingredient. Websites are built with views that cover several disciplines, visual (graphic) design, interface and user experience design, Web document and style sheet production, Scripting and programming, Content strategy and Multimedia. Thus, the use of internet and multimedia technology can change the way knowledge is presented and can be used as an alternative in the learning process (Zhang et al., 2004). The challenge facing the application of ICT technology in distance or online learning in the vocational education sector is whether online learning can be carried out for fields that require hands-on skills training. To what extent can the use of ICT technology in online learning become an innovation that changes learning methods that were originally carried out conventionally to become more modern through website development? The results of Gheytsi, Azizifar and Gowhary's research in (Khusniyah & Hakim, 2019) stated that, in several other studies they reviewed showed that the application of technology in education had a positive effect on learning.

The positive influence that is created is supported by the integration of the internet in learning media, so that teaching and learning activities can run more effectively and easily. Online teaching and learning activities are distance learning systems implemented by utilizing online media. The purpose of online learning is to facilitate the delivery of learning material while still paying attention to network quality. Achieving distance learning goals through the use of network technology has a major impact in the field of education The most widely used media to support the implementation of online learning is the website, especially during a pandemic (Istiqomah et al., 2021). From the various online learning studies above, it shows that there are positive and negative influences, so this research will look at how the influence of Website learning media in teaching and learning activities in Engineering Drawing subjects?

The Engineering Drawing course is one of the practical courses at the tertiary level from the Mechanical Engineering expertise program held at UPI for online learning. The learning process during the pandemic was only carried out face-to-face using internet or online network media and could only conduct lectures, the next discussion was given assignments. students who have to take online technical drawing courses are class of 2018 and class of 2019 and most of these students do not have basic skills in technical drawing lessons, especially students with a background from high school, have not yet acquired basic skills in Engineering Drawing subjects so that it can affect mastery other fields of mechanical engineering studies, this becomes important to study. The Engineering Drawing course is a means and language for communicating in the field of engineering technology. This Technical Drawing course requires a demonstration/tutorial on how to draw so students can understand the principles of technical drawing. Web site technology is an ICT learning media technology that was used before the covid pandemic, so to what extent does online learning in engineering drawing courses affect student abilities? and what factors are the obstacles in the learning process in this engineering drawing course?

LITERATURE REVIEW

Traditional educational practices do not influence students' attitudes toward the Internet and computers. Most students at higher education level in particular have found these web-supported educational practices influential in the occurrence of outcomes considering social networking and sharing sites whose use has spread rapidly, widely used especially among students receiving tertiary education, high levels of student preparedness in in terms of attitudes towards the internet and computers is the last 10 years (Usta, 2011). At this stage, website-based learning is an important part of being a communication tool in learning activities. Developing

web-based learning materials for various learning methods may be worth the effort, it can no doubt be time consuming and expensive or even more effective and efficient. Web-based learning is a time-consuming and expensive proposition. In addition, most of this learning development is carried out at the local level with similar subject matter being developed simultaneously in various learning institutions (Smith, 2006). There are two types of websites that can be developed as an option when building learning websites, namely (1) Static Websites are defined as websites whose content is fixed or does not change, is made with HTML code and displays the same information to every visitor and only webmasters or developers can update it. static website content. Generally static websites are created using HTML and CSS by developers who understand programming and coding or can use static website generators such as Jekyll, Hexo, or static websites that do not require a database because they only need to provide basic information such as addresses, contacts and other information. publish, (2) Dynamic Website is a website whose content is updated regularly. Dynamic websites display content from databases that are usually only accessible by webmasters or developers. This makes it possible to have multiple users who can update website content without disturbing the website design.

Website-Based Learning Media

Web-based learning media that are feasible and useful for use in the development of learning media can already be done without knowing the meaning of coding or by going through coding. To publish a website for technical drawing material, you don't need to know how to make web graphics, image editing program skills, and basic graphic production skills. The creation of images, text, graphics must be adapted for web delivery (Niederst Robbins, 2012). Media in language literally means middle or intermediary (Arsyad, 2019) (Azhari, 2015) and is used as a means of conveying messages or information in learning activities whose goal is to arrive at information (Maknun, 2017). With the understanding that learning media is a tool used to assist teaching and learning activities and has a function to clarify the information to be conveyed, so that the teaching and learning process can achieve its goals. Asynchronous technology allows participants to choose a time and place that is convenient for them. Table 1 shows how the different digital multimedia technologies fit into these two structures.

Table 1. Multimedia Technologies Adapted (From Bates and Poole. Effective Teaching 55)

		TECHNOLOGIES			
		Broadcast (one-way) applications	Communication (two-way) applications		
		Synchronous	Asynchronous	Synchronous	Asynchronous
			Websites		
Digital	Webcasting		CD-ROMS	Chat	
Multimedia	Audio Streaming		DVDs	MUDs	E-Mails
	Video Streaming		Learning Objects	Web Conferencing	Discussions Forums
			Multimedia Clips	Voice over IP (VoIP)	
			Blogs		

In table 1 above there are various media that can be used in delivering educational content: text (print, including graphics), audio (analog), video (analog), and digital multimedia. Digital multimedia is a technology that can be used to transmit media. Bates identified that the main difference made in the technology used to transmit digital multimedia is one-way technology that transfers information from producer to receiver, but does not include bi-directional interaction mechanisms. The development of communication technology makes it easier for communication to occur back and forth evenly between all participants which can be done synchronously versus asynchronously. Synchronous technology operates in real time; all parties must participate simultaneously.

Multimedia-based Teaching Materials

Education experts in Indonesia state that the function of media and learning media (Arsyyad, 2019) can be said to be message delivery technologies that can be implemented into the learning process in the form of print media, communication media including television, films, photographs, recordings, projections, and magazines which used for learning purposes, both physical and non-physical.

Based on the nature and platform of the e-learning website, multimedia-based teaching materials are very useful to support distance learning. However, there are technical constraints such as hosting, servers that must be stable, server security, and a difficult coding process. Of the various interesting website learning media that have been widely used and developed both in the form of software and hardware, one of them is the iSpring Suite software. The iSpring suite is a tool for converting presentation files into flash slides that integrates with PowerPoint to create effective e-learning programs. This iSpring suite presents teaching materials in the form of flash slides which can contain images, animations, videos and audio which can be used as alternatives to create interesting learning media, so that they can assist teachers/lecturers in conveying subject matter to be more interesting, practical and optimal.

Learning media can be used appropriately in accordance with the objectives, materials, achievement indicators expected after the learning process takes place. Means of conveying messages through ICT media technology are now a necessity in learning activities that take place in the digital era which do not limit learning because there are limitations of space and time. The sender to the recipient so that the recipient can understand or more easily open his thoughts, feelings, interests and attention to what is conveyed by the media. Media are tools, methods and techniques that can be used as a means of communication and interest, between students and educators in the teaching and learning process. It can be concluded, learning media have undergone changes, starting from different ways of communicating and relating using digital era technology and ICT as well as different ways of conducting learning. Readiness of educational institutions with big challenges must make changes. How can we ensure that we develop the kind of graduates from our courses and programs that are suitable for an increasingly volatile, uncertain, complex and ambiguous future? What must we continue to protect in our teaching methods (and institutions), and what do we need to change? based on the industrial era not the digital era (Bates, 2015) and and Online Collaborative Learning (OCL) learning or the development of online media websites will be successful if the teacher's abilities are supported by school situations and conditions that match the required infrastructure(Suartini, 2019). What is the position of a teacher in the OCL knowledge community as shown in Figure 1 below

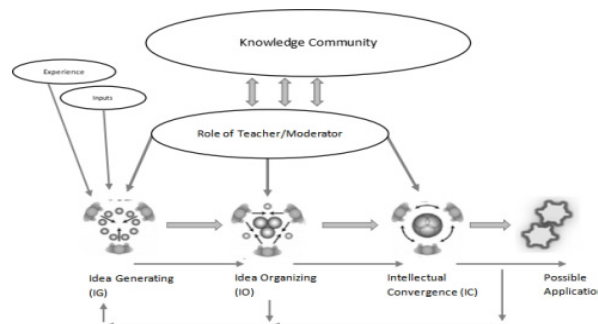


Figure. 1. The position of the teacher in OCL learning (Harasim, 2017)

Through website learning media, Figure 1. Technique is not a tool for expressing ideas or ideas of technical experts but also a teaching material that can be developed in OCL learning. Through website learning media, Figure 1. Technique is not a tool for expressing ideas or ideas of technical experts but also a teaching material that can be developed in OCL learning. Engineering Drawing learning media is a teaching material that aims to instill basic technical competence in image standardization, image functions, image projection to embody machines in the real world into schemes that can be used to design innovations for machine development to facilitate human activities (Juhana & Suratman, 2000). Engineering drawing material in the field of machinery delivered online is

only part of the technology-based learning tools or media (Sukandar et al., 2020). In the context of the real world and ultimately requires a Laboratory, Workshop or Work Studio; Internship; Problem Based Learning; Case Based Learning; Project Based Learning; Inquiry-Based Learning; Cooperative Learning (Work Or Community Based).

The use of multimedia which will involve student activities needs to be based on knowing the advantages and constraints that will arise in the learning process. Gerlach & Ely said that the use of multimedia which will involve student activities needs to be based on knowing the strengths and constraints that will arise in the learning process. Multimedia has fixative, manipulative and distributive abilities, although there are still obstacles in verbal communication, misinterpretation, attention is less focused and often misinterpreted because there is no explanation (Grabowski, 2003). So that the presentation of learning multimedia needs to be based on tutorials, drill and practice, multimedia simulations, experiments and concept formation games

The use of multimedia in the learning presented must be structured, interesting, aligned with the material displayed such as image concepts, image rules and provisions needed to be able to equalize perceptions among students by designing creative multimedia according to learning needs (Arsyad, 2019). Online learning that uses the concept flow as shown in Figure 2 below if it is carried out using websites, multimedia or ICT technologies for academic and conceptual development, the discussion needs to be well organized by the teacher, and the teacher will provide the necessary support to enable development new ideas and knowledge construction for students ((Bates, 2015).

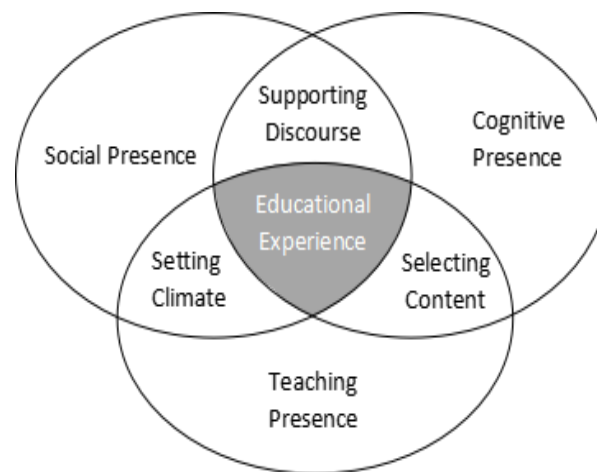


Figure 2. Community of Inquiry

The development of technical drawing materials in the digital era designed like Figure 2 above shows that broadcast/communicative and synchronous/asynchronous are two separate dimensions and the placement of media technology in the image matrix is in different quadrants as shown in Figure 3 below as a learning medium that can also be applied to an online learning model known as the internet as a means of website development that can be used to deliver learning material.

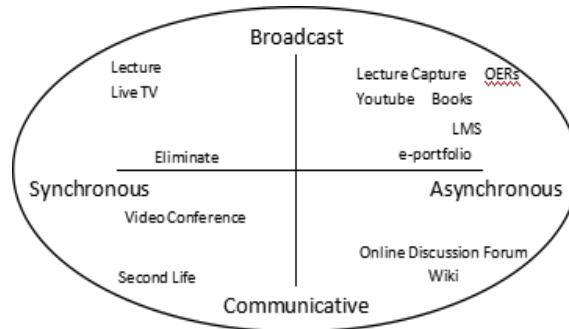


Figure 3. Internet

Engineering drawings

Ritchie and Hoffman identified the following: Sequences that are considered important for the learning process are providing learner motivation, visual and multimedia elements that can contribute to motivational factors and can incorporate components such as problem solving opportunities, critical thinking exercises, and relevance to learner needs. Being able to offer reviews to build their knowledge and active engagement is much more than clicking on a hyperlink to explore a site. Testing the material delivered through the web site is still a way that teachers still have to do to find out whether students have learned what has been taught. Website technology that can be used for technical drawing teaching materials is the presentation that is displayed. Web-based learning to increase understanding of the importance of technical drawings in conveying information to engineers, machinists and other assembly personnel as below

- To understand what is meant by orthographic view, isometric drawing, and solid modelling.
- To understand the basic rules required for engineering drawings, including showing dimensions, determining material sizes, and indicating surface finishes.
- When to use isometric view and slice view.
- Displays various types of section views to be clearer
- Displays solid modeling in conveying concepts and checks parts for their ability to fit with other parts.
- Simulation uses technical symbols to communicate among ourselves.
- Displays several common symbols of civil, electrical and mechanical engineering in accordance with standardized engineering drawings in order to interpret technical drawings.

Technical drawing is a type of technical drawing that is used to convey information about an object which is part of the working mechanism in the field of technology and engineering is to determine the required geometry for component construction and is called a detail drawing. Example engineering drawings Typically, a number of drawings are required to completely define even the simple components in Figure 4 below:

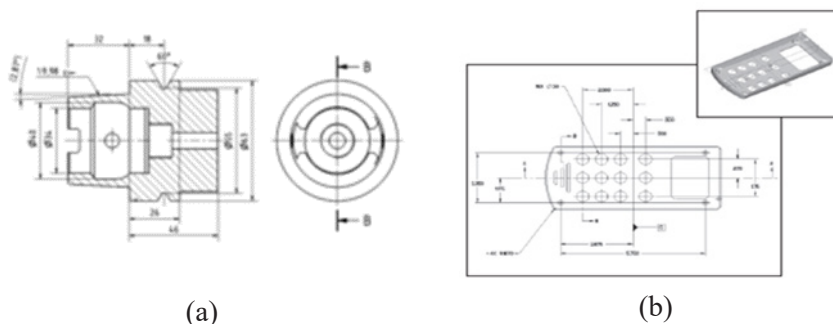


Figure 4. (a) Engineering drawing of a machine tool part (b) Schematics of cellular phone

Engineering drawings such as schematics of mobile phones and machine tools here, are important in conveying useful information to other engineers or machinists in a standard way that allows visualization of the proposed product (Timings, 2007). A technical drawing is a drawing that combines components that are linked together in a master drawing or an assembly drawing which gives the next detailed component drawing number, the number required. With website-based learning, the process of making technical drawings is often referred to as technical drawings or drafting which then become working drawings that contain component views, additional doodles and detailed displays for explanations. Important information such as dimensions can be easier to read and can avoid repetition and possible inconsistencies. Appropriate tolerances are given for critical dimensions so that components can be manufactured and functions via the web can be simulated in real time.

From the description above, the success of the engineering profession career is one of the most important is to have knowledge competence and sensitivity to various contexts in which engineering is practiced. The role of ICT technology-assisted learning media is very important. Software that can be used for implementing web-based learning that can realize an understanding of technical drawings and does not require an understanding of coding is:

a. iSpring Suite

iSpring was released in 2005 developed from Flashspring Pro as a PowerPoint-to-Flash converter and the current iSpring Suite version is iSpring Suite 9.0 came out on April 24 2018 Research responses to the use of Lectora Inspire media show some as learning tools that support effective student learning both In the learning process as well as the current response, a lot of software and hardware has been developed that can be used in learning. One of them is the iSpring suite software (Wibawa, 2017). The website implementation featured by iSpring suite is a tool for converting presentation files into flash slides that integrates with PowerPoint to create effective e-learning programs. This iSpring suite presents teaching materials in the form of flash slides which can contain images, animations, videos and audio which can be used as alternatives to create interesting learning media (Desk, 2020). Thus it can be said as a learning tool/media which in conveying subject matter will be more interesting, practical and optimal and of course will help teachers/lecturers in carrying out learning activities.

b. Website

It should be noted that while website was the original spelling of the proper noun when referring to the World Wide Web, this variant has become rarely used, and website has become the standard spelling. A website (also written as website) is a collection of web pages and related content identified and published on a single web server. Examples of well-known websites are Google, Facebook, Amazon, and Wikipedia are websites that are commonly used for activities on the internet. Website is a collection of web pages that are interrelated to provide certain information, which can be accessed via a domain name on the internet using a web browser application (Chrome, Firefox, etc.). This website, which is already familiar in the ICT era, can be accessed via electronic devices such as computers, laptops or cellphones, where on the website there are various forms such as templates, views and designs that can be used for various needs related to online activities. media. WEB is a combination of content which includes images, text or video that is packaged into a page, which is stored on a computer server that can be accessed by the internet network. Each website has an address to access, which is commonly referred to as a URL (Unifrom Resource Locator).

c. CAD (Computer Aided Design) AutoCAD

Engineering is an applied science, and communication of physical facts must be complete and accurate. The designed machine and structure shall be described, and constructed in the required graphical representation. While an artist's work (or photography and other methods of reproduction) will provide a pictorial representation, they cannot serve as a technical description. Parallel engineering drawings, with separate views should be arranged in a logical projection system. These views, add custom dimensions and annotations that provide other operations and directions for creation. It is a graphical language and can be defined as a graphical representation of physical objects and relationships (French, 1978). One of the engineering drawing software is called CAD.

CAD stands for Computer Aided Design which functions to assist human work in the field of design, or

more precisely applications to assist in the depiction of a product, before the product is produced. A method for reducing human effort when validating CAD documents that are automatically generated from a class of complex engineering drawings called P&IDs. Experimental validation shows that we achieve an average reduction of about 40% of human effort, while maintaining an error-free process (Rica et al., 2020). One CAD application that is often used as the basis for lecture material based on machine technology is AutoCAD. To be able to create machine drawings using AutoCAD, CAD can represent images with patterns of lines and symbols that are arranged side by side and side by side to form patterns that form 2-dimensional images or 3D images. So that the schematic projection to be a guide in realizing a machine will be more accurate than manual drawings. The common robot drawing system is based on the principle of vectorizing images by decomposing them into line segments using a genetic algorithm.

METHODS

The research procedure used to determine the effect of Web-based learning in engineering drawing courses used the ADDIE Model research approach. The data analyzed from data collection techniques through qualitative and quantitative methods to be used at the ADDIE Model stage were obtained through interviews, observations, and questionnaires. The iSpring suite is used to deliver the material. The iSpring suite gives learning design developers the opportunity to work closely with content, media and learning design experts to produce good quality products. The ADDIE approach research model developed by Dick and Carey (1996), can be used for the procedure for designing a learning system that uses five development steps, namely: Analysis, Design, Development, Implementation, Evaluation. This ADDIE model, with situation scenarios used for the development of educational products (Brinkerhoff, 2001).

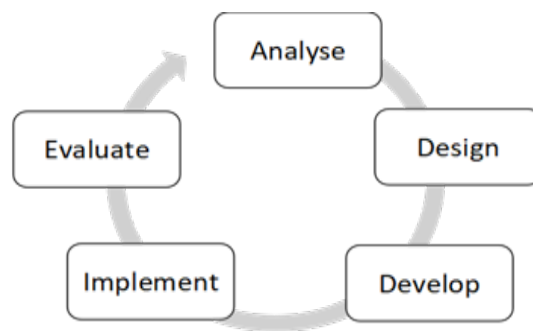


Figure 5. Model ADDIE

The research procedure using the ADDIE approach in Figure 5 for this research is based on an analysis of meaningful functions according to the conditions of the students, namely psychological functions and social functions, as shown in Figure 6 below :

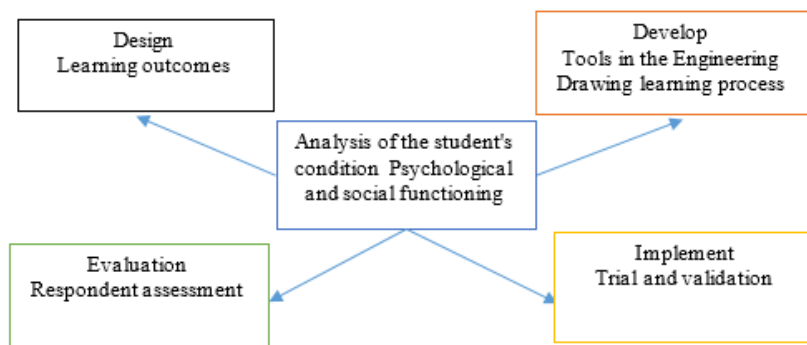


Figure 6. Procedure of product development

1. Analysis

This stage is conducting a needs analysis, identifying problems (needs), and conducting a task analysis. Analysis of the characteristics or profile of students who study will learn about craft drawing techniques for production, identify gaps, identify needs and detailed task analysis based on knowledge needs, namely: students, aims and objectives of learning, and online delivery media. Next, the components needed to create a learning media structure are analyzed, namely: (1) student characteristics, (2) student needs, (3) concept maps, (4) types of media to be developed, (5) constraints found, (6)) designing assessments, (7) analyzing learning strategies, and (8) selecting media for sematic manipulative functions, and psychology (verbal, visual, tactile, auditory)

2. Design

The design process formulates SMAR learning objectives (specific, measurable, applicable, and realistic) and determines learning strategies by implementing learning models (a combination of methods and media) that are most relevant to learning resources, the environment is made clear and detailed. document (blueprint).). The data obtained is in the form of syllabus and lecture implementation plans (RPP) on mechanical engineering drawings (Sato, 2013) to serve as guidelines for preparing teaching materials to be included in product development.

3. Development

The process of realizing a blue-print or design to be developed in an e-learning web-based technical drawing course. Product development is carried out by analyzing system users and those who access data by creating categories, organizing content, setting subjects, selecting and changing views. Assignments to upload material, assign assignments, assess assignments, and monitor learning progress.

4. Implementation

The implementation of the learning system developed was carried out by conducting direct media trials to obtain a practicality test for students taking engineering drawing courses.

5. Evaluation

Based on the results of trials conducted at the implementation stage, two stages of data analysis were carried out, namely qualitative data analysis of responses to the quality of learning media and quantitative respondent assessments in the form of numbers on the questionnaire given to the processes carried out in learning activities.

The research population was carried out on students with a sample of 30 students from class of 2020 who were taking Engineering Drawing courses. The sampling technique in the form of media testing is needed by those who are carrying out Engineering Drawing courses. The sampling technique in the form of a media test is needed by students who are taking Engineering Drawing courses, and are affected by the Dick and Carey pandemic/online learning. To find out the influence of learning media that involves all students who take the course.

RESULT AND DISCUSSION

Products from Engineering drawings delivered through the iSpring suite website-based learning software have succeeded in increasing independent learning activities. With iSpring Suite learning activities are successfully operated on personal computers and mobile communication devices. Independent learning according to their abilities and interests and can overcome the limitations of the senses, space and time in accordance with the learning environment from the conditions and situations that exist in each place. This situation can be seen in online learning activities. For technical drawings of the iSpring suite that have been successfully presented with back and forth communication technology evenly between all participants which can be done synchronously versus asynchronously, this can be seen in table 3 below:

Table. 3 Occupation of Engineering Drawings

Engineering Drawings				
Broadcast (one-way) applications			Communication (two-way) applications	
The Graphic Language Theory and Practice			Methods of Shape Description.	
Synchronous		Asynchronous	Synchronous	Asynchronous
iSpring Suite	Webcasting	Websites Multimedia	Chat MUDs Web	E-Mails Discussions
	Audio Streaming	Clips	Conferencing	Forums
	Video Streaming			

Table 3 above is an Engineering Drawings course that can be implemented in learning communication learning activities using the website which are carried out synchronously through Google meet, and asynchronously independently which can be carried out through the WhatsGroup communication medium. The technical description of the structure of the projected shape component can serve as a description language that is accurate with physical objects, a graphic language compared to using pencil and paper to create sketch images. The function of learning media can clarify the presentation of messages and information, symbols, projections, real objects to expedite and enhance the process and value of learning.

Engineering drawings of learning materials using a website that begins with data collection, analysis of the quality of facilities, data obtained stating that the development of teaching materials via the internet is still constrained in aspects such as difficult to access with a slow internet network, open applications, audio on video so that it is not large, and so on -other before instrument testing. With the amount of data adjusted to the Gmail data standard for text, image and video material of a maximum of 25 MB, 2 teaching materials were successfully compiled in table 3, namely: The Graphic Language Theory and Practice and Methods of Shape Description. At the design stage of the research instrument as a media test tool obtained high validity and reliability so that it can be trusted. Based on the results of the revised means of presentation. The evaluation of website design results for teaching materials obtained a validity of 0.463 with a reliability calculation result of 0.93 and was reinforced by expert judgment, so that the materials used as teaching materials in the Engineering Drawings course were good.

At the stage of developing teaching materials, it is carried out in stages with the ADDIE development model by applying the first step, namely Analysis, which is a stage that includes activities to collect the initial information needed in the process of developing WEB-based learning media. After discussing with the lecturer and the results of interviews with several students, in engineering drawing courses, projection material is one of the materials that requires interactive learning media. Needs analysis in making the resulting learning media is carried out by not consuming the smartphone or device storage used by the user, because it is considered burdensome if there is no storage left. Then use software such as Power Point, iSpring Suite, Google Drive, and Movavi to create these learning media.

Needs analysis in the first stage of designing material and content, the material contained in this WEB-based learning media includes; understanding, tool layout, types of tools, and how to use tools. The material in this WEB-based learning media is presented in the form of writing, pictures and videos. And at the product design stage, the media design is in the form of a storyboard which is the reference for making the user interface in this WEB-based learning media.

In developing a series of processes for making WEB-based learning media starting from making background images, opening media, making opening menus, making menu sets, entering material and content, and making learning videos to validate research instruments. Based on the results of expert judgment it was concluded that this WEB-based learning media was categorized as "Very Appropriate" with notes in the form of comments and suggestions used for improvement in the next stage.

The quality of teaching materials designed in web-based learning media is designed in accordance with the results of revision evaluations and teaching materials that are ready to become products can be seen in the image below:

ENGINEERING IMAGE MATERIALS IN WEBSITE LEARNING MEDIA

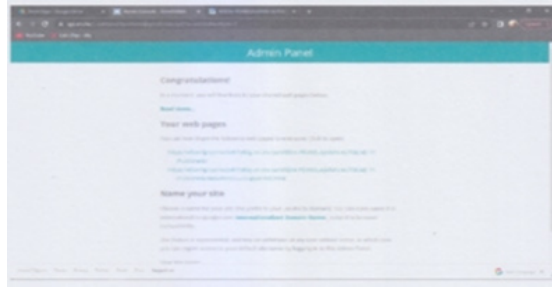


Figure 7. Website Drive To Web

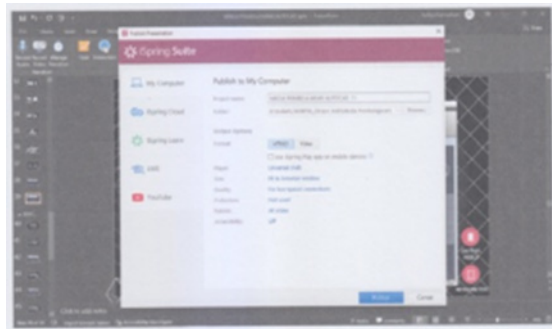


Figure 8. Media Display When Accessed by Website



Figure 9. Display Material Menu

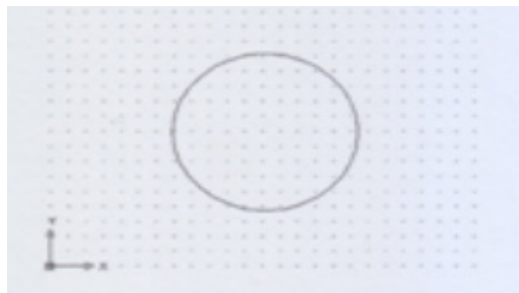


Figure 10. 2D object display, xy isometric

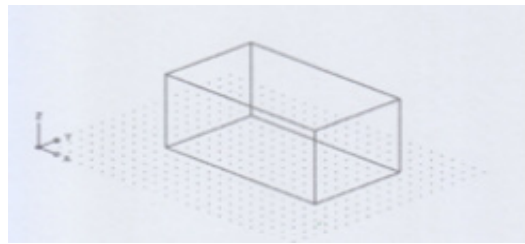


Figure 11. Display of 3D objects, xy plane

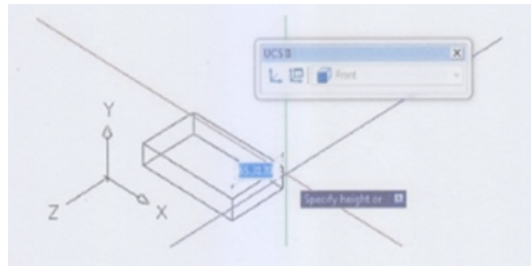


Figure 12. Example of creating an object with the direction of movement
front rear extrusion

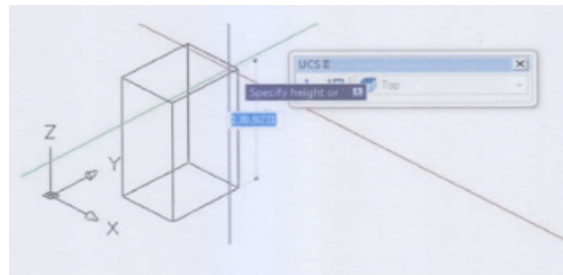


Figure 13. Example of creating an object with the direction of movement
top down extrusion

Furthermore, Figures 7, 8, 9, 10, 11, 12, and 13 results of the development of teaching materials according to the stages of the ADDIE approach in the implementation stage are carried out to students of the 2020 Mechanical Engineering Education study program which is carried out online. Assessment is carried out using the Google Form to provide an assessment of the media to be used. Based on the results of data collection through a questionnaire, it can be seen that presentation through web site media can affect the quality of learning. The quality of technical drawing material delivered through learning media received a very good response. The results of the responses evaluated by a sample of 30 students on aspects of the evaluation indicators are shown in table 4 below

Table 4. Response Value of Presentation of Technical Drawing Material
Using Website teaching materials

No.	Assessment Aspect	Indicator	AVAREGE
1.	Learning materials	Suitability with learning objectives	80
		Presentation of material discussion	84
		Increased curiosity	82
		Description delivered	80

No.	Assessment Aspect	Indicator	AVAREGE
2.	Media display quality	The use of sentence structure in delivering material	78
		Use of communicative language	79
		Use of easy-to-understand language descriptions	80
		Presentation of examples in pictures	83
		Presentation of the suitability of video images with introductory language tutorials	80
3.	Learning process	Improvement of learning motivation	81
		Increased interest in learning	79
Median value		Average rating of Media quality	80.54 %
			80

The development of WEB-based learning media uses the ADDIE development model (Analysis, Design, Develop, Implementation. Evaluation). Based on table 1 above in graphical form it can be seen in Figure 14.

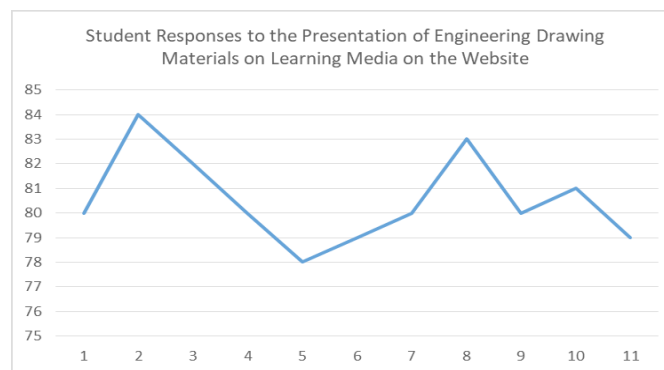


Figure. 14. Description of the response to the Engineering Drawings material on the Website

From the results of the evaluation stages in the research model for product development the ADDIE approach is the final stage. The pictures of the learning outcomes of the Engineering Drawings teaching materials that are displayed on the website are of a quality that can be partially categorized as showing “Very Good” drawing results. In addition, the descriptive data generated from expert assessments in the form of suggestions and comments were processed to become a reference for product revisions aimed at improving WEB-based learning media and student responses which can be seen in table 4.

The results of student responses to WEB-based learning media are in line with Wahid’s opinion (2018), that learning media is not just a tool, but learning media must be able to increase students’ curiosity about the material to be able to provide other experiences that are not easy to obtain, and can provide methods more varied learning, in this case students are presented with learning media that can be used on any device, especially smartphones. This WEB-based learning media is structured so that it can be accessed easily and does not reduce the smartphone’s storage space. In line with (Ryan & Gottfried, 2012) that in compiling learning methods that are likely to be of interest to students, one of them is the need for easy access to media available with smartphones owned by students. This WEB-Based Learning Media only requires an internet network to access it, so it is very easy to use.

Learn more about this source text. The source text is required to obtain additional translation information. Send feedback. Side panel. The use of WEB-based learning media is in line with what was conveyed by (Sadiman, 2012), namely media can clarify visual messages, overcome student passivity, overcome limitations of space, time and senses and provide the same stimulation. and can equate students’ perceptions of the content of the lesson.

This WEB-based learning media can also be one of the learning media that is applied visually even to online and offline learning.

The ADDIE development method is the Implementation stage or the implementation stage of the developed learning media. WEB-based learning media was piloted to students of the 2020 Mechanical Engineering Education study program conducted online. The assessment is carried out using a Google Form to provide an assessment of the media to be used.

The last stage in the ADDIE method is Evaluation. Evaluation is the stage of analyzing the data generated at each stage in the ADDIE method. In this study, the evaluation carried out was a formative evaluation including data processing on student responses. Where the results obtained are categorized as "Very Good". In addition, descriptive data generated from expert judgments and student responses in the form of suggestions and comments are processed into references for product revisions that aim to improve this WEB-based learning media.

The results of students' responses to WEB-based learning media are in line with Wahid's opinion (2018), that a learning media is not only a tool, but learning media must be able to increase students' curiosity about the material to be able to provide other experiences that are not easily obtained, and can provide more varied learning methods, in this case students are served by learning media that can be used on any device, especially smartphones. This WEB-based learning media is structured so that it can be accessed easily and does not reduce smartphone storage by storing it. In line with (Ryan & Gottfried, 2012) that in compiling learning methods that are likely to be of great interest to students, one of them is the need for easy access to available media with smartphones that students have. This WEB-based Learning Media, only requires an internet network to access it, making it very easy to use.

Learn more about this source text. Source text is needed to get additional translation information. Send input. Side panel. The use of WEB-based learning media is in line with what was conveyed by (Sadiman, 2012) namely the media can clarify visual messages, overcome the passive nature of students, overcome space limitations, time and senses as well as providing the same stimulation and can equalize the perceptions of students towards the content of the lesson. This WEB-based learning media can also be one of the learning media that is applied visually to online and offline learning though.

This learning media is made with the general principles as stated above. This is done so that the learning media developed has the principles and quality of media that are feasible to be implemented. Although sometimes these existing methods do not work effectively, there is increasing interest among educators and researchers in introducing more useful methods to enhance the teaching and learning experience. Along with the increasingly widespread digital technology in recent years, the integration of technology has influenced the way or method in the learning process. The challenge faced by students is that changing the conventional education system to a virtual format takes a This learning media is made with the general principles as stated above. This is done so that the learning media developed has the principles and quality of media that are feasible to implement. Although sometimes these existing methods do not work effectively, there is a growing interest among educators and researchers to introduce more useful methods to enhance the teaching and learning experience. Along with the rise of digital technology in recent years, the integration of technology has influenced the way or method in the learning process. The challenge faced by students is that changing the conventional education system to a virtual format takes a very long time. The use of technology in learning media is highly recommended for development in the field of engineering education. Based on these results, this WEB-based learning media will be able to display images from software that can increase interest, especially interest in independent learning.

CONCLUSION

Based on the results of the research that has been conducted on the development of WEB-based learning media in the Engineering Drawing course, it is concluded that the WEB-based learning media developed using the ADDIE approach (Analysis, Design, Develop, Implementation. Evaluation) from the due diligence conducted by experts , and responses to learning media received a score that can be categorized as "Very Appropriate" so

that it can be used as an alternative learning media in Engineering Drawing courses. Material presented via the web can be delivered in an interesting way and can increase learning motivation and interest in studying Engineering Drawing courses. WEB-based learning media relevant to the development of ICT-based learning media technology can be used as learning media for online and offline lectures. By only having a gadget that is owned and connected to the internet, this media can be accessed easily.

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