

Development of Differentiate Learning Media Using Google Sites to Improve Biology Learning Outcomes

Lasrin Leonardus Situmorang¹, Abdul Hamid K², Keysar Panjaitan³

{leonardsitumorang1983@gmail.com¹, abdulhamidk1958@gmail.com²,
pkeysar9@gmail.com³}

Educational Technology Study Program, Universitas Negeri Medan, Medan, Indonesia¹,
Educational Technology Study Program, Universitas Negeri Medan, Medan, Indonesia²,
Educational Technology Study Program, Universitas Negeri Medan, Medan, Indonesia³.

Abstract. This research and development aims to: (1) to determine the feasibility of differentiated learning media using google sites in improving biology learning outcomes of class XII IPA students at SMA Negeri 1 Uluan, and (2) to determine the effectiveness of differentiated learning media using google sites in improving Biology study results of class XII IPA students at SMA Negeri 1 Uluan. The type of research conducted by research is Research and Development (R & D) type of research. The Product Development model used is adapted from the Gall, Gall & Borg model and combined with the Assure learning model. The results of the calculation of the T-test with a significance level of 0.05 or 5% on the post-test scores of the experimental class and the control class show that $t_{count}(\text{years}) = 3.276$ and $t_{table} = t(0.05) = 1.996$. So it can be concluded that $t(3.276) > t(0.05)(1.996)$. It is evident from the average post-test score of the experimental class which is 85.11 compared to the average post-test value of the control class which is 78.30. The average post-test score of the experimental class $>$ the average post-test value of the control class was $85.11 > 78.30$. Thus, the development of differentiated learning media using Google sites for class XII high school students is effective in improving biology learning outcomes.

Keywords: development, learning media, differentiated learning, google sites, biology

1 Introduction

The learning outcomes of the Biology subject on the topic of Inheritance for two years of learning, the researchers found that the learning outcomes of class XII IPA students at SMA Negeri 1 Uluan were still dominant below the Minimum Completeness Criteria (KKM). The Biology Minimum Completeness Criterion on the topic of Inheritance is 78. By looking at the table in the 2020/2021 school year it is 52.63% (50 out of 95 students) and in the 2021/2022 school year it is 55.76% (58 out of 104 students). [1].

According to Wardiman (2001: 18) that the low learning outcomes of students in the exact sciences is because the learning process does not support students' understanding, namely too

much memorization, only sticking to existing manuals, and incompatibility with students' learning needs. According to the results of an interview with a biology teacher at Uluan 1 Public High School, it is true that this happened because learning was still designed, not differentiated learning. Learning is student-centered with the discovery learning model but the media or material presented is still uniform to students, namely in the form of power point slides only. It is possible that because of this students have not received diverse learning needs according to their choices. [2].

In connection with the above, it is very necessary to apply differentiation learning in the classroom. Differentiated learning means learning based on the needs of students. The needs in question are individual needs related to learning interests, learning styles, student readiness. According to Tomlinson (2000), Differentiated learning is an attempt to adjust the learning process in the classroom to meet the individual learning needs of each student. Each learner has a different learning style, different talents/interests, different ways of learning. Therefore, educators may become facilitators, motivators, managerial learning, namely facilitating, directing, guiding, helping, motivating students so that they can learn according to their own needs and ways. Educators will facilitate students with this diversity so that they can construct the knowledge they get in their own way. [3]. Researchers made initial observations about students' learning styles. Based on the mapping of student learning styles to students in SMA Negeri 1 Uluan class XII IPA at T.P. 2022/2023 which will be the subject of research conducted through online tests through the website <https://akupintar.id/tes-gaya-belajar>. Learning style mapping data is calculated based on the highest score on the test results. [4]. Therefore researchers are looking for solutions to overcome the above problems by developing differentiated learning media, namely by making various learning media on Google sites that are tailored to the learning needs of students. Google sites must contain learning media that facilitate students who have different needs. Media that meets the auditory, visual and kinesthetic learning styles of students. According to Kurniawan (2010) said Google Sites is a platform created by Google. Google sites can be designed as stand-alone websites or costume websites. Google sites are still empty websites. The contents of this website are designed by the owner himself and regulate who may access, repair and use them collaboratively in accordance with the permission of the website owner. It includes many features that can be used to design material in the form of text, slides, videos, links from Drive or other Google apps. [5]. There are four main advantages of this google sites tool, the first is that it is not paid or free. Second, it is easy for users to use and can do collaborative work with other users. Third, these Google sites have about 100 MB of free online storage. Fourth, the search is easy to do with Google. [6]. Hayati (2017) in Imron (1996) states that learning is an effort intended to master/gather a certain amount of knowledge. Knowledge is collected little by little until it becomes a lot.

Faturrohman and Sulistyorini (2012: 265) state that learning is a mental process that occurs within a person to gain mastery and absorption of information in the cognitive and psychomotor domains by going through a process of interaction or individual relationship with the environment that is used to describe/describe potential behavior that comes from experience. , thus causing the emergence of positive behavioral changes both changes in cognitive, psychomotor and affective aspects permanently. [7].

Sukmadimanta (2007) in Noviyanto, T.S.H, Susanti, B.H., Khairunissa, S. (2022) states that the results of learning to develop abilities possessed by a student, which is shown from changes in behavior both in the form of mastery of knowledge, motor skills and student

attitudes. Kustawan (2011), stated that learning outcomes are when someone learns there will be a change in behavior in that person. For example, from those who don't know to know and from those who don't understand to understand. Likewise Sudjana (2009: 3) argues that student learning outcomes are essentially changes in behavior that occur after going through the learning process. Learning is done with the aim of changing the behavior of the individual/someone who is learning. [8].

Meanwhile, according to Suryaningsih (2017) argues that biology subjects are subjects that have a lot of material that is adapted to the demands of the curriculum and in practice practical activities are needed as a support so that students can understand a concept that is difficult to understand if practicum is not carried out in their learning. Biology is an integral part of natural science (IPA), providing various learning experiences and science process skills to understand concepts related to the life of living things. Biology is part of the Natural Sciences (IPA), biology includes sciences related to life in this universe. Furthermore, according to Kurniati, T. (2021) states that biology is one of the subjects related to a systematic way of finding out about nature, so that biology is not only the mastery of gathering knowledge in the form of concepts or principles, but also the process of discovery. Biology learning is one of the sciences that studies the life of living things and their environment. Biology is very important to study because in learning biology one can understand and know the functions of organs in the body and structures (Fitriani, 2022) [9].

Arsyad (2014: 25), media is useful for instructional purposes where information in the media must involve students both in thought, mentally or in the form of real/real activities so that learning can occur. Media Wati (2016: 3) the media plays a role in regulating the effectiveness of educators and students in the learning process. [10].

Differentiated learning is nothing new in the world of education. Tomlinson (1999) in Marlina (2021) argues that differentiated learning is learning that accommodates, serves, and recognizes the diversity of students in learning according to student learning readiness, interests, and preferences. Differentiated learning is essentially learning that views students as different and dynamic. Concern for students in paying attention to the strengths and needs of students is the focus of attention in differentiation learning. Differentiated learning is an adjustment to interests, learning preferences, readiness of students in order to achieve increased learning outcomes (Marlina, 2021). [11].

Google sites is one of the software products developed by Google which was originally known as G Suite in 2016 and developed into Google Work Space for Education and was launched in 2020. Initially launched in 2006 under the name Google Apps for Your Domain. Workspace consists of google sites, gmail, google drive, google meet, google class room, google forms, google calendar, google chat, google contacts, google doc, google slides. [12].

Google sites is a website builder with an intuitive and simple interface so users will find it easy to use. According to Bernstein (2020), here's how to create a Google Sites website.

1. Access Google Sites
2. Create a New Website
3. Get to know Google Sites Editor
4. Create a Website Design
5. Publish the Website

2 Method

The R&D (Research and Development) model is the type of research used in this research where a procedure in developing new products or revising existing products is scientific. This study aims to develop differentiated learning media using google sites in biology learning for class XII IPA SMA from the aspects of feasibility and effectiveness.

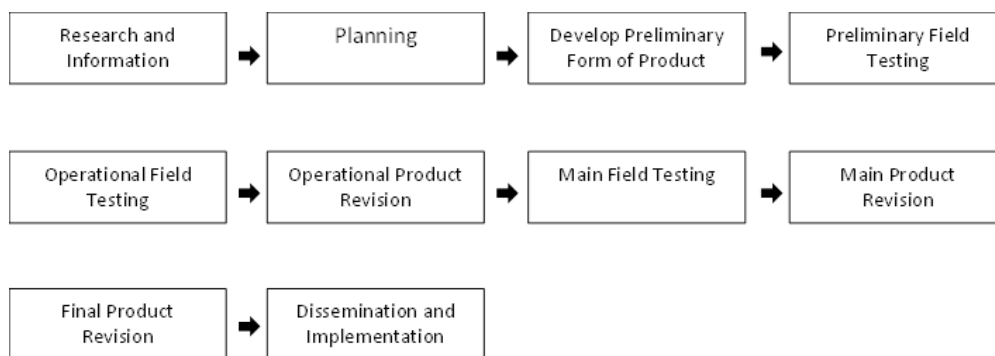


Fig. 1. The Borg & Gall Development Model.

The data analysis technique used in this study is Descriptive Statistical Analysis. Descriptive statistical analysis aims to analyze and describe the data that has been collected. The qualitative data obtained and the results of observations are presented in the form of a descriptive narrative presentation.

The interpretation of the feasibility of the developed learning media is carried out through descriptive statistical calculations. Score answers in the range of 1 to 5 and tabulated and calculated the average score. The eligibility level was divided into four groups, with an ideal mean of 2.50 as the eligibility threshold score. If the score is less than the ideal mean then it is grouped into "inadequate" while the mean score in the "decent" category is grouped into three levels namely "less feasible", "decent" and "very feasible" and can be seen in the following table (Sriadhi, 2018).

Before the test instruments in biology subjects were used to collect research data, validity and reliability tests were first carried out. For trials carried out outside the respondent outside the sample. The method taken is to give tests to students who are selected as trial respondents. For learning outcomes in biology subjects in class XII IPA students as many as 30 people.

The product effectiveness test was carried out aiming to determine the extent to which the learning media developed could improve student learning outcomes in biology subjects. The data analyzed in this effectiveness test are student scores obtained from students from the experimental group and the control group of students. The average value of the two groups of students was then tested with the t test.

The data analysis technique used is descriptive and differential techniques. What is meant by descriptive techniques are statistics used to analyze data by describing the data collected without intending to draw a generalization or general conclusion. Presentation of data using descriptive techniques in the form of tables, graphs, pie charts, pictograms, calculations of mode, median, mean, decile, percentage, mean and standard deviation, percentage, correlation and regression without any significance test. The differential technique is a statistical technique that is used to analyze sample data and the results are applied to the general population where the conclusions drawn have opportunities for error and truth.

Testing the hypothesis in this study was carried out by comparing the experimental value of the Posttest Only Control Group Design design, namely by comparing the post test scores of students who used Google Sites-based learning media with students who did not use Google Sites-based learning media.

The research hypothesis to be tested is:

H0 : $\mu_1 \leq \mu_2$

H1 : $\mu_1 \geq \mu_2$

Information:

μ_1 : average learning outcomes of students using learning media based on google sites.

μ_2 : average student learning outcomes without using google sites-based learning media.

3 Discussion Result

3.1 Feasibility of Google Sites

The validation of learning material experts on the development of differentiated learning media using Google sites was carried out to 2 (two) learning material experts, namely Lecturers of the Postgraduate Biology Study Program, Medan State University. The assessment is carried out with the aim of obtaining information that will be used for the feasibility of Google Sites learning media. The validation of media experts on the development of differentiated learning media using Google sites was carried out to 2 (two) media experts, namely Lecturers of the Postgraduate Educational Technology Study Program, Medan State University. The assessment is carried out with the aim of obtaining information that will be used for the feasibility of Google Sites learning media. The trial of expert learning media practitioners was carried out at SMA Negeri 1 Uluan, Kec. Uluan Kab. Toba. Expert practitioner trials were conducted on 2 (two) biology teachers at SMA Negeri 1 Uluan. The purpose of this trial is to identify deficiencies in media products after being validated by material and media experts. Assessment and input from this pilot is about guidance and information, multimedia materials, evaluation, and design, media facilities and pedagogic effects. Individual trials were carried out at SMA Negeri 1 Uluan, Kec. Uluan Kab. Toba. Individual trials were conducted on 3 (one) class 12 students of SMA IPA consisting of 1

(one) student with high achievement, 1 (one) student with moderate achievement, and 1 (one) student with high achievement low. Small group trials were conducted at SMA Negeri 1 Uluan, Kec. Uluan Kab. Toba. Small group trials were conducted on 9 (nine) grade 12 SMA IPA students consisting of 3 (three) high achieving students, 3 (three) moderate achieving students, and 3 (three) students low achievers. Limited field trials were carried out at SMA Negeri 1 Uluan, Kec. Uluan Kab. Toba. A limited group trial was conducted on 30 students in grade 12 SMA IPA. The purpose of this field trial is to measure the feasibility of the product being developed, as well as to find out to what extent the benefits of the product being developed are for user learning outcomes.

Differentiated learning media using Google sites on biology subjects for assessment by learning material experts is 90.45%, assessment by media experts is 88.33%, the percentage of assessment by expert practitioners is 93.24%, the percentage for individual trials is 90 %, the percentage of small group trials was 90%, the percentage of limited group trials was 80.75%. Overall, the average percentage is 87.16%. Based on the criteria in the table above, it is included in the "Very Eligible" category, which means that the use of differentiated learning media by using Google sites meets the needs of students.

The results of the validation of learning material experts show that differentiated learning media using google sites that have been developed meet the criteria of "Very Eligible" to be used to improve student learning outcomes. Based on the results of the assessment of learning media experts, it shows that differentiated learning media using Google sites that have been developed also meet the criteria of "Very Eligible" to be used to improve student learning outcomes. Then the results of the assessment of the level of media users (users) used by individuals (one-to-one evaluation), small group evaluations (small group evaluation) and limited field trials (field trial evaluation) show that the differentiated learning media products developed meet the very high acceptance criteria. high or very well received by users (users) and have met very decent standards in improving the cognitive domain (knowledge) of students.

By looking at the guidelines and assessment criteria according to Sriadhi (2018) it is concluded that differentiated learning media using Google sites in the "Inheritance of Traits" material for class XII high school biology that is developed meets the criteria of "Very Eligible" to be used to improve student learning outcomes.

3.2 Google Sites Effectiveness

Product effectiveness trials were used to obtain information about the effectiveness of differentiated learning media using Google sites in improving biology learning outcomes for class XII IPA students at SMA Negeri 1Uluan. Class XII IPA2 which consists of 36 people is an experimental class that uses Google sites in learning biology on the material "Inheritance of Traits" and Class XII IPA3 which consists of 33 people is a control class where learning does not use Google sites as a learning medium (learning media). using direct instructions).

The effectiveness test in this study was conducted to obtain information on whether the differentiated learning media using google sites that were developed were proven to be able to improve students' cognitive skills (knowledge).

Based on the average test of the learning outcomes of students in the experimental class, namely students who use Google Sites media as a differentiated learning media by not using Google Sites or Direct Instruction learning media in the control class, it can be concluded that differentiated learning media using Google Sites is effectively used to improve learning outcomes. biology in cognitive domains/aspects (knowledge) of class XII students of SMA IPA.

The average test score for experimental class students' learning outcomes, namely students who carry out learning using differentiated learning media using Google sites is higher than the average value of learning outcomes for control class students who do not use differentiated learning media using Google sites means using direct instructions only. The average posttest result for the experimental class was 85.11, which was higher than the control class, which was 78.30. The experimental class has a positive influence on increasing the ability of knowledge of biology, students are also increasingly happy because they can choose the media that suits their talents, and what they like. Learning media can be used either face-to-face in class or at home to be studied independently.

3.3 Research Limitations

The limitations in this study are

- a) Differentiated learning media using google sites that are developed must require more variety/variety of media, especially interactive media.
- b) Given the limitations of time, costs and the ability of researchers, this learning media does not have interactive media.
- c) The measured learning outcomes are only focused on the cognitive domain in biology subjects.
- d) The media that was tested was not carried out on a large scale, thus allowing the occurrence of several factors that could influence the results of the research that was developed.

4 Conclusion

Based on the results of the research and discussion that has been carried out, the following conclusions can be drawn:

1. Differentiated learning media using google sites developed "Appropriate" to use biology learning media.
2. Differentiated learning media using google sites developed "Effectively" improve biology learning outcomes.

References

- [1] Anderson, L.W., and Krathwohl, D.R. (2001). *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Addison Wesley Longman, Inc.
- [2] Andini, D.W. (2016). *Differentiated Instruction: Learning Solutions for Student Diversity in Inclusive Classrooms*. Trihayu, 2(3).
- [3] Arsyad, A. (2014). *Learning Media*. Jakarta. Rajagrafindo Persada.
- [4] Aryulina, D. (2004). *Class XII Biology SMA and MA*. Jakarta: Erlangga.
- [5] Astiti, K. A. (2021). Development of Connected Type Integrated Science Module Based on Differentiated Learning on Class VII Earth Layer Material. *JPPSI: Journal of Science Education and Learning*, 4(2), 112-120.
- [6] Asrul, Ananda, R., Rosnita. (2014). *Learning Evaluation*. Bandung: Media Library Goals.
- [7] Bakhruddin, M. (2021). *Teaching and Learning Strategies: Basic Concepts and Their Implementation*. Bojonegoro: Agrapana Media.
- [8] Bayumi. (2021). *Application of Differentiated Learning Models*. Yogyakarta: Deepublish (Primary Mind).
- [9] Bernstein, J. (2021). *Google Sites Made Easy: Websites Designed the Easy Way*. United States of America.
- [10] Borg, WR & Gall, MD. (2003). *Educational Research: an Introduction Fourth Edition*. New York. Longman. Inc.
- [11] Cantilon, P., Jollie, C., and McKimm, J. (2003). *Web-Based Learning*. PubMed Center. Vol. 326.
- [12] Clark, R.C. & Mayer, R.E. (2008). *E-Learning and the Science of Instruction Proven Quidelines for Consumers and Designers of Multimedia*. Second Edition. San Francisco: John Wiley & Sons, Inc.
- [13] Dewi, W.A.F. (2020). The Impact of Covid-19 on the Implementation of Online Learning in Elementary Schools. *Journal of Educational Sciences*, 2 (1): 55-56.
- [14] Dewi, E.M. (2022). Development of Google Sites as Learning Media for Unisono Singing Materials in Class VII Pariskian Islamic Middle School, Serang City. *JKPS: Journal of Education and Art Studies*, 7(1), 23-37.
- [15] Dimiyati and Mudjiono. (2013). *Learning and Learning*. Jakarta: Rineka Cipta.
- [16] Djamarah, S.B. 2002. *Learning Psychology*. Jakarta: Rineka Cipta. Indonesian Education University, Special Edition (2): 60-69.
- [17] Fathurrohman, M., Sulistyorini. (2012). *Learning & Learning: Improving the Quality of Learning According to National Standards*. Yogyakarta: Terrace.
- [18] Ferlianti, S. (2022). Application of Differentiation Learning with the Blended Learning Station Rotation Method to Improve Student Learning Outcomes on Hydrostatic Pressure Material. *Indonesian Journal of Education*, 3(3), 266-272.. Springer Science & Business Media.