

Microsoft Sway 365 to Develop Discovery Learning- Based E-module for Grade IV Elementary Students

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ABSTRACT

The objective of this project was to develop e-modules using the current Microsoft Sway 365 platform, with a focus on discovery learning. The creation of the e-module dilator is driven by the discovery that current mathematics e-modules fail to effectively assist students in freely constructing knowledge and grasping topics. Students continue to see mathematics as challenging to comprehend, resulting in persistently low academic achievements in the subject. This research falls under the category of Research and Development (R&D) and utilises the Plomp model. The Plomp model comprises three distinct stages: basic research, prototype phase, and assessment. The data-gathering procedures employed consist of observation sheets, questionnaires, and test sheets. This study included descriptive and statistical methodologies. The investigation yields products that fall within a legitimate category value range of 4.2. This indicates that the e-module is appropriate for use by fourth-grade primary school students.

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1. INTRODUCTION

Mathematics is a fundamental discipline that is crucial to acquire. It resembles routine tasks of everyday life. The significance of science and technology in both initial and subsequent advancements is crucial (Trisnawati, et al., 2018). Modern advancements in technology, such as social networking and online commerce platforms, employ statistical data to impact an individual's trustworthiness. According to Jacqueline (2019), the credibility of a social media account increases in proportion to the amount of its followers. Similarly, technological calculators that facilitate effortless calculations. Through the acquisition of mathematical proficiency, individuals can cultivate essential life skills that enable them to effectively address the challenges encountered in their daily existence. Mathematics is a discipline that is introduced in primary education and continues to be taught in higher education institutions. Nevertheless, mathematics continues to be perceived as challenging for kids to comprehend, hence school meetings alone are insufficient for pupils to grasp the subject matter. Furthermore, according to a review of academic literature, the majority of current educational resources are predominantly available in physical print format, which may be less engaging and repetitive for students (Laili et al., 2019; Pratiwi et al., 2016). The current e-module lacks the ability to assist students

in freely developing knowledge and exploring topics, which remains a significant drawback (Mentu, 2022). To summarise, mathematics plays a crucial role in our daily lives.

Teachers must possess the ability to adapt to the ever-evolving technological and informational advancements. The presence of technology is currently seen as highly significant in human existence, serving as a crucial tool in facilitating various job and educational endeavours (Kidi, 2016; Susanti, 2021). Students have the opportunity to engage in educational activities at their own individual speed and level of proficiency, as their abilities differ and can be assessed at any location and time. Consequently, electronic modules were created to address the aforementioned issues and engage pupils in the study of mathematics. Electronic modules are a structured collection of self-learning materials presented in an electronic format. These modules consist of interconnected learning units, which are accessed through navigation links. The modules enhance student engagement by incorporating video tutorials, animations, and audio to enhance the learning process (Febriyanti, 2019). E-modules are educational resources designed to facilitate the acquisition of abilities outlined in the curriculum (Laili et al., 2019). Essentially, the e-module facilitates students' comprehension of learning by allowing them to repeat it at any given time.

E-modules can be created with a range of applications, including Microsoft Sway 365. Sway 365, an application developed by Microsoft Office, enables users to gather, structure, disseminate ideas and narratives, and deliver web-based interactive canvases, as stated by the Education Information and Communication Technology Development Centre (BPTIKP) (Afrianti, 2022). Microsoft Sway 365 is a complimentary platform utilised for creating interactive digital instructional materials (Muflikatun, 2021). E-modules that utilise discovery learning are deemed appropriate for facilitating students' knowledge acquisition and independent concept exploration. Discovery learning enables students to independently uncover and develop their understanding of subjects, drawing upon their existing knowledge. Discovery learning is an instructional approach that empowers students to actively engage in teaching and learning activities, enabling them to utilise their cognitive processes to independently uncover and comprehend a subject or idea under study. The Guided Discovery learning model, as described by Lestari (2017), is a student-centered approach that emphasises direction, concept discovery, and critical thinking skills. Discovery learning is an instructional approach that emphasises the process of actively seeking and uncovering relevant knowledge during the learning process. The discovery learning process consists of several steps, including stimulation, problem identification, data collecting, data processing, verification, and generalisation (Hutapea, 2017). To summarise, discovery learning promotes self-directed learning in kids.

Prior studies on the utilisation of Microsoft Sway 365 for development purposes span from 2017 to 2021. Notably, Mahardani (2021) conducted a study on the creation of a Web Sway-based Interactive e-LKPD for Acid-Base material. The research findings confirmed the viability of this approach for testing. Moreover, the teacher's feedback and evaluations indicated that the produced e-LKPD was suitable and practical for testing on students. Based on the development process and study findings, it was determined that this e-LKPD is appropriate for utilisation as an e-module on Acids and Bases. Furthermore, Huda's (2017) investigation indicated that the limited test conducted at SMPN 10 Madiun achieved an excellent score, thereby confirming the suitability of the media. The following study conducted by Ceria et al. (2022) examines the research outcomes of an electronic e-module that has been constructed. The e-module is found to be valid, practical, and has the potential to produce significant effects. The expert review stage confirmed the validity of the e-module product. The validator concluded that the product was qualitatively valid in terms of content, design, language, e-module, and PMRI features.

This study describes the utilisation of a mathematics e-module implemented by Microsoft Sway 365 to engage students and foster their enthusiasm for learning mathematics. Its purpose is to address issues and facilitate the attainment of educational objectives for both teachers and students. Consequently, there was a notable improvement in the kids' mathematical proficiency. The achieved end results include of a discovery learning-based mathematics e-module created using Microsoft Sway

365. These results have been determined to be valid, practical, and successful in enhancing student learning outcomes. The research challenge revolves around developing a valid, practical, and effective e-module using Microsoft Sway 365 for discovery learning.

2. METHODS

The research's method is developmental research using a procedural model. The procedural model is a descriptive model that describes the procedural steps that must be followed to generate a product (Setyosari, 2016) and aims to produce products based on trials. The product developed in this developmental research is a mathematics e-module based on discovery learning.

2.1 Research Procedure

Research development uses the model developed by Tjeer Plomp where it consists of three stages, namely preliminary research, development or prototyping phase, and assessment phase (Plomp, et al., 2013).

The flow of developing mathematics e-module based on discovery learning using Microsoft Sway 365 can be seen in the following figure:

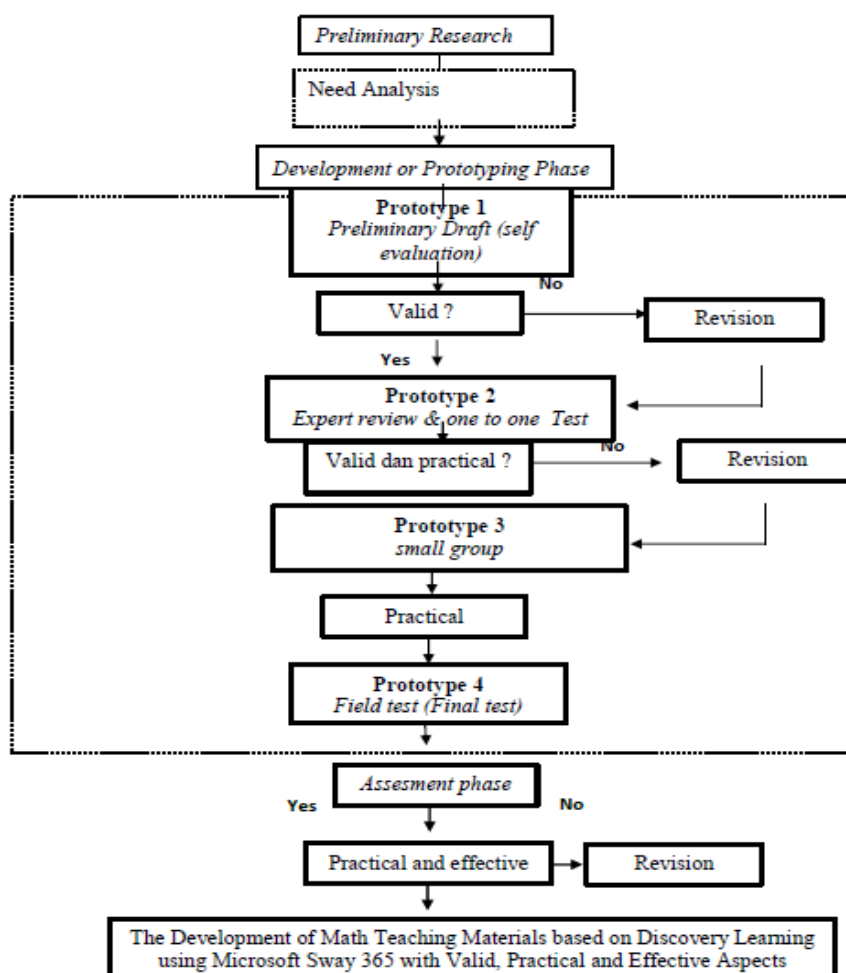


Figure 1. The development flow of the Plomp model modification

2.2 Data analysis technique

The essential thing in research is data analysis. Data from the analysis of e-module obtained were analyzed for all aspects presented. The validity data is the result of an assessment by an expert and the practicality sheet is the result of student and teacher responses. The validation and practicality sheets that have been filled in are then assessed using a Likert scale.

3. FINDINGS AND DISCUSSION

3.1 Validation of Material Experts

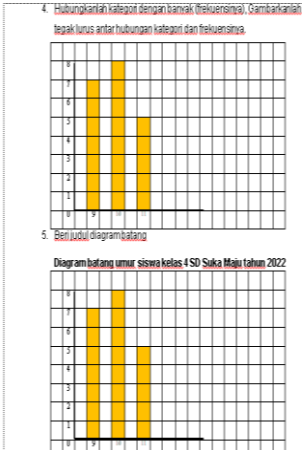
Based on the results of the researcher's discussions with the subject matter experts, there are suggestions that the validity questionnaire must have a clear descriptor, the order of substance of the material as a descriptor, and learning methods adapted to operational verbs (KKO). The validation of the feasibility aspect of the content by material experts is classified as a valid e-module category. In detail, the results of material validation can be seen in table 1 :

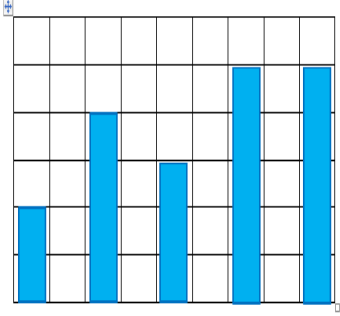
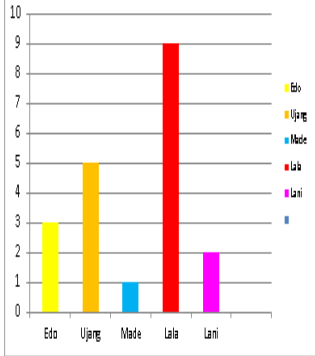
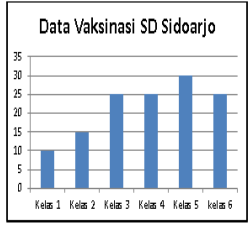
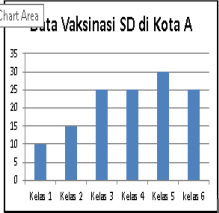
Table 1. Material validity test results.

Assessed aspect	Score	Category
Conformity of KI and KD	4	Valid
The truth of material substance	4	Valid
Conformity with the students' thinking level	5	Very Valid
Benefit	4	Valid
Conformity with moral and social values	5	Very Valid
Total Score		22
Average		4,4
Category		Very Valid

After conducting discussions with experts, the results of the consideration by the roots were then analyzed and improved according to criticism and suggestions.

Table 2. Product revision results.

Before revision	After revision
<p>Langkah-langkah membuat diagram batang</p> <ol style="list-style-type: none"> 1. Buatlah tabel untuk memudahkanmu m 2. Gambarkanlah dua buah garis yaitu garis x Garis mendatar sumbu x merupakan je Garis tegak lurus sumbu y menyatakan 3. Hubungkanlah kategori dengan banyak tegak lurus antar hubungan kategori da 4. Beri judul diagram batang 	 <p>Each step is presented with an image.</p>

<p>2. Buatlah garis vertical untuk barvak kategori!</p>  <p>3. Gambar yang kamu lengkapi ini di sebut diagram batang.</p>	
	
<p>Be careful of preposition</p>	<p>After revision: Preposition is separated when indicating a place: It becomes “<i>di atas</i>”, “<i>di bawah</i>”</p>
<p>Double writing of words like with</p>	<p>Writing one word with omitted</p>

3.2 One to one evaluation

According to the findings of the individual trial, the e-module was deemed to be practical for usage. Overall, students experienced increased motivation and improved comprehension of the material delivered through a discovery learning-based mathematics e-module utilising Microsoft Sway 365. The outcomes of students' empirical surveys on the utilisation of mathematics-oriented e-module discovery learning with Microsoft Sway 365.

Table 31. The results of one-to-one student practicality tests.

Assessed aspect	Number of statements	Total score	Average item score
Practical use	1	12	4,0
	2	12	4,0
	3	10	3,3
	4	15	5,0
	5	13	4,3
	6	12	4,0
Efficient	7	12	4,0
	8	12	4,0
	9	12	4,0
Attractiveness	10	14	4,7
	11	13	4,3

	12	11	3,7
	13	10	3,3
Total number		2122	52,7
Overall average			4,05
Category			Practical

The practicality assessment is also assessed by the teacher. In detail, the results of teacher practice in the one-to-one test can be seen below.

Table 4. The result of one-to-one teacher practicality tests

Assessed aspect	Number of statements	Total score	Average item score
Practical Use	1	4	4
	2	4	4
	3	4	4
	4	5	5
	5	5	5
	6	4	4
Efficient	7	4	4
	8	4	4
	9	4	4
Attractiveness	10	4	4
Category			Practical

Table 5. Continuation of one-to-one teacher practicality test results.

Assessed aspect	Number of statements	Total score	Average item score
	12	5	5
	13	4	4
	14	4	4
Total number		60	60
Overall average			4,29
Category			Practical

In detail, the results of the practicality of students in the small group test can be seen below:

Table 6. The results of the practicality test for small group test students.

Assessed aspect	Number of statements	Total score	Average item score
Practical use	1	24	4,0
	2	24	4,0
	3	21	3,5
	4	29	4,8
	5	25	4,2
	6	24	4,0
Efficient	7	22	3,7
	8	23	3,8
	9	24	4,0
	10	29	4,8
Attractiveness	11	26	4,3
	12	23	3,8
	13	19	3,2
Total number		158	52,7
Overall average			4,01
Category			Practical

Teacher practicality assessment of mathematics e-module at the small group test stage, namely by asking the class IV B homeroom teacher for help.

Table 7. The results of the teacher practicality test on the small group test

Assessed aspect	Number of statements	Total score	Average item score
Practical use	1	4	4
	2	4	4
	3	5	5
	4	5	5
	5	5	5
	6	4	4
Efficient	7	4	4
	8	5	5
	9	4	4
	10	4	4
Attractiveness	11	5	5
	12	5	5
	13	4	4
	14	4	4
Total number		62	62
Overall average			4.43
Category			Very Practical

3.3 Practicality

The results of student responses to the practical use of discovery learning-based mathematics e-module can be seen below:

Table 8. The results of the student practicality test in the field test.

Assessed aspect	Number	SD PM	SD KL	Total score	Average Items
Practical use	1	86	81	167	4,1
	2	83	80	163	4,0
	3	84	79	163	4,0
	4	88	78	166	4,0
	5	85	76	161	3,9
	6	87	73	160	3,9
Efficient	7	82	77	159	3,9
	8	86	73	159	3,9
	9	87	80	167	4,1
	10	89	81	170	4,1
Attractiveness	11	91	78	169	4,1
	12	83	80	163	4,0
	13	76	79	155	3,8
Total number				2122	51,8
Overall Average					3,98
Category					Practical

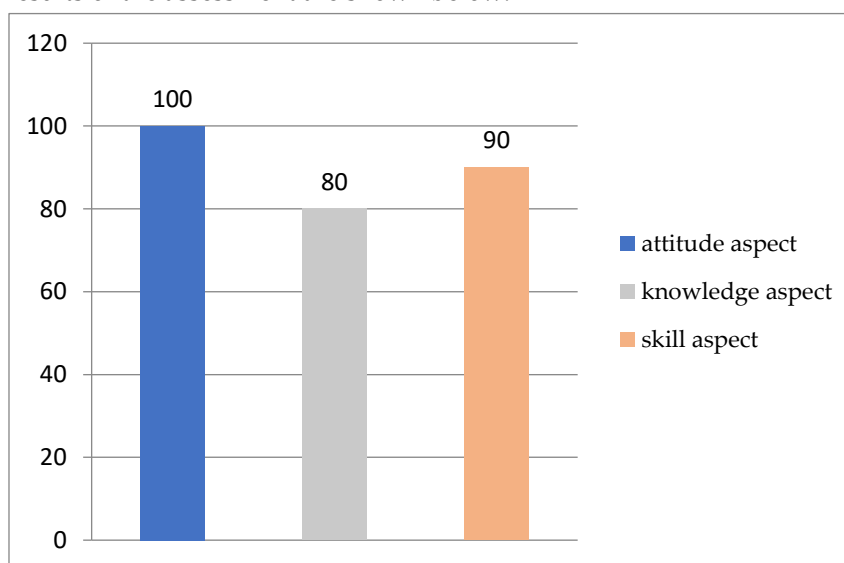
Assessment of teacher practicality at the field test stage was also carried out on the discovery learning-based mathematics e-module using Microsoft Sway 365, namely by asking the homeroom teacher for the research subject's help. The results of the teacher's response to the practical use of discovery learning-based mathematics e-module in detail can be seen in the following table 9:

Table 9. The results of the teachers' practicality test in the field test.

Assessed aspect	Number	SD PM	SD KL	Total score	Average items
Practical use	1	4	4	8	4
	2	4	4	8	4
	3	4	4	8	4
	4	5	5	10	5
	5	5	5	10	5
Efficient	6	4	4	8	4
	7	4	4	8	4
	8	4	4	8	4
Attractiveness	9	5	4	9	4,5
	10	4	4	8	4
	11	5	5	10	5
	12	5	5	10	5
	13	5	4	9	4,5
	14	4	4	8	4
Total number				122	61
Overall Average					4,36
Category					Very practical

3.4 Effectiveness

The effectiveness of discovery learning-based mathematics e-module using Microsoft Sway 365. The detailed results of the assessment are shown below:

**Figure 2.** Effectiveness results

Discussion

This study focuses on the achievement of research objectives, namely the validity, practicality and effectiveness of the product. The following is a description of the discussion in accordance with the findings of researchers at each research step.

Findings in the Preliminary Research Stage

The results of the preliminary study are important things that must be added to the basic idea of developing mathematics e-module Preliminary study results obtained through observation, questionnaires, interviews and literature. Regarding students' interest in learning mathematics, namely the motivation to learn mathematics is still low, learning outcomes in mathematics are still low,

students tend to feel mathematics as a subject that is difficult to understand. The results of this preliminary study are relevant to the results of research which state that students still perceive mathematics as a difficult and boring subject (Siregar, 2017; Amran et al., 2021). The finding of the analysis of e-module is that existing e-module do not help students in discovering and building mathematical concepts independently. Existing e-module still do not cause students to be active and less enjoyable learning. Discovery learning-based mathematics e-module in the implementation of learning required mathematics teaching materials that can help students build and discover concepts independently and in fun. Supporting the implementation of learning by using mathematics e-modules relevant to the discovery learning model because discovery learning-based mathematics e-modules can help students find concepts independently. The results of this preliminary study are relevant to the results of research which state that the discovery learning model is suitable for helping students build knowledge and helping students better find a concept for themselves (Desyandri et al., 2019; Ariyanto et al., 2019).

Regarding the preliminary study of student characteristics, 100% of students are able to use smartphones. Discovery learning-based mathematics e-module using Microsoft Sway 365 are relevant to student characteristics and relevant to the conditions of the student learning environment because mathematics e-module can attract attention and overcome student boredom in learning mathematics. The results of this preliminary study are relevant to the results of research which state the use of electronic devices in learning to facilitate the delivery of material and so that learning is not monotonous (Ramdani et al., 2021; Nurfadhillah et al., 2021). So, e-module is needed to help students learn independently.

Findings in the development or prototype phase

In the development or prototype phase, there are findings related to the results of validity and practicality tests of discovery learning-based mathematics e-module using Microsoft Sway 365. The results of the validity test of the validity test of e-module from the aspect of content feasibility assessment. From the results of this study the mathematics e-module obtained a value on the feasibility aspect of the content of 4.4, the results of the validity test of the linguistic aspect obtained a value of 4, the presentation aspect obtained a value of 4 and the results of the validity test of the graphic aspect obtained a value of 4. Of the four aspects, the average value of the validity of discovery learning-based mathematics e-module using Microsoft Sway 365 is 4.1 in the valid category. In general, the results of testing the validity of discovery learning-based mathematics e-module using Microsoft Sway 365 have valid criteria.

This shows that the mathematics e-module based on discovery learning using Microsoft Sway 365 has met the product development validity criteria. This also means that the mathematics e-module based on discovery learning using Microsoft Sway 365 are correct and suitable for use by fourth grade elementary school students. The practicality test was carried out at the one-to-one evaluation stage. The practicality test results show that the use of e-module can be used easily. In general, discovery learning-based mathematics e-modules using Microsoft Sway 365 have practical criteria. The practicality test was carried out at the small group evaluation stage. The practicality test results show that learning mathematics becomes more fun. By revising according to the comments and suggestions of students and teachers, discovery learning-based mathematics e-module using Microsoft Sway 365 are considered practical and appropriate for use in learning. This refers to the opinion (Akker et al., 2013), if the user views the product that is easy to use and can be useful in learning, then the product can be said to be practical.

The final stage of the practicality test of field test. At this stage, classical learning is carried out as a whole. The practicality test results from the teacher aspect generally have practical criteria. The highest achievement was in the practicality aspect of the use and attractiveness of discovery learning-based mathematics e-module using Microsoft Sway 365. This shows that the teacher assesses this e-module as helping him deliver learning material and attract students' interest in learning.

Meanwhile, from the aspect of students in general, they have practical criteria. The highest achievement was in the aspect of practical use and attractiveness. This shows that in general students find it useful and make it easy for them to learn subject matter and students like learning that uses Discovery Learning-based mathematics e-module using Microsoft Sway 365. If users view the product as easy to use and useful in learning, the product can be said to be practical (Akker, 2013; Gravemeijer et al., 2013).

The choice of Microsoft Sway 365 is due to its advantages in being able to insert various media in the form of images from various websites that provide free images, insert relevant learning videos from YouTube or from our own computer devices. The final step after we develop online learning materials for mathematics e-module based on discovery learning using Microsoft Sway 365 is to share the media. Share e-module that we have developed by providing the link or address of the Sway to students. Online learning materials for mathematics e-module based on discovery learning using Microsoft Sway 365 which were developed can be accessed by students through various devices such as smartphones, tablets and computers. In short, e-module is valid, and feasible to use by grade IV students.

Finding the stage of the assessment phase

Effectiveness can be seen from students' reactions towards the positive, the learning process is dynamic, students use knowledge and learning skills and student learning outcomes increase. The effectiveness test is the compatibility between the person carrying out the task and the intended target (Wahab, Junaedi, & Azhar, 2021). Achievement of learning outcomes in class with discovery learning-based mathematics e-module using Microsoft Sway 365 based on learning outcome data on aspects of attitudes, knowledge and skills. In general, the assessment of student attitudes during the implementation of learning using discovery learning-based mathematics e-module using Microsoft Sway 365 has very good criteria. In the aspect of knowledge, 80% of students experience increased learning outcomes. In the skill aspect, 90% of students have reached the standard mark or KKM. This shows that learning with discovery learning-based mathematics e-module using Microsoft Sway 365 can improve student learning outcomes. In other words, it can help students achieve learning goals. The results of this preliminary study are relevant to the results of research which states that discovery learning-based mathematics e-module using Microsoft Sway 365 is effective in improving student learning outcomes (Itsnaniyah & Lestyanto, 2021). In summary, this research produced practical and effective e-module.

4. CONCLUSION

After analysing the research and development of a discovery learning-based mathematics e-module using Microsoft Sway 365, it can be concluded that this study successfully created a product. The product is a discovery learning-based mathematics e-module for fourth-grade elementary school students. The module includes data presentation material in the form of a bar chart. The discovery learning-based mathematics e-module, developed using Microsoft Sway 365, has successfully passed the validation test stage and has been deemed suitable for usage by students and teachers as an alternative and diverse mathematics e-module for fourth-grade elementary school children. These e-modules facilitate comprehension of data diagram stems for both students and teachers, hence enhancing mathematics learning outcomes and enabling the attainment of learning objectives. The instructional influence in the creation of this e-module is restricted to learning outcomes, ensuring its applicability to a wide range of learning outcomes. Essentially, the next research aims to evaluate the efficacy of the e-module that utilises Microsoft Sway 365 for discovery-based learning, while considering other variables.

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