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Preliminary Analysis for Development of Google Sites Web-Based Learning Media

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***Abstract**: Learning media plays an important role in helping the smooth process of learning activities carried out, including when studying the Multivariable Calculus course. The purpose of this study is to analyze student needs for teaching materials in the form of Google-Sites Web-based learning media that can be accessed easily anywhere and can help students understand learning materials in the Multivariable Calculus course. This research is a qualitative descriptive study with the research subject being the third-semester students of the Mathematics Education study program at the Raja Ali Haji Maritime University. The research data were collected through observation sheets of lecture activities and questionnaires on student needs for teaching materials in the form of Multivariable Calculus learning media which were distributed via the google form link. The results of observations indicate that there are no available learning media that is attractive, can be accessed easily, and can be used as a guide in the learning process in Multivariable Calculus courses such as the Google-Sites Web. The results of the questionnaire analysis show that students need learning media in the form of Websites Google in the Multivariable Calculus course. Based on the research data, it can be concluded that it is necessary to develop learning media in the form of Websites Google.*

***Keywords**: google-sites letters; learning media; preliminary analysis; web-based.*

INTRODUCTION

The 21st century is marked by the development of science and technology. According to Mukhadis, the 21st century is also known as the century of knowledge. In this era, knowledge is the basis for all alternative efforts to meet life's needs in various contexts. Efforts to meet the needs of knowledge-based education, knowledge-based economic development, knowledge-based social empowerment and development, and knowledge-based industry development (Wijaya et al., 2016).

The rapid development of the internet in the 21st century helps in facilitating all activities in all fields without exception in the field of education where access is easy such as learning optimization (Ferismayanti, 2012). Education in the 21st century is becoming increasingly important to ensure students have learning and innovation skills, skills in using information technology and media, and can work and survive using life skills. The 21st century is also marked by: (1) the abundance of information that is available anywhere and can be accessed at any time; (2) faster computing; (3) automation that replaces routine work; and (4) communication that can be done from anywhere and anywhere.

The development of information and communication technology (ICT) also has an impact on education becoming more advanced by utilizing all digital teaching materials/sources. The quality of education can be improved by utilizing ICT, namely by accessing knowledge and providing quality education. ICT systems provide a wide, fast, effective and efficient means of dissemination of information to various parts of the world.

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Information technology develops in line with developments in theory and communication technology that support the practice of learning activities. Learning activities are the most basic activities in the entire educational process (Tekege, 2017).

In every learning activity, teaching materials are important learning resources that must exist (Olayinka, 2016). Teaching materials are the most effective and efficient source for determining and obtaining learning information that affects student learning outcomes. Teaching materials are a set of learning tools or devices, methods, limitations, and ways of evaluating that are designed in a systematic and attractive way to achieve the expected goals, namely the achievement of complex potential (Widodo & Jasmadi, 2008). Broadly speaking, teaching materials are divided into printed teaching materials (consisting of books, modules, LKS, etc.). Non-printed teaching materials (consisting of audio, audio-visual, multi-interactive, and web-based teaching materials). Non-printed teaching materials can be used with electronic assistance. One of the web-based non-print teaching materials is google-sites.

Google Sites can be used to create websites for both personal and corporate purposes. Google Sites is the easiest way to make information accessible to people who need information quickly, and people can work together on sites to add attached files and information from other Google applications such as google docs, sheets, forms, calendars, awesome tables, and so on (Arief, 2017; Azis, 2019). There is a positive impact, namely the convenience offered by the Google site, including: 1. The Google site can be used free of charge. 2. Ease in creating a Google site. 3. Allows users to collaborate on google site pages. 4. Google site provides 100 MB of free online storage. 5. Can be searched using the Google search engine. 6. The Google site can be accessed through various devices connected to the internet network, for example Smartphones, Tablets, Laptops, and Personal Computers (Arief, 2017).

Multivariable calculus is a compulsory subject for 3rd semester students of the Mathematics Education Study Program, Faculty of Teacher Training and Education, Raja Ali Haji Tanjungpinang Maritime University with a weight of 3 credits of theory. In the learning process that has been going on so far, it is known that there are no optimal teaching materials available that can be used as guidelines in the learning process in Calculus courses with many variables that can be accessed easily by students. So far, students have obtained teaching materials from various sources, namely from textbooks available in the library, printed books at SMA/MA level, YouTube videos, journal articles, e-books, the internet, and so on so that there is no uniform source. of teaching materials for students. With the development of teaching materials based on web-google sites, it is hoped that it can be used as a guide in the learning process by both lecturers and students, which is easy and practical to use. Based on the problems previously described, it is necessary to conduct research that aims to analyze the level of need for Google Sites web-based teaching materials that need to be developed for students in Multivariable Calculus courses.

Some relevant research includes research on the development of google sites-based learning media in class X sociology subjects conducted by (Nugroho & Hendrastomo, 2021) on the learning process. Subsequent research was carried out by (Nalasari et al., 2021) namely the development of teaching materials based on web google sites on Theme 9 sub-themes of utilization of natural resources in Indonesia for Grade IV Elementary School students. valid and practical to be integrated into learning by teachers and students.

Previous research used a type of development research methodology with the primary and secondary school categories and the research being conducted was still at the needs analysis stage with a qualitative research methodology in universities.

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RESEARCH METHODS

This study used a survey method in the Mathematics education study program at Raja Ali Haji Maritime University (UMRAH) Tanjungpinang. The sample of this study were 62 third semester students of the UMRAH mathematics education study program who took multivariable calculus courses. Data collection techniques by observing and distributing questionnaires via the Google form link. Data collection instruments used observation sheets and questionnaires.

The indicators used in the questionnaire are divided into 3 categories, namely: (1) Smartphone/laptop ownership as learning media; (2) Student's opinion on learning calculus with many variables; (3) Student needs for Google site web learning media. The type of research used is descriptive qualitative research by reducing data, presenting data using pie charts, and drawing conclusions from the data which are then linked to relevant concepts.

RESULTS AND DISCUSSION

Based on the results of observations about the availability of teaching materials, it was concluded that students still lack teaching resources in the form of textbooks, both printed and digital, in the multivariable calculus course at UMRAH Tanjungpinang. This is because the university library does not yet have a large number of variable calculus books that are able to optimally cover the needs of students, even though there are quite a number of calculus books. In addition, previous teachers had not developed books as teaching materials/learning media for the needs of multivariable calculus courses. The reason the researcher wanted to develop web-based teaching materials first rather than print-based was because of the positive impact and conveniences offered by Google sites, as explained by Arief, that the facilities offered by Google sites include: 1. Google sites can be used free of charge. 2. Ease in creating google sites. 3. Allows users to collaborate on Google Sites pages. 4. Google sites provide 100 MB of online storage for free. 5. Can be searched using the Google search engine. 6. Google sites can be accessed through various devices connected to the internet network, for example: Smartphones, Tablets, Laptops, and Personal Computers (Arief, 2017). In addition, the results of the needs analysis for the Google site web teaching materials/ learning media collected from 62 students via the Google form questionnaire are as follows:

❖ Smartphone/ Laptop Ownership as Media in Learning

Smartphones/Laptops are media that help the learning process take place optimally. Many useful things can be explored by utilizing the features available on smartphone devices, both for educational activities and community activities. Having an internet connection on a smartphone/laptop allows us to manage various activities more easily (Nurwan et al., 2018). Some of the benefits of using smartphone media as learning media are as teaching and learning media for teachers and students, as a communication tool, and as a tool for finding information and adding insight, of course it will make it easier for students to learn from home like during the Covid 19 pandemic (Maknuni, 2020).

From figure 1, data is obtained that many students who take variable calculus courses already have smartphones/laptops. The percentage of those who own a smartphone/laptop is 98.4% while those who do not own a smartphone/laptop are 1.6%. This means that many students use smartphones/laptops for their daily activities, including their needs in the learning process.

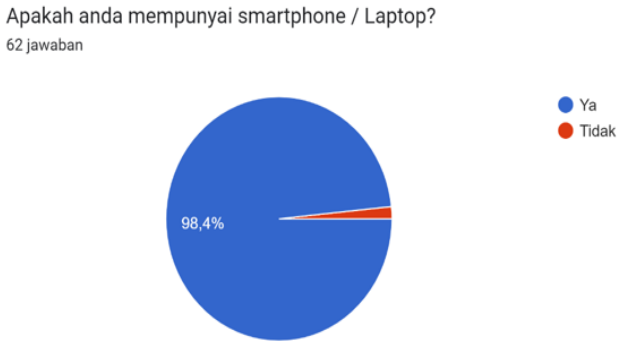

Figure 1. Percentage of Students Who Have Smartphones/Laptops

❖ Opinions of Students on Multivariable Calculus Learning

Researchers obtained students' opinions about learning multivariable calculus through 3 questions submitted through a Google form questionnaire with the following analysis results:

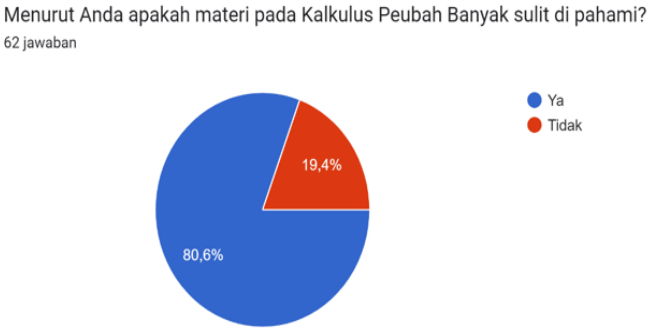

Figure 2. Student Difficulties in Understanding Multivariable Calculus Material

From figure 2, information is obtained that as much as 80.6% of students consider the material in variable calculus to be difficult to understand, while around 19.4% think otherwise. This means that more than half of the students have difficulty understanding multivariable calculus. Difficulties in the aspect of understanding the concept include: Difficulty in interpreting the questions, that is, students are still confused in determining the right concept to solve the problem; Difficulty remembering concepts, that is, students cannot remember concepts well and still do not master how to explain them (Sholikah & HW, 2017). There are several types of errors made by students in solving KPB questions including types of conceptual errors (chain rules and use of absolute values, trigonometry derivatives, partial derivatives, integral and exponential concepts), operational errors (multiplication between coefficients and variables of a function and integer operations).) and principle error types (chain rule formula writing). And the factors that cause students to make mistakes are their lack of understanding of concepts and procedures regarding chain rules, absolute values, trigonometric derivatives, partial derivatives, integrals and exponents, and lack of accuracy in calculations (Afifah et al., 2018).

Figure 3. Learning Media Used by Students

From figure 3, learning media in the form of printed teaching materials used by students has not reached 50%, namely only around 13%. Learning media as a component in the teaching and learning process is needed to assist teaching activities and also as an integral part of learning. Learning is a process of interaction/communication learning between teachers, students and also teaching materials in the learning process (Naufal & Soeprajitno, 2016)

Figure 4. Interest in the Media and Teaching Materials Used

Figure 4 explains the amount of interest and motivation of students to learn multivariable calculus from the media and printed teaching materials they have used so far. 92% of students are neither interested nor motivated to learn multivariable calculus. This is due to several factors, such as the lack of printed teaching materials provided by the campus to meet the needs of teaching materials, and printed teaching materials also seem monotonous so that students tend to get bored studying. According to Arsyad, the weakness of print media is that the manufacturing process takes quite a long time, thick printed materials may be boring and turn off students' interest in reading them, if the volume and paper are bad, the printed material will be easily damaged and torn (Arsyad, 2007). Printed teaching materials are also unable to represent movement, the presentation of material is linear, and it is difficult to provide guidance to readers (Heryani & Rustina, 2018).

❖ **Student Needs for Google Site Web Learning Media**

The needs of students for digital learning media based on the Google site web, were collected by researchers through 6 questions submitted in the Google form questionnaire with the following analysis results:

Figure 5. Use of Digital Media such as the Web as a Learning Resource

Yaniawati in Simanihuruk explained that rapid technological developments had an impact on education because there was a need for education to continuously improve the efficiency and effectiveness of learning and management of the education system (Simanihuruk et al., 2019). Based on this opinion, we can draw the conclusion that learning is growing, including learning resources, not only print media, but digital media such as the web. Content in digital media can be in the form of web pages, audio media, videos, images, interactive multimedia, files, and so on. The contribution of web-based learning can change student learning styles to be more effective and efficient (Yunarti & Ningsih, 2019). Figure 5 explains that 98.4% of the total students studying variable calculus courses use digital media such as the web a lot in finding lecture material.

Figure 6. Choice of Preferred Teaching Materials

Teaching materials in written form are material that students must learn as a means to achieve competency standards and basic competencies. The learning material is in the form of knowledge, skills, and attitudes that must be taught by educators and must be studied by students to achieve competency standards and basic competencies (Arsanti, 2018). Abidin in Fitriani divides teaching materials into two types, namely printed teaching materials and non-printed teaching materials. Examples of printed teaching materials are textbooks, textbooks, handouts, modules, worksheets, posters, leaflets, and so on. Examples of non-printed teaching materials are audio teaching materials such as radio, cassettes; visual teaching materials such as photos, drawings; or audiovisual teaching materials such as videos, films (Fitriani & Susanti, 2022).

From figure 6, as many as 77.4% of students prefer digital/non-printed teaching materials which are more effective and interactive. While the remaining 22.6% chose printed teaching materials. This is because effective and interactive teaching materials will attract students' attention so that students are more motivated to carry out the learning process (Arfiana & Ismayati, 2017). According to Morgan in Zaini, teaching materials/digital books are a combination of hardware or software specifically designed for reading and can be viewed on a computer (Zaini et al., 2019). Munadi in Zaini added that interactive digital books really help teachers in increasing student motivation to find concepts of a subject matter independently because teachers position themselves more as facilitators, not as the main learning resource for students (Zaini et al., 2019).

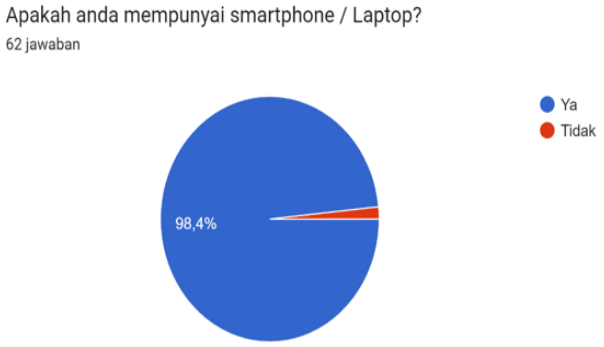

Figure 7. Student Responses to Digital Teaching Material Development Plans

Figure 7 explains that students 100% agree with the development of digital-based alternative teaching materials for multivariable calculus courses so that they are easy to understand and easy to access anywhere and anytime. It is known that there are many advantages that students get when learning to use digital-based media. Arsyad argues that the interactive concept is most closely related to computer-based media, the interaction follows three elements, namely: 1) instructional sequences that can be sequenced, 2) answers or responses or student work and 3) feedback that can be adjusted (Arsyad, 2007). Interactive media usually refers to products and services in digital computer-based systems that respond to user actions by presenting content such as text, graphics, animation, video, audio, and others (Zaini et al., 2019). It can be concluded that learning with digital teaching materials is more interesting because it is interactive, objectives can be formulated clearly, animations and videos presented can help students' understanding, as well as become teaching media for teachers and independent learning materials for students.

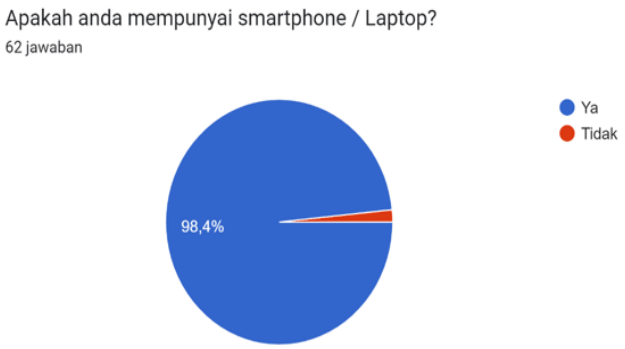

Figure 8. Student Knowledge of Google Sites Web Media

Based on figure 8, as many as 59.7% of the students who took the calculus course varied, many of them already knew about the google site web media. However, there are still students who do not know about the Google site web media, namely as much as 40.3%. The Google Site web is one of the popular applications and can be used as a learning site which is a wiki site which is a supporting feature of the Google browser (Zainal & Kasmawati, 2021). The Google Sites platform can be used to create or design web-based teaching materials which can certainly make learning interesting and can be used by students via smartphones or other devices anytime and anywhere (Nalasari et al., 2021). Google sites are products made by Google as a tool for creating sites and are very easy to use, especially to support learning by maximizing features such as Google Docs, sheets, forms, calendars, awesome tables and so on (Azis, 2019) .

Figure 9. Student Interest in Learning to Use the Google Web Sites

Learning to use the Google web site is more complete and interesting because you can take advantage of the features in it such as; google docs, sheets, forms, calendars, awesome tables and so on. Google site web teaching materials are also easy to access and use. From figure 9, data is obtained that all students who take the Variable Calculus Course feel interested in learning with the help of the Google web site. In the teaching materials by utilizing the Google sites application there are not only material and pictures, but illustrated animations that can improve students' problem solving skills (Putri, 2022). On the Google web site, students no longer need to download material provided by the teacher, so it won't take up a lot of internet quota and memory. In addition, the teacher also does not need to be confused in delivering the material. This is because students can access it via the Google Site web. The display on the Google Site can also be made as attractive as possible so that students don't feel bored in learning activities (Nugroho & Hendrastomo, 2021).

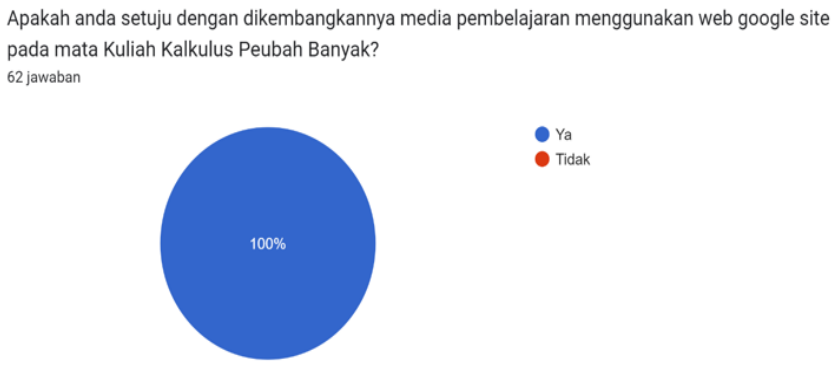

Figure 10. Student Response to Google Sites Web Media Development Plan

A good learning atmosphere can be realized by choosing the right teaching methods and materials (Andani & Yulian, 2018). So, lecturers as learning managers need to design so that learning becomes easier, faster, and more fun (Dwiyogo, 2018). A lecturer as the main source of learning not only makes himself a source of learning but must be able to design, prepare and utilize other learning resources in order to improve the quality of learning such as being able to develop teaching materials on the Google site web. Figure 10 explains that all students agree to the plan to develop Google site web learning media for multivariable calculus courses for UMRAH 3rd semester mathematics education students. The development of Google Sites web learning media is an interesting tool to learn because it has several advantages including (1) it's free, (2) it's easy to make, (3) it allows users to collaborate with its beneficiaries, (4) it provides 100 MB of free online storage, (5) can be searched (searchable) using the Google search engine (Harsanto, 2012). In addition, the Google Sites Web-based teaching materials developed have several implications, namely enabling everyone anywhere, anytime, to learn anything, so that students can access information from various sources and can encourage students to be more active and independent in learning. Besides that, teachers can easily fill in or update materials and publish web-based teaching materials. Therefore, Google Sites web-based teaching materials are the right choice for teachers to integrate into learning.

CONCLUSION AND SUGGESTIONS

Based on the data from the results of the research conducted, it can be concluded that: (1) students think that the material in MK calculus is much difficult to understand; (2) The existing teaching materials do not meet the needs of students and also the use of printed teaching materials does not attract students' interest and motivation to learn; (3) the lack of learning media makes students look for other digital-based teaching resources that are available online, this is good but can make teaching resources too diverse and not systematic; (4) students expect interactive digital-based learning media and their application can be easily created and operated such as the Google web sites.

With the many conveniences offered by Google sites as explained in the discussion, Google Sites web-based teaching materials are the right choice for teachers to integrate into learning.

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