



## DEVELOPMENT OF GOOGLE SITES WEB-BASED IPAS LEARNING MEDIA TO IMPROVE TEACHER PEDAGOGICAL COMPETENCE

Iis Narahmalia<sup>1</sup>, Andrian Gandi Wijanarko<sup>2</sup>, Farinka Nurrahmah Azizah<sup>3</sup>

<sup>1,2,3</sup> Institut Islam Nahdlatul Ulama Temanggung, Temanggung, Indonesia  
[iisnarahmalia05@mail.com](mailto:iisnarahmalia05@mail.com)<sup>1</sup>, [andriangandi4@gmail.com](mailto:andriangandi4@gmail.com)<sup>2</sup>, [farinkanurrahmahazizah@gmail.com](mailto:farinkanurrahmahazizah@gmail.com)<sup>3</sup>

### PENGEMBANGAN MEDIA PEMBELAJARAN IPAS BERBASIS WEB GOOGLE SITES UNTUK MENINGKATKAN KOMPETENSI PEDAGOGIK GURU

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#### ABSTRACT

**Abstract:** This paper demonstrates the product in the form of Google Site web-based Natural Science learning media to improve teachers' digital pedagogical skills. The research type is research and development (R&D) with the ADDIE model, which consists of five steps or stages, namely analysis, design, development, implementation, and evaluation. The participants consisted of 21 students and 17 teachers in grade IV SD Universal Temanggung. Data collection techniques were interviews, observations, and questionnaires. The validation test results from two validators, namely media expert and material expert validators. Based on the media expert validators, an average percentage was 81% interpreted into the very feasible category. Of the material expert validator, the average percentage value was 79% in the feasible category. The increase in digital pedagogical competence was 88.5% with a very feasible category in making educational content creation that increased 15%. Based on the data, it can be concluded that the development of Google Site web-based Natural Science learning media can improve teacher's digital pedagogical competence.

**Keywords:** Google Site web, IPAS development, teachers' digital pedagogical competence

**Abstrak:** Artikel ini menunjukkan hasil produk berupa media pembelajaran IPA berbasis *web google sites* untuk meningkatkan kemampuan pedagogi digital guru. Jenis penelitian yang digunakan adalah penelitian dan pengembangan (R&D) dengan model ADDIE yang terdiri dari lima langkah atau tahapan, yaitu analisis, desain, pengembangan, implementasi, dan evaluasi. Pesertanya terdiri dari 21 siswa dan 17 guru kelas IV SD Universal Temanggung. Teknik pengumpulan datanya adalah wawancara, observasi, dan angket (kuesioner). Hasil uji validasi oleh dua validator yaitu validator ahli media dan materi. Berdasarkan validator ahli media, rata-rata sebesar 81% diinterpretasikan dalam kategori sangat layak. Dari validator ahli materi, rata-rata nilai persentase sebesar 79% dalam kategori layak. Peningkatan kompetensi pedagogi digital sebesar 88,5% dengan kategori sangat layak dalam pembuatan konten edukasi yang meningkat sebesar 15%. Berdasarkan data yang diperoleh, dapat disimpulkan bahwa pengembangan media pembelajaran IPA berbasis *web google sites* mampu meningkatkan kompetensi pedagogik digital guru.

**Kata Kunci:** situs *web google*, pengembangan IPAS, kompetensi pedagogik digital guru

#### CITATION

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#### INTRODUCTION

The industrial revolution 4.0 interprets the rapid progress of science and technology in various areas of life which requires digital

transformation through the collaboration of cyber technology and automation technology so that this era is called the digital era (Muhajir, Musfikar, and Hazrullah 2019)(A.A

Ketut Jelantik 2019). This wave of the industrial revolution caused changes that could not be avoided, as well as in the aspect of education (Ibda 2020). The 21st century educational paradigm equips the younger generation to have specific skills in technology to respond to various possibilities that may occur in the future (Asmoro, Dwinugraha, and Faridah 2021) According to statistical data from the results of the 2021 Susenas Survey data, 62.10 percent of Indonesia's population has access to the internet in 2021 (BPS 2021).

The use of technology needs to be integrated in learning, this can be done with learning support facilities such as the internet, LCD, e-books and projectors as curricular support facilities which have an impact on student success. However, so far the use of technology in the learning process has been interpreted more superficially, limited to the uses available in each educational institution (Sopiansyah et al. 2022). The use of this technology should be used as a transfer of knowledge, not just as a transfer of value (Purfitasari et al. 2019). So that the use of these facilities has not been matched by increasing teacher competence in using technology through digital-based learning activities.

Pustekom data from the Ministry of Education and Culture shows that the gap between teachers and students in using technology is 40% of non-ICT teachers who are ready to use technology (<http://gtk.kemendikbud.go.id/>). While most teachers use technology on a daily basis, the type of technology they use is not as up-to-date as what students need, or even their teaching needs (Howell 2005). The existence of these gaps is a trigger for teachers to improve the quality and quality of education. Post-Covid-19 pandemic policies have made learning less than optimal, this has become a form of gap where 40% of teachers have not mastered ICT. So that changing the 2013 curriculum to an independent learning curriculum with the aim of improving the quality and quality of

education both in process and results is the solution (Kurniawan, Saputra, Daulay, et al. 2020)

The learning process in the independent learning curriculum is a very essential manifestation of student-centered learning (Rahayu et al. 2022). As a feature of the independent learning curriculum learning process, namely teacher centered to student centered, the fact is that it is not in accordance with expectations, this is shown in the learning process which is still teacher centered. One indicator of the success of the Merdeka Learning program initiated by the Ministry is the concept of effective learning by utilizing technological sophistication that educators are able to implement in learning activities (Dirjen Dikti Kemendikbud, 2020).

One indicator of the success of the Merdeka Learning program initiated by the Ministry is the concept of effective learning by utilizing technological sophistication that educators are able to implement in learning activities (Kurniawan, Saputra, Aiman, et al. 2020). Through mastering digital pedagogy competencies, teachers should ideally integrate technology into learning to explore creative ideas and collect data that supports the process of implementing learning that combines conventional learning with technology-based learning (Rakyat 2019)(Howell 2005).

Digital pedagogy competence is a learning approach that is not only based on teacher skills using technology, but how teachers as facilitators use technology to build thinking skills while developing students' affective aspects (Purfitasari et al. 2019) Digital pedagogy competence does not only build students' mindsets but the teacher is able to shape the attitudes, behavior and personality of students to understand how and why it should be used (Syaifurrohman and Nasution 2021).

Digital competence according to (Prayogi & Estetika, 2019) includes several forms, namely: information (literacy ability);

communication (ability to interact through technology and digital media); educational content creation (the ability to create content or learning media digitally); security (ability to provide protection against the impact of learning content or media); and educational problem solving (ability to solve problems related to technology-based learning) (Gerety 2018). The competency role of digital pedagogy provides a space for teachers to meet new digital technologies and be able to use them effectively in their classrooms. (Howell 2005) So that these indicators are aligned with digital pedagogy competencies that teachers must master in order to utilize technology to build thinking skills while developing students' affective aspects (Howell 2005) So that these indicators are aligned with digital pedagogy competencies that teachers must master in order to utilize technology to build thinking skills while developing students' affective aspects (Purfitasari et al. 2019).

One of the innovations in the development of virtual learning digital media which is quite interesting in this digital era, one of which is based on the Google Sites web owned by Google as a site creation tool (Raharjo 2022). *Google sites can be accessed anywhere and anytime as long as there is an internet connection that is packaged in the form of an integrated web link* (Japrizal and Irfan 2021). *Google sites are easy to use, students only need to open links (web addresses) and documents provided by teachers through available web browsers* (Japrizal and Irfan 2021) Pengembangan media pembelajaran berbasis *web google sites* dapat dijadikan sebagai solusi dalam pengimplementasian kompetensi *digital pedagogy* (Santosa 2022) Google sites web-based learning media innovations can be applied in various subjects with the aim of increasing students' abilities as well as teacher digital competency innovation through the effective use of google sites web-based media in each educational institution.

## **THEORITICAL REVIEW**

### **Instructional Media**

According to AECT (Association of Education and Communication Technology) cited by Basyaruddin (2002) "media is any form that is used for the process of distributing information". Google sites Web-based learning media is one of the applications facilitated by Google with the combination of writing and reading commands that can make Google sites the media of choice in conveying subject matter at school (Raharjo 2022:13). Thus, the researchers made innovative innovations by using Google Sites web-based learning media that would have an impact on student learning outcomes in the Natural Sciences subject, especially in the structure and function of plants for class IV SD/MI.

### **Google Sites Web-Based Science Learning**

Science Science is a subject that studies oneself, nature and the surrounding social environment (Zahara 2019). Google sites web-based learning media provides benefits for students and teachers alike. In line with research conducted by Fadhilah Salsabila (2022) states that the development of google sites web-based learning media is a new innovative learning media that is practical and effective for use (Salsabila 2022) other literature states that the development of google sites web-based learning media in subjects Sociology class X SMA N 1 Andong is suitable for use in helping learning activities as well as increasing student learning motivation (Cahyo Nugroho and Hendrastomo 2021). In the Google Sites web-based IPAS learning media, this has a site space that provides more features, interesting things are displayed in the learning games feature to reduce student boredom in learning. (Raharjo 2022)

### **Teacher Digital Pedagogy Competency**

Digital pedagogy is a learning approach that is not only based on the teacher's skills in using technology, but how the teacher

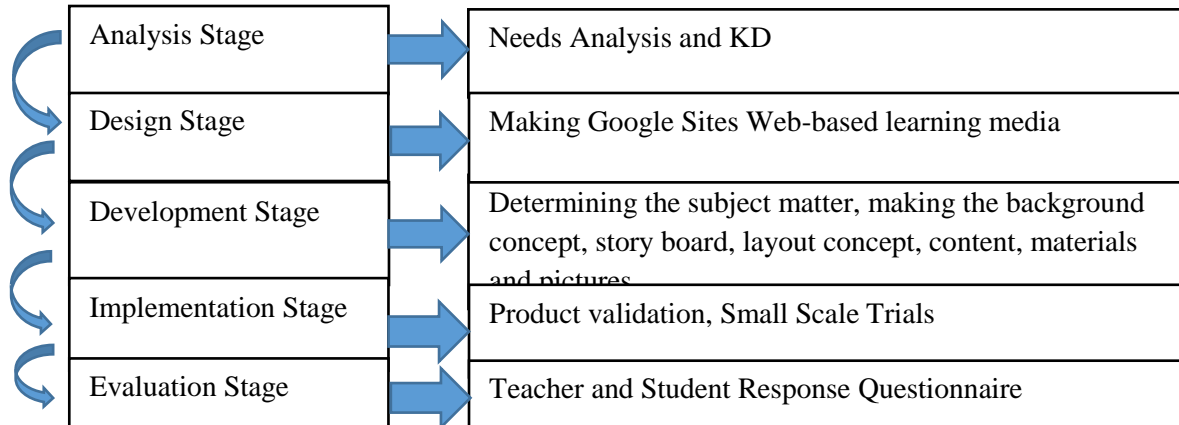
as a facilitator uses technology to build thinking skills while developing the affective aspects of students (Purfitasari et al. 2019). Digital pedagogy competence does not only build students' mindsets, but educators are able to shape the attitudes, behavior and personality of students (Syaifurrohman and Nasution 2021). Digital pedagogy competence emphasizes how teachers have attitudes and talents with digital technology and the ability to use it effectively to understand how and why it should be used (Howell 2005).

Digital competence according to (Prayogi & Estetika, 2019) meliputi beberapa bentuk, yaitu: *information* (kemampuan literasi); *communication* (kemampuan berinteraksi melalui teknologi dan media digital); *educational contents creation* (kemampuan menciptakan konten atau media pembelajaran secara digital); *security* (kemampuan memberikan perlindungan terhadap dampak konten atau media pembelajaran); dan *educational problem solving* (kemampuan mengatasi masalah terkait pembelajaran berbasis teknologi includes several forms, namely: information (literacy ability); communication (ability to interact through technology and digital media); educational content creation (the ability to create content or learning media digitally); security (ability to provide protection against the impact of learning content or media); and educational problem solving (ability to solve problems related to technology-based learning) (Gerety 2018). So that teachers are expected to have literacy and science and technology skills obtained through mastering digital pedagogy competencies.

## **RESEARCH METHODS**

The method used in this study uses the Research and Development (R&D) method. This method is a research or research method that aims to develop a product that already exists and can be accounted for both in terms of materials, processes and results (Arifin 2020). The development research method is made through the stages of the research process, planning, production, and testing the feasibility or effectiveness of the resulting product so that it can be useful and function well in society. This research was carried out during February 2023 and will produce a product in the form of development of class IV science and learning media based on the google sites web on the structure and function of plants which will assist the learning process at SD Universal Temanggung as a new, innovative and interesting learning medium. This Google Sites web-based learning media makes various learning activities and information integrated into one website. The research subjects were 21 grade IV students and SD Universal Temanggung teachers.

The development model used, namely the ADDIE model, is the right model for media development in this study. Because the ADDIE model is most commonly used for instructional development (Rabiah 2018) and this model can be used for various product developments such as teaching materials, strategies, models, and learning media. In addition, the ADDIE model is packaged more simply into several stages, namely Analysis (Analyze), Design (Design), Development (Development), Implementation (Implementation), and Evaluation (Evaluation).



Sumber : (Bety, Bahtiar, and ... 2022)

The data obtained in this study with the aim of knowing the competence of digital pedagogy teachers focused on creating educational content creation (the ability to create content or learning media digitally) which was tested on fourth grade students at SD Universal Temanggung in science learning material structure and function plants with the acquisition of qualitative and quantitative data. Qualitative data were obtained from the results of needs analysis, observations, interviews, criticism (input) and suggestions from material and media experts which were developed based on the Google Sites web. While the quantitative data obtained based on the validation results obtained from media experts, materials, teacher response questionnaire results, students. The data collection instruments were in the form of interview guidelines, material and media validation questionnaires, teacher and student response

questionnaires. Fill out the questionnaire assessment using a Likert scale in the form of a checklist with a scale of 4 (Ghony 2016). Furthermore, the data will be processed and analyzed from the results of the questionnaire using the following percentage technique (Lasabuda 2018) :

$$NP = \frac{R}{SM} \times 100 \%$$

Information :

NP = Percentage Value

R = Value obtained

SM = Maximum score

Based on the calculations that have been carried out, the results of the percentage scores obtained from the research are interpreted or described into several categories in order to determine the feasibility value of the resulting product as table 1, as follows:

**Table 1. Feasibility Scale**

Achievement Rate(%)	Category
80 % - 100 %	Very Decent
61 % - 80 %	Decent
41 % - 60 %	Inadequate
0 % - 40 %	Ineligible

Sumber : (Cahyo Nugroho and Hendrastomo 2021)

## **RESULTS AND DISCUSSION**

The final product in this study is google sites web-based learning media as an innovation of digital learning media to improve teacher digital pedagogy competence as a medium for developing science learning in elementary schools which is described in the discussion of google sites web-based science learning media, implementation of learning media and digital pedagogy competencies. Teacher .

Google sites web media also makes it easier for teachers to convey information, learning materials and share material because they are combined into one web. So that the material looks better, and is not easily piled up and lost, in line with previous research by (Salsabila 2022). This is supported by research conducted by Fadhilah Salsabila in Basicedu Journal Vol 4 No 6 of 2022 with the title development of google sites web-based learning media in learning natural sciences in elementary schools (Salsabila 2022).

### **The Effectiveness of Google Sites Web-Based Science Learning Media**

Based on the results of the initial analysis, structured interviews and direct observation of the fourth grade homeroom teacher at SD Universal Temanggung, learning activities after the Covid-19 pandemic which were carried out remotely for children experienced a decrease in motivation and learning outcomes (Narahmalia 2022). he learning and teaching activities are carried out through the coordination of the provision of information and communication whats app group. Learning information in the form of sending video links, attendance links, video conferencing, PowerPoint materials sent separately, or other teaching materials. Home visit activities are also carried out by the homeroom teacher at least 2 times a month to provide information and guidance to students experience a slow learner(Anon 2022).

This creates confusion for teachers because they send too many links, videos, and learning documents that parents also feel when accompanying their children at home. Then look at the current conditions with learning activities that are already running face to face in class by delivering material using PowerPoint media displayed on a projector screen, where the appearance is still monotonous and boring for students in

learning. Seeing these conditions, it is necessary to apply technology to support the learning process in various educational institutions. The author tries to integrate the use of learning media technological innovations as a transfer of knowledge so that through technology students are able to master the three domains of cognitive, affective and psychomotor aspects.

The focus of the research that the author conducted at SD Universal Temanggung was on the subject of science and technology class IV on the structure and function of plants. Science learning taught in elementary schools is a concept that is instilled from an early age related to scientific knowledge because through learning science science can relate contextually to everyday life(Puspitarini 2016) (Darmayanti and Wijaya 2020) So that through learning science science can be used as a provision for students by correlating with relationships that describe reality in terms of facts that occur in the universe (Marpaung, Yolida, and Meriza 2021) applying technology with learning activities based on related theories and facts.

Through testing the use of google sites web media which was tested on IPAS Class IV SD Universal Temanggung material on the structure and function of plants supported by the results of student and teacher questionnaire responses that Google sites web-based IPAS learning media to improve teacher digital pedagogic competence in creating educational content creation (the ability to create content or learning media digitally). This google sites web media can be easily accessed again so that students can look back at material that has been previously studied as evaluation material. Then the google sites web media can also make it easier for teachers to convey information, learning materials and share material because they are combined into one web. So that the material looks better, and is not easily piled up and lost, in line with previous research by(Salsabila 2022).

The advantages of Google Sites web-based learning media include: it can be accessed anywhere for free, easy to use and operate, can be easily shared with various devices, Google Sites web learning link addresses are easy to share, practice questions and image features on the display can be made interesting and varied so as to make students more enthusiastic about learning as well as

enthusiasm in working on evaluation questions. However, this google sites web-based learning media has drawbacks and weaknesses, namely, the device used to access the Google Sites website link must be connected or connected to the internet network (online) so that students can access Google sites (Cahyo Nugroho and Hendrastomo 2021) Who still need assistance and direction in applying this Google Sites media.

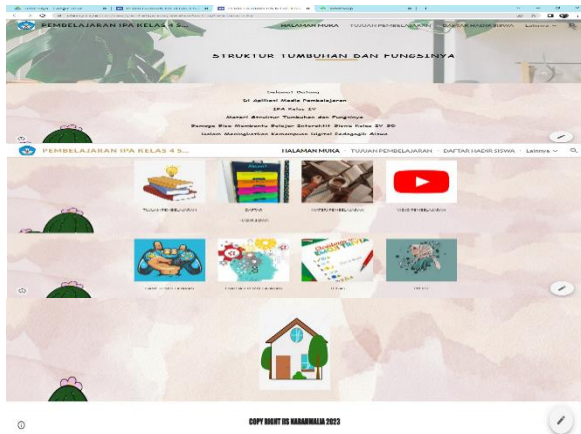
### **Google Sites Web-Based Science Learning Media**

The results of the development of google sites web-based learning media products in class IV science learning were obtained through the steps of developing the ADDIE model which consisted of 5 stages as follows:

Analysis Phase (Analyze). In the early stages of this development research, the researcher carried out the information gathering stage through literature studies, observation or direct observation of learning activities and analysis of the needs and characteristics of teachers and students. Some of the problems found in the field are that teachers still have difficulties in developing technology-based learning media. At this stage it was found that students had difficulties when learning distance learning because they had to open one by one the material that the teacher sent in the WhatsApp group in the form of PowerPoint, YouTube links, and e-books.

When learning in class the learning media used are still manual and text book in nature, as well as conventional methods that educators implement when learning takes place with the help of simple PowerPoint slides so that learning seems monotonous and less interactive so that it has an impact on student saturation in participating in learning activities. Next, the researcher conducted an analysis of the material according to the learning outcomes and indicators that were in accordance with the Merdeka curriculum. Then perform tool analysis and media creation, namely in the form of a manufacturing site which is a derivative product made by Google called Google Sites which can be accessed at the following link or address: <https://sites.google.com/>

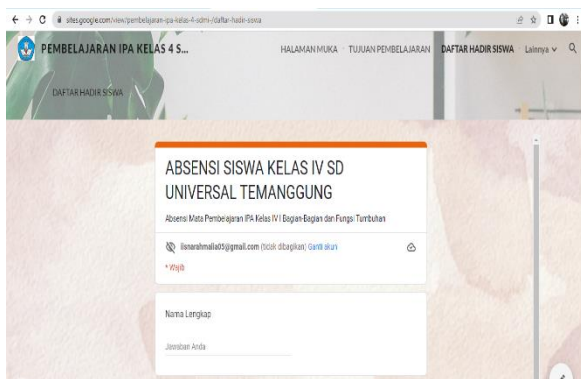
Design Stage (Design). This second stage is related to product design or planning. In this stage the researcher begins to design innovative learning media and materials that will be developed into Google sites. Starting from determining the background concept, creating a storyboard, to make it easier for the concept to be made in the media, both layout concepts, material content, supporting images, videos, learning games and other supporting media. Development stage (Development). In this third stage, the design that has been designed will then be processed into the Google Sites media. The following Google Sites media product results are presented in the image below:



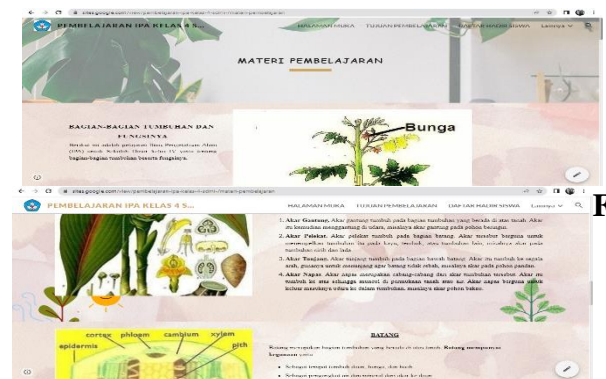
**Figure 1. Main Page Menu**



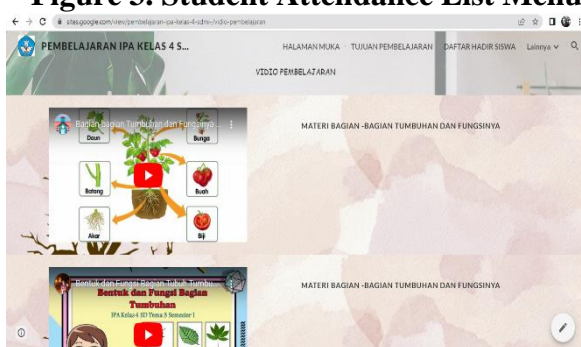
**Figure 2. Learning Objectives Menu**



**Figure 3. Student Attendance List Menu**



**Figure 4. Learning Material Menu**



**Figure 5. Learning Video Menu**

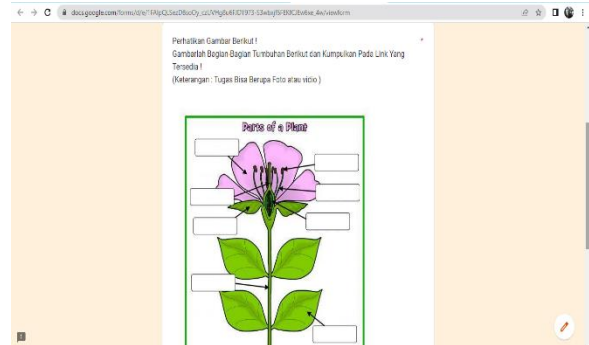


**Figure 6. Learning Game Menu**





**Figure 7. Learning Evaluation Menu**



**Figure 8. Learning Task Menu**

This Google Sites web-based learning media can be visited via the following link, namely <https://sites.google.com/view/pengembelajar-ipa-klas-4-sdmi/>.

**RESULTS**

After the product has been developed, then at this stage a validation test is carried out by two validators, namely media experts and

material experts. Testing is carried out using a validation instrument sheet in the form of a questionnaire with a rating scale along with the media product that has been developed given to the validator along with the media use rubric. Following are the results of the validation by the two experts, presented in table 2 and table 3 below:

**Table 2. Validation Test Results by Media Experts**

Aspect	Percentage	Category
Software	82 %	Very Decent
Visual Communication	80%	Worthy
Average	81 %	Very Decent

Based on the results of product validation by media experts above, there are two aspects used for assessment. In the software aspect, obtaining a percentage score of 82% is described in the very feasible category. While the programming

aspect obtained a percentage score from the results of the validation test by media experts of 81%, then based on this category learning media products are very feasible to use.

**Table 3. Validation Test Results by Material Experts**

Aspect	Percentage	Category
Feasibility of Material Content	80 %	Very Decent
Eligible Language	74%	Worthy
language	89 %	Very Decent
Average	79 %	Worthy

Based on the validation results by the material experts above, there are three aspects that are used for assessment. In the feasibility aspect, the content of the material obtained a percentage score of 80% and received a very feasible category, the feasibility aspect of presenting the material obtained a percentage score of 74%, which received a feasible category, and the linguistic aspect received a percentage score of 89%, which received a very feasible category. From the results of the validation test by material experts at 79%, then based on this category learning media products are suitable for use. The conclusion of the validation results by experts states that this google sites web-based learning media is feasible to be tested with several revisions or improvements. Comments and suggestions

from the validator are followed up with media improvements or revisions.

Stage of Implementation (Implementation). At this stage a product trial was carried out, namely to class IV students and 17 teachers at SD Universal Temanggung. At this stage a questionnaire will be given to respondents (students and teachers) to obtain data related to product response and find out the quality of products that have been developed with Google sites as the development of science and learning media to improve teacher digital pedagogic competence in educational content creation (the ability to create content or digital learning media). The results of the assessment of the responses of teachers and students are presented in table 4 and table 5, as follows:

**Table 4. Student Response Assessment Questionnaire Results**

Aspect	Percentage	Category
Practicality	92 %	Very Decent
Media	91%	Very Decent
Usefulness	90 %	Worthy
Average	90%	Worthy

Based on the results of students' responses to this google sites learning media, that on the practicality aspect a score of 92%,

the media aspect scores 91%, the usability aspect 90%, based on the criteria it is included in the very feasible category.

**Table 5. Results of the Teacher Response Assessment Questionnaire**

Aspect	Percentage	Category
Media Ease	90 %	Very Decent
Competency educational content creation Digital Pedagogy	79%	Worthy
Eligible	85 %	Very Decent
View Uniqueness		
Usefulness	100 %	Very Decent
Average	88,5 %	Very Decent

Based on the results of the teacher's response to this google sites learning media, that for the aspect of media convenience got a

score of 92%, the educational content creation digital pedagogy competency aspect got a score of 79%, the uniqueness aspect of the

display got a score of 85%, the usability aspect got a score of 100% based on criteria including into the very decent category. So it can be said that the google sites web-based learning media is declared feasible and can be used as a medium in learning.

Stage Evaluation (Evaluation). This is the final stage of the ADDIE model development research. At this stage the final improvements are made to perfect the deficiencies in order to avoid any obstacles in the future when the Google Sites media will be used in the teaching and learning process. Google sites learning media can be used to develop various learning materials at all school levels.

### **Digital Pedagogy Teacher Competency Improvement**

The ability of digital pedagogy in the process of advancing education through innovation in educational content creation learning media (the ability to create content or

learning media digitally) must be possessed by a teacher. According to Senft, M.T. (2008, hlm.272 Teachers must have abilities that match their passion. Even though content creators are good at digital and manual, they are required to have original works with their own uniqueness and charm. A content creator must always be updated on trend developments by multi-tasking in various ways. The toughest challenge that must be carried out by content creators is consistency in their work (Ulfa Dwi Solikhah 2018).

As educators, teachers have a role as facilitators in transferring knowledge in this digital era. Educators must have digital pedagogy competence as an alternative learning approach that combines conventional learning with technology-based learning (Howell 2005). Based on the results of a needs analysis related to digital pedagogy competencies before and after using the Google web sites at SD Universal Temanggung as follows:

**Table 5. Digital Pedagogy Teacher Competency Questionnaire**

Aspects of Digital Pedagogy Competency	Percentage Before Using WGS	Percentage After Using WGS	Percentage Improvement
<i>Information</i>	87 %	90 %	3 %
<i>Communication</i>	76 %	76%	0 %
<i>Educational Contents Creation</i>	60 %	75 %	15 %
<i>Security</i>	93 %	93 % %	0 %
<i>Educational Problem Solving</i>	80 %	87 %	7 %
Rata-rata	79,2 %	85,2 %	5 %

Based on the results of the digital pedagogy competency questionnaire, teachers in every aspect experienced an increase before the existence of Google Sites web-based media and after. The table above shows that information competence increased by 3%, in the communication aspect by 0%, educational

content creation aspect by 15%, security aspect by 0%, educational problem solving aspect by 7%. With an average increase in overall digital pedagogy competency of 5%.

Digital pedagogy competence can be integrated in every policy of educational institutions to improve the quality of education

through the process of learning activities, including through innovative learning media. This really supports and helps the realization of learning in presenting material by collaborating on manual or digital-based media that is able to attract student learning interest (Nurdyansyah 2019). So that the student learning situation is more active and the material that educators provide so that students can easily understand learning material in improving the quality of learning. Through innovative learning media that the teacher designs, in addition to achieving effective and efficient learning objectives, it is expected to be able to convey information from educators (teachers) to students (students) with innovative, creative, comprehensive presentations, so that students are more enthusiastic and create situations and conditions. fun learning (Pradana, Abidin, and Adi 2020).

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on the research and discussion above, the development of learning media products based on the Google Sites web which was tested on Science Class IV SD Universal Temanggung learning material on the structure and function of plants was successfully developed with the result of a learning media product in the form of Google Web Sites. The results of the feasibility validation test by the media validator obtained an average presentation result of 81%, so based on these criteria it is included in the very feasible category. While the validation results by material experts obtained an average of 79% in the feasible category.

The competence of digital pedagogy teachers in creating educational content creation (the ability to create content or learning media digitally) increased by 15% after implementing google sites web-based learning media, this was also seen from the

trials of developing Google sites web-based IPAS learning media with an average the average questionnaire response of 88.5% is included in the very decent category. So that it can be concluded that the google sites web-based IPAS learning media is suitable for use in learning activities and is able to improve teacher digital pedagogy competence. It is better to develop google sites web learning media in collaboration with experts in the IT field, so that in the manufacturing process it will facilitate the development of learning media on each display of the application of the learning menu.

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