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# The Use of Google Sites-based Electronic Modules in Science Learning Against Digital Literacy of Junior High School Students

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***ABSTRAK***

*Pembelajaran di abad 21 membutuhkan inovasi dengan memanfaatkan teknologi sebagai sumber belajar bagi siswa. Mengintegrasikan teknologi ke dalam pembelajaran memiliki peran penting untuk meningkatkan keterampilan siswa. Salah satu integrasi teknologi adalah penggunaan Modul Elektronik berbasis Google Sites yang digunakan sebagai sumber belajar dalam pembelajaran IPA. Penelitian ini bertujuan untuk menganalisis literasi digital siswa SMP dengan menggunakan modul elektronik berbasis Google Sites. Populasi penelitian ini adalah siswa kelas VII dengan menggunakan teknik cluster random sampling. Penelitian ini termasuk penelitian kuasi eksperimen. Desain yang digunakan adalah post-test only control group design using angles. Penelitian ini menggunakan instrumen berupa kuesioner. Analisis data menggunakan independent sample t-test. Berdasarkan hasil analisis angket diketahui bahwa literasi digital siswa kelas eksperimen lebih unggul dengan rata-rata proporsi 48%. Hasil analisis independent sample t-test diperoleh Sig (2-tailed) 0,000 yang artinya terdapat perbedaan literasi digital siswa SMP yang menggunakan modul elektronik berbasis situs Google dalam pembelajaran IPA. Dapat disimpulkan bahwa modul elektronik berbasis situs Google dapat meningkatkan literasi digital. Situs google berbasis modul elektronik juga dapat memunculkan kemampuan literasi digital siswa.*

**ABSTRACT**

Learning in the 21st century requires innovation by utilizing technology as a learning resource for students. Integrating technology into learning has an important role to improve students' skills. One of the integrations of technology is the use of Google Sites-based Electronic Modules which are used as learning resources in science learning. This study aimed to analyze the digital literacy of junior high school students using Google Sites-based electronic modules. The population of this study included class VII students using the cluster random sampling technique. This research includes quasi-experimental research. The design used is the post-test-only control group design using angles. This study uses an instrument in the form of a questionnaire. Analyzing data is using the independent sample t-test. Based on the results of the questionnaire analysis, it is known that the digital literacy of students in the experimental class is superior with an average proportion of 48%. The results of the analysis of the independent sample t-test were Sig (2-tailed) 0.000, which means that there are differences in the digital literacy of junior high school students using electronic modules based on Google sites in science learning. It can be concluded that electronic modules based on Google sites can improve digital literacy. Electronic module based google sites can also bring up students' digital literacy skills.

## 1. INTRODUCTION

The world has entered the 21st century, the era of digitalization where information and technology develop rapidly and make people accept that digital fluency is important. The development of digitalization is increasing with progress in developments that have significantly changed aspects of people's social life. Technology in the form of the internet has integrated operations related to information, communication, and interaction (Kateryna et al., 2020; Nasionalita & Nugroho, 2020). Access

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to the digitalization of this technology will be able to help use it in daily activities. The use of digital technology in Indonesia has developed quite rapidly. A very large digital footprint can be used as a source of digital data. According to data from 2021 to 2022, the internet users increased by 77.02% of the total population in Indonesia (Hutchinson, 2016; Syafganti, 2018). The 21st-century learning will affect the existing education system such as developing 21st-century skills to face global life (Chalkiadaki, 2018; Erdoğan, 2019; Gunadi et al., 2022). The 21st -century Learning Framework will require students to have knowledge and skills in the fields of technology, media, and information that foster digital and ICT literacy skills. With digital and ICT literacy, it is expected to create, evaluate and utilize ICT effectively (Jagodziński & Wolski, 2015; Kivunja, 2015). In this era of technological advances, information has changed the way people produce, distribute, and use information. ICT also makes activities carried out virtually so that it can affect lifestyle. Humans will also become centers of developing technology-based (Abbate, 2017; Hotimah & Ulyawati Siti Raihan, 2020).

One of the uses of technology and communication is in the field of education. Education will progress seen from how the use of technology is used. One of the determining aspects is the ease of obtaining information and the success of science through technology (Huang et al, 2021; Hulukati & Rahmi, 2020; Wardani et al., 2017). The use of technology in education can help teachers make learning more attractive. For this reason, it is not only teachers who play a role in utilizing technology in learning but students are required to take part in using technology as a source of independent learning (Chin & Wang, 2021; Falode & Gambari, 2017). In line with that, the importance of understanding topics through technology is (1) students can access material more quickly; (2) enabling independent learning and (3) providing a scientific basis for learning to avoid a lot of inaccurate information, and (4) technology has enabled knowledge to be spread more quickly and effectively (Harris et al., 2020; K. Khasanah et al., 2021). In the field of education, student involvement in using digital media will help students develop knowledge and skills that support the 21st century, one of which is digital literacy skills (Blyth, 2014; Buckingham, 2015; Langub & Lokey-Vega, 2017; Redmond, 2015). In learning, students must have digital literacy skills to understand and utilize information from sources accessed via the internet (Hajar et al., 2022; Sanova et al., 2022). This digital literacy involves how to think critically, and confidence in using digital social networks to find information, the ability to participate and the ability to use information systems to foster creativity and innovation as well as responsibility in using technology (Hariati, 2021; Tang & Chaw, 2016).

Digital literacy is how to read instructions in digital form, how use digital tools, access material content available online to acquire new knowledge, evaluate information that comes from the internet and have ethics in using the internet (Alexander et al., 2017; Shopova, 2014). This literacy enables a person to participate in social networks to create and share knowledge and support various computing skills in a professional manner (Chetty et al., 2018; Harmoko, 2021). There are 4 digital literacy competencies: internet searching, hypertextual navigation, content evaluation and knowledge assembly). Digital literacy means having the skills that will be needed in learning and working together in a society where communication and access to information are increasing through digital technologies such as internet platforms, social media, and mobile devices (Pangrazio et al., 2020).

The role of digital literacy determines success in learning for both students and teachers. The link between digital literacy and the use of technology will improve the implementation of learning in the classroom. This can be done by integrating learning materials with technology and the method of delivering material through the use of technology (Kurniawati et al., 2018; Sugiri & Arie Pratama, 2020; Vélez & Zuazua, 2017). Digital literacy education needs to be implemented in schools by familiarizing students with using digital media in learning. However, the high development of the internet is not supported by an increase in digital literacy. Digital literacy-based learning resources are important to apply in education because they can present instructional material contextually, visually, and through audio interestingly and interactively (Ouahidi, 2020; Pagani et al., 2016). The use of technology can make a major contribution to the learning process as a provider of information and clarify specific learning materials. In this case, students and teachers can prioritize collaboration during the teaching and learning process. The development of digital-based teaching materials can be used by students because of easy access anywhere and anytime (Roza et al., 2021; Sari & Sutihat, 2022). The use of electronic modules is one that can achieve learning competencies well (Febriana & Sakti, 2021; Nesri & Kristanto, 2020; Santosa et al., 2017). This electronic module can contain digital material that is arranged systematically. This electronic module can also provide broader material content such as images, illustrations, videos, audio, animations which are packaged more attractively and students can more quickly understand the material. Learning modules allow for independent study (McNamara et al., 2020; Santosa et al., 2017; Yulando et al., 2019). Web-based electronic modules can be used as supporting teaching materials that can present a variety of material content, video sites that will provide additional information to strengthen the material.

The use of links can also be embedded in this electronic module to support Web-based automatic assessments (Dermawan & Fahmi, 2020; Karlina et al., 2021; Nurohman & Suyoso, 2014). One of the websites that can be developed in electronic modules is based on Google Sites. Through Google sites, teachers can provide learning materials, assignments that are packaged into a module (Armanda & Yosintha, 2022; Fatmawati et al., 2021). In addition, this Google site is very easy for students to access using gadgets or laptops connected to the internet network (Adzkiya & Suryaman, 2021; Khasanah & Muflihah, 2021; Thomas et al., 2022). Google Sites-based websites have several advantages. First, Google Sites are easy to create and free. Second, it allows users to collaborate in its utilization. Fourth, free online storage capacity. Fifth, searchable (easy to browse) (Cahyo Nugroho & Hendrastomo, 2021; Fitriani et al., 2022). In line with science learning, it supports the process of exploring information regarding the development of natural science products which can be done by accessing information widely in digital form (Ariastika, 2022; Tarjiah et al., 2020). Learning science material about motion and style using a website is a form of implementing digital literacy-based learning. In learning science, students will build character and apply the knowledge, attitudes and skills that students get through learning experiences using science and technology (R. D. Kurniawati et al., 2022; W. M. Sari et al., 2022; Wilujeng et al., 2020).

Based on the results of teacher observations and interviews during Class 7 Science lessons at SMPN 6 Yogyakarta, teachers have not optimized the use of electronic modules that support students' digital literacy skills. Digital literacy possessed by grade 7 students is also not visible. This is because students access more things that are not appropriate for the subject matter. Thus, digital literacy in classroom learning is not optimal and teachers are not used to applying digital literacy to students (Hajar et al., 2022; Naila et al., 2021). Even though digital literacy has a significant relationship with the use of e-resources and also allows teachers to provide creative and innovative learning innovations by integrating technology as a learning resource (Akbar & Anggaraeni, 2017; Nurjanah et al., 2017). Therefore, there is a need for research related to the analysis of the use of google sites-based electronic modules on digital literacy of junior high school students.

## 2. METHOD

This research is quasi-experimental. The research method with the type of quasi-experiment is research that can be used to find out whether there is an effect on the subjects studied by controlling certain conditions and as the control and experimental groups were not chosen randomly. In this design, the subjects were divided into two groups, namely the experimental group and the control group (Rusmana & Suprihatin, 2019). The purpose of this research is to find out the causation of a particular subject, namely knowing students' digital literacy abilities in using electronic modules based on Google sites. This research was conducted at SMP Negeri 6 Yogyakarta. The population in this study included students of class VII. The sample used in this study amounted to 63 students who were divided into two classes. Determination of the sample using cluster random sampling technique. Sampling is done by groups that are considered equal and not tiered (Primadiati & Djukri, 2017; Taherdoost, 2018). The design of this study uses the "Post-test Only Control Group Design". In this design, there are two types of groups, namely the control class and the experimental class which will emphasize the comparison of the treatment between the two classes (Sugiyono, 2016). The experimental class design and control the Post-test Only Control Group Design are shown in Table 1.

**Table 1.** Desain post-test only control group design

| Class | Before Measurement | Treatment | After Measurement |
|---|---|---|---|
| Control | - | - | O1 |
| Experiment | - | X | O2 |

Information:
X: Treatment
O1: final measurement of digital literacy using a control questionnaire
O2: final measurement of digital literacy using an experimental class questionnaire.

This study uses an instrument in the form of a questionnaire. The questionnaire uses a Likert scale which is a research scale used to determine the attitudes and opinions of respondents as the data collection instruments (Ebert et al., 2018; Sumual & Ali, 2017). This relates to students' digital literacy abilities. Fill out the questionnaire using the Google Form and distribute it to students after learning. Data collection was carried out after students were given treatment. The treatment in question is the use of

Google Sites-Based Electronic Modules in science learning. The following grid of questionnaire sheets is presented in Table 2.

**Table 2.** Student's Digital Literacy Questionnaire Grid

| No | Digital Literacy Indicator | Item Number | | Total Items |
|---|---|---|---|---|
| | | Positive Statement | Negative Statement | |
| 1 | Internet Searching | 3 | 1,2 | 3 |
| 2 | Hypertextual Navigation | 4,6,8,11,12 | 5,7,9,10 | 9 |
| 3 | Content Evaluation | 14,13,16, | 15,17 | 5 |
| 4 | Knowledge assembly | 18 | 19,20 | 3 |
| **Number of items** | | | | **20** |

This questionnaire consists of a Likert scale divided into two statements, namely positive statements, and negative statements. Positive statements are never given a score of 1, rarely given a score of 2, sometimes given a score of 3, often given a score of 4, and always given a score of 5. Meanwhile, for negative statements, it is the opposite. The instrument used in this study uses digital literacy indicators used in this research are (1) internet searching; (2) hypertextual navigation; (3) content evaluation and (4) knowledge assembly (Ng, 2012). The following grid indicator of questionnaire is presents in Table 3.

**Table 3**. Students Digital Literacy Questionnaire Indicator

| No | Indicator | Sub-Indicator | Total Item |
|---|---|---|---|
| 1 | Internet Searching | Students ability to search the internet | 2 |
| | | The ability of students in the activity of finding information available via the internet | 1 |
| 2 | Hypertextual Navigation | The ability of students to understand how websites, web browsers and URL work | 4 |
| | | The ability of students to understand the characteristics of website pages | 2 |
| | | The ability of students to know hypertext and hyperlinks and how they work | 2 |
| | | The ability of students to distinguish literature found in books and via the internet | 1 |
| 3 | Content Evaluation | The ability of students to analyze information available on the internet | 1 |
| | | The ability of students to distinguish between information display and content | 2 |
| | | The ability of students to evaluate websites with available domains | 1 |
| 4 | Knowledge Assembly | The ability of students to use other media available on the internet to support the truth of information | 2 |
| | | The ability of students in compiling knowledge from the information obtained | 2 |

The criteria for determining the results of the questionnaire based on the answers of the respondents can be determined as follows. The maximum score for each questionnaire is 5 and the minimum score is 1 or a range of 20% to 100%. To obtain the percentage of interpretation of the score by comparing the scores of the items obtained based on the answers of the respondents with the highest score of answers then multiplied by 100%. Item scores can be calculated by multiplying the scale value by the number of respondents who answered at that value, then the highest score is obtained from the number of questions with the highest scale value multiplied by the total number of respondents. The results of these calculations will then be compared with the questionnaire indicator criteria. The following are the criteria for the questionnaire indicators. The following are the criteria for the questionnaire indicatorsi is presented in Table 4.

**Table 4**. Questionnaire Indicator Criteria

| No | Persentase(%) | Criteria |
|---|---|---|
| 1. | 0 - 20 | Very weak |
| 2. | 21 - 40 | Weak |
| 3. | 41 - 60 | Sufficient |
| 4. | 61 - 80 | Strong |
| 5. | 81 - 100 | Very Strong |

In addition, the questionnaire response data were tested with an independent sample t-test which was intended to test the research hypothesis of whether there were differences in students' digital literacy after participating in learning using electronic modules based on Google sites in two different groups. Before analyzing using the independent sample t-test, prerequisite tests was carried out, namely the normality test and homogeneity test. The independent sample t-test is a different test to determine whether there are differences in data between 2 independent groups with interval or ratio scales (Gerald, 2018).

## 3. RESULT AND DISCUSSION

### Result

This research was conducted by distributing a digital literacy questionnaire online assisted by google Forms to students of class VII SMP Negeri 6 Yogyakarta. A spread questionnaire was conducted after learning science using electronic modules based on google sites developed for students to provide responses related to digital literacy. Before the start of learning the teacher gives the electronic module link based on the google sites material “motion and style" to students. The development of electronic modules based on google sites is selected for use in learning because it is one of the online media that allows users to insert a variety of media such as video featuring visual and audio and can feature a virtual laboratory to support learning and sharing tasks. Implementation of the use of google sites deemed suitable for students in integrating technology to obtain knowledge to improve learning outcomes. Electronic module based on Google Sites is used to determine the level of ability digital literacy students. Because, digital literacy itself involves understanding related to the web and search engines.

This google site-based electronic module is used to determine the level of digital literacy skills of students. Based on the data obtained in the form of digital literacy questionnaire data. This questionnaire consists of four digital literacy indicators adopted from. The first digital literacy indicator is internet searching in a questionnaire consisting of 3 statements. The second indicator, hypertextual navigation consists of 9 statements. The third indicator of content evaluation consists of 5 statements. While the last indicator of knowledge assembly consists of 3 statements. Thus, the number of statements consists of 20 statements in the questionnaire. The analysis of students' digital literacy questionnaire response data is show in Figure 1.

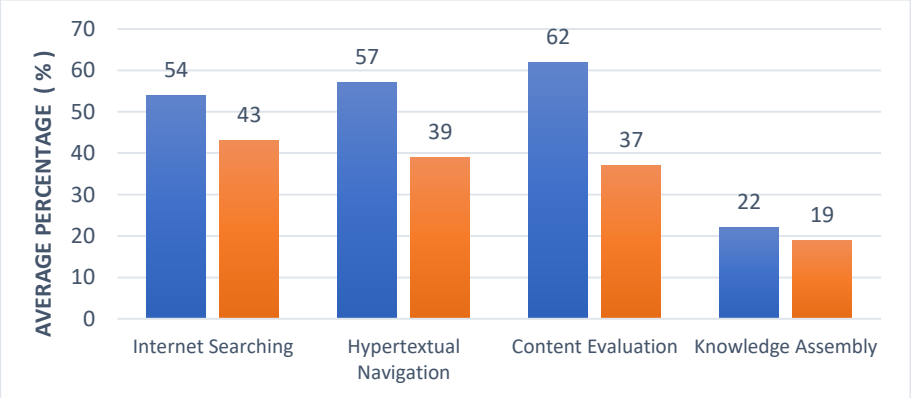


**Figure 1**. The result of the digital literacy data questionnaire response

Based on the Figure 1, internet searching and hypertextual navigation indicators in the experimental class are classified as sufficient criteria with percentages of 54% and 57%. For the experimental class, the content evaluation indicator got the highest score with a percentage of 62%, this shows that this indicator is strong. While the knowledge assembly indicator in the experimental class

obtained a percentage of 22% belonging to the low criteria. Digital literacy in the internet searching indicator control class belongs to the sufficient criteria with a percentage of 43%. Meanwhile, the indicators for hypertextual navigation, content evaluation, and knowledge assembly are classified as weak criteria with the obtained percentages of 39%, 37%, and 19% respectively. The difference in digital literacy percentage scores between the experimental class and the control class is quite a big difference when compared to the overall digital literacy indicator scores. In addition, this study examines whether there are differences in digital literacy in using electronic modules based on Google sites. The first step is to carry out a normality test which is carried out with the help of the SPSS 22 application, it is found that the population of the questionnaire data in the experimental class and control class is normally distributed with a Sig value. 0.200 in the *Kolmogorov-Smirnov test*. Meanwhile, in the homogeneity test, the value of Sig. 0.971 which indicates that the variance in each group is the same. For the independent sample t-test, the results of the analysis are shown in Table 5.

**Table 5**. Independent Sample T test

| | **Levene's test for Equality of Variance** | | **t-test for Equality of Means** | | |
|---|---|---|---|---|---|
| Digital Literacy | F | Sig. | t | df | Sig.(2-tailed) |
| | 0.001 | 0.971 | 7.751 | 61 | 0.000 |

Based on Table 5, the results of the analysis above, the value of Sig. (2-tailed) 0.000 <0.05, it can be concluded that H0 is rejected. This means that there are differences in the digital literacy of junior high school students using electronic modules based on Google sites in science learning.

**Discussion**

Internet searching is the ability to operate, use and perform internet activities. This indicator is related to the search for information on the internet and other relevant activities (A'yuni, 2015; Nasionalita & Nugroho, 2020; Škoda et al., 2020). Science learning by using electronic modules makes students will look for information related to the material in the electronic module. The system digital makes it easy for students to find relevant information related to the material learning with the help of the internet without being limited in space and time (Ariastika, 2022; Hanik, 2020; Hervi & Ristiono, 2021). As research conducted states that every individual has literacy abilities digital is quite good, especially in finding, understanding, and using references comes from the internet.

Hypertextual Navigation is the ability to understand the use of hypertext/hyperlinks in a website or digital media and how students in operating the internet in information and communication students can find further information by hypertext dan hyperlink (Hobbs & Coiro, 2019; Lee, 2014; Nugroho & Nasionalita, 2020). Skills in finding information and interpreting basic ways logical technology information from digital media (Abdi, 2013; Asrizal et al., 2018; Juardi et al., 2022). However, this is in line with research knowledge students recognize hypertext and hyperlinks which is quite enough. So, in this study, the navigation indicator is in a sufficient category. Content Evaluation is an ability related to the identification and completeness of the information provided (A'yuni, 2015; Meyers et al., 2013; Nasionalita & Nugroho, 2020). Digital literacy is very important to strengthen the ability to search and disseminate information responsibly. Information in learning obtained from digital media must first be ascertained accuracy and students can select relevant information and source proficiency digital used. Ability of digital literacy students included in finding and evaluating the information it can then be connected to learning objectives that are applied in everyday life (Febliza & Okatariani, 2020; Terry et al., 2019). This is in line with the opinion state digital literacy includes information literacy which is the ability to evaluate a piece of information obtained through the internet. Knowledge Assembly is the ability to relate to how information is built on the basis of various sources that exist in digital media. Compilation information is used as science for certain interests such as knowledge and equips themselves against the threat of the digital environment (Nugroho & Nasionalita, 2020; Porat et al., 2018; Zaenudin et al., 2020). This ability uses the knowledge there to explore new information in order to enrich the knowledge already owned previously, not only receiving raw information but can analyze and thinking critically (Hariati, 2021; Langub & Lokey-Vega, 2017; Lee, 2014). Based on the results, indicator knowledge assembly shows the lowest criteria. According to research conducted information users in citing sources related to the material and can distinguish the contents of some sources (Irhandayaningsih, 2020; Rahayu et al., 2022). In addition, learners conveying information still do not attach relevant images or videos, so the information has not been fully understood by students. Electronic module is a learning module that contains learning materials packaged in an interesting and interactive way that can be used students in search of information and new knowledge from digital media. This electronic module can be used for

learning independent students (Perdana et al., 2017; Pertiwi, 2019; Seruni et al., 2019). Module usage Electronics is able to train the ability of digital literacy in learners so that they can supporting independent learning (Pratiwi & Indana, 2022; Sanova et al., 2022). Each participant learners must have digital literacy or skills to be able to learn effectively in following learning to obtain material and instruction indirectly by the teacher (Lee, 2014; Ouahidi, 2020; Tang & Chaw, 2016). Correspondingly, according to previous study modules can time effiency in teaching and train the ability of digital literacy by teachers so that the learning process will run better and more interactive (Sanova et al., 2022).

Not only that, but today the growing digital literacy has many benefits. Examples for students can easily find information related to the material learning (Chetty et al., 2018; Giovanni & Komariah, 2020; Vélez & Zuazua, 2017). Digital literacy refers to the attitude and ability to utilize information technology to access, analyze, evaluate information and build and develop new knowledge. Learners who can master the device generally already have a basic digital literacy on digitalization era (Hutagalung & Purbani, 2021; Johnston, 2020; Yazon et al., 2019). Digital literacy is required to process information quickly through the internet, the more often a person in using the internet can provide experience in using online portals. Not only building knowledge access skills, but digital literacy also builds skills critical thinking in the use of digital technology. Success in building capabilities digital literacy is one of the indicators of achievement in education (Lee, 2014; Ozdamar-Keskin et al., 2020; Shopova, 2014).

Integration of digital literacy into learning instruments can measure the ability digital literacy learners so as to improve learning strategies. It also can correlate with students' learning motivation (He et al., 2021; Ouahidi, 2020). It is in line with other research that digital literacy is also able to influence the achievement academic and learning outcomes of students in science learning (Akhyar et al., 2021; Pagani et al., 2016; Shopova, 2014). In addition, with increasing literacy ability digital students then increase learning opportunities during the learning process (Abbas et al., 2019; He et al., 2021). Digital literacy is influenced by the effectiveness of learning online as the ease of using the platform/application in learning and availability of internet and adequate devices. Frequency of interaction between participants the use of technology also supports the creation of digital literacy capabilities (Abdul, Latip, Nursida & Hardinata, 2022; Tang & Chaw, 2016). For the future, the ability of digital literacy still needs to be developed with one of the integration of learning modules with technology as an example use of electronic modules (Aulia & Khalid Riefani, 2021; Jusriati et al., 2021; Thomas et al., 2022). This is to face the increasingly advanced era of digitalization in the world of education and useful for teachers and students.

## 4. CONCLUSION

Based on the results of analysis and discussion can be concluded that the ability of literacy digital students experimental class is classified as higher than the control class. As for the independent t-test analysis results showed that there are differences there are differences in digital literacy Junior High School students using electronic modules based on google sites science learning. The use of technology in learning needs to be applied. Teachers must be able to integrate technology with learning instruments to appear other students abilities. One of them with the electronic module in the rise digital literacy skills for students. This digital literacy will support students in seeking a broader insight through the internet and this can be in line for their improvement of students learning outcomes. Furthermore, learning instrument based on digital literacy must be develop.

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