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Development of Visual Basic Application PPT Media Based on Cooperative Model Type of NHT to Increase Motivation and Mastery of Physics Concepts

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Abstract: This development research aims to create a product in the form of Power Point Visual Basic Application (PPT VBA) media based on the Numbered Heads Together (NHT) cooperative model on valid, practical, and effective business and energy materials, so that it can be used to measure motivation and mastery of concepts. students at school. The type of research used is research and development (Research & Development) with the ADDIE model, namely analysis, design, development, implementation, and evaluation. Data collection techniques were obtained from the results of filling out the validation sheet by 6 validators, namely 3 expert validators and 3 practitioner validators using a Likert scale. Practicality is obtained from the results of student response questionnaires. Effectiveness was obtained from a learning motivation questionnaire and a concept mastery test. Validity is obtained from the results of the validity assessment by expert validators and practitioners, namely 84% and 89%, respectively, with very valid categories. Practicality is obtained from the results of the student response questionnaire with an average value of 99.45% in the very practical category and gets a positive response. The effectiveness is obtained from the results of the motivation questionnaire after learning with an average value of 71.09% in the high category and the results of the concept mastery test calculated using N-Gain getting an average value of 0.59 in the medium category. So that it can be concluded, the development of PPT Visual Basic Application media based on the cooperative model of the NHT type is valid, practical, and effective to increase learning motivation and mastery of students' concepts on business and energy materials in school learning.

Keywords: Development; PPT VBA Media; Cooperative Type NHT; Learning Motivation; Concept Mastery

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Introduction

Education is the need of every individual and as one aspect of life that plays an important role. A country can achieve progress if the education in that country is of good quality. Education, especially in Indonesia, is carried out in various ways. One of the efforts taken to improve the quality of education is by improving the quality of learning in schools, which can be done by improving the quality of teachers and learning facilities and infrastructure.

Teachers play a role in improving the quality of education, where teachers will interact directly with students in learning in the classroom. It is through this

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process of learning and teaching that the establishment of quality education begins. Likewise, with the facilities and infrastructure in learning. Facilities and infrastructure are needed to support the learning process so that students are more facilitated in learning. One of them is the need for appropriate learning media during the learning process. According to Arsyad (2006), using instructional media in the teaching and learning process can generate desires, new interests, motivation, and stimulation of learning activities, as well as bring psychological effects on students.

Based on the results of interviews with physics teachers and students of class X MIA 5 at SMAN 2 Kota Bima, namely, teachers apply direct learning models with learning methods such as questions and answers and lectures using blackboard media to write practice questions and PowerPoint media to deliver solid physics material. However, students assume that the PowerPoint media used in physics learning is not effective, because it only contains the text. As a result, students assume that physics lessons are difficult and unpleasant because many formulas are memorized. Thus, learning motivation and mastery of physics concepts are not good enough. Therefore, innovation is needed in the use of learning media,

One of the efforts to improve the quality of learning in terms of teachers in addition to learning media is to change the learning model and method. One of the models that can be used to overcome the above problems is the Numbered Heads Together (NHT) cooperative learning model. The Numbered Heads Together (NHT) learning model is a systematic group work learning model, where students are trained in individual responsibility, the interaction between peers, and collaboration skills, and students spend most of their time in class working together in a group. Each student will be given a number for each group in this lesson. This technique provides opportunities for students to share ideas with each other, consider the most appropriate answers,

The NHT learning model involves students actively studying the material covered in a lesson. This NHT learning model emphasizes the activeness of students towards patterns of social interaction through group work, so that teachers can stimulate student activity through groups. students can increase (Astutik, 2016).

The NHT type of cooperative learning model is one of the cooperative learning models that emphasizes special structures designed to influence the interaction patterns of students with the aim of increasing academic mastery. The application of NHT learning has a greater interaction between students and other students than the interaction between students and teachers. Thus, students who feel they are not able and are afraid to ask questions become brave enough to ask because what they are facing is their own friend. Thus, students will be motivated to learn and become more understanding (Susanti, 2016).

Learning motivation has a big influence on students' mastery of concepts, because if the material being studied is not in accordance with the motivation of students, then students will not learn optimally. If the motivation of students is high then the mastery of the concepts, they have will also be high, and vice versa if the motivation to learn is low, the mastery of the concepts they have will also be low (Sardiman, 2007). In physics students are required to be able to understand existing concepts, understanding the concepts embedded in students will help in understanding and solving problems, or solving problems they face in life.

Based on the description presented, therefore the researcher intends to develop PPT Visual Basic Application media based on the NHT cooperative model to increase motivation and mastery of physics concepts for high school students.

METHOD

The type of research used in this research is the Research and Development (R&D) method using the ADDIE model which consists of 5 stages, namely analysis, design, development, implementation and evaluation. evaluate). At the analysis stage, needs analysis, student analysis, and task analysis are carried out. At the design stage, media device selection, format selection, initial design of learning media are carried out. The development stage is carried out to develop and validate Visual Basic Application PPT media. Validation was carried out by three expert validators and three practitioner validators. In the implementation phase, a trial of PPT Visual Basic Application media was conducted in teaching and learning activities.

This research was conducted at SMAN 2 Bima City with the research subject being students of class X MIA 5 for the academic year 2021/2022. Data was collected by providing validation sheets, student response questionnaires, motivation questionnaires, and concept mastery tests. The validation sheet is used to determine the validity of the PPT VBA media given to expert validators, namely lecturers of Physics Education at the University of Mataram and practitioner validators from teachers who teach physics subjects at SMAN 2 Kota Bima. The response questionnaire was used to determine the practicality of PPT VBA media. Motivation questionnaires and concept mastery tests were used to determine the effectiveness of PPT VBA media.

The types of data in this study are qualitative data and quantitative data. Qualitative data were obtained from the results of expert validation and practitioner

validation in the form of suggestions or comments as material for revision of the developed PPT VBA media. Quantitative data were obtained from the results of expert validation and practitioner validation using a Likert scale of 1 to 4, where 1 = not good, 2 = quite good, 3 = good, and 4 = very good. The formula used to calculate the validity of the PPT VBA media is as follows:

$$Validitas\ (V) = \frac{Total\ skor}{Skor\ maksimum} \times 100\% \quad (1)$$

The assessment score data obtained is then converted into the validity criteria of the PPT VBA media as presented in Table 1.

Table 1. Visual Basic Application PPT Validity Criteria

Percentage	Criteria
< 21%	Very Invalid
21 – 40%	Invalid
41 – 60%	Quite Valid
61 – 80%	Valid
81 – 100%	Very Valid

(Arikunto, 2009)

Analysis of the practicality of PPT VBA media was carried out by analyzing student responses to learning using PPT VBA. Student response data in the form of a response questionnaire with a scale of 1 to 4, where 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. Scales 1 and 2 indicate a negative response and scales 3 and 4 indicate a positive response (Hobri, 2010). The formula used to calculate the practicality of PPT VBA media is as follows:

$$\%Respon = \frac{jumlah\ yang\ memberikan\ respon\ positif}{jumlah\ yang\ mengisi\ angket} \times 100\% \quad (2)$$

The assessment score data obtained is then converted into practicality criteria for PPT VBA media as presented in Table 2.

Table 2. PPT VBA Practicality Criteria

Percentage	Criteria
81 – 100%	Very Practical
61 – 80%	Practical
41 – 60%	Practical enough
21 – 40%	Less Practical
≤ 20%	Very Less Practical

(Arikunto, 2010)

Media effectiveness analysisPPT VBA is done by analyzing learning motivation and concept mastery test. Analysis of students' learning motivation towards learning uses a cooperative model of the NHT type on business and energy materials. Student motivation data in the form of a learning motivation questionnaire after learning with a scale of 1 to 4, where 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. The formula used to calculate the results of the learning motivation questionnaire uses the frequency distribution formula 2 (Pradilasari, 2019).

$$P = \frac{f}{N} \times 10 \quad (2)$$

The assessment score data obtained was then converted using a standard value of 100 as presented in Table 3.

Table 3. Learning Motivation Questionnaire Criteria

Percentage	Criteria
20 – 36%	Very low
37 – 52%	Low
53 – 68%	Currently
69 – 84%	Tall
85 – 100%	Very high

(Hendrayana, 2014)

Besides that, the concept mastery test was analyzed using the results of the pre-test and post-test. The formula used to calculate the results of the concept mastery test uses the N-Gain formula (Hake, 1998) as follows:

$$N - Gain\ = \frac{\overline{x}_{posttes} - \overline{x}_{pretest}}{skor\ ideal - \overline{x}_{pretest}} \quad (3)$$

The standard gain value obtained from the calculation results is then categorized according to Table 4.

Table 4. N-Gain Score Criteria

Value <g>	Criteria
$0{,}00 < g < 0{,}030$	Low
$0{,}30 < g < 0{,}70$	Currently
$0{,}70 < g < 1{,}0$	Tall

(Sundayana, 2015)

Results and Discussion

Research result

At the analysis stage (analyze) is the initial stage which aims to determine and define the terms of learning. At this stage, it begins with a need's analysis carried out by distributing interview sheets to physics teachers and students of class X MIA 5 at SMAN 2 Bima City, which can be seen in Appendix 24 and Appendix 25. Based on the results of the interview sheets for physics teachers and students, it can be seen that The lack of motivation and mastery of students' concepts is caused by students feeling that physics lessons are not fun and difficult to understand because many formulas are memorized, resulting in students not actively asking questions related to physics concepts that are still poorly understood when physics learning takes place. Teachers more often use direct learning models that are less active for students. Direct learning methods that are often used by teachers are questions and answers and lectures assisted by power point media which contain only text.

Teachers are more comfortable doing learning and teaching activities using power point media because it is easy and simple to deliver solid physics material. From this situation, the researcher suspects that the cause of the lack of motivation and mastery of students' concepts is caused by the lack of learning supporting factors that can attract the attention of students. So, from the facts obtained, it is necessary to develop learning models and media that can increase students' motivation and mastery of physics concepts. Direct learning methods that are often used by teachers are questions and answers and lectures assisted by power point media which contain only text.

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Analysis of students, entering the formal operational stage. According to Piaget's theory of cognition, students are able to think conceptually and think hypothetically so that students at this stage are able to build their own thinking concepts based on the things they receive. Based on this, the developed media needs to be designed so that it is able to provide opportunities for students to explore the material independently with the help of teachers who act as mentors and facilitators. Students today are also students who are growing in the rapid development of technology, so that they do very intensive interaction with the media.

In addition, students have the ability to quickly adapt to the use of technological products. The characteristics of such students require teachers to make innovations in learning, one of which is the development of learning mediaPPT VBA. Task analysis aims to determine the content of the subject matter that will be included and achieved according to the core competencies, basic competencies, and indicators used by SMAN 2 Kota Bima. The material developed in this research is Business and Energy KD 3.9 and KD 4.9.

The design stage is carried out by selecting the media devices that will be used in the development of visual basic power point applications for business and energy materials, media formatsPPT VBAmade based on the results of interviews with physics teachers at SMAN 2 Kota Bima in accordance with the material and character of high school students who have entered their teens, and the initial design of the mediaPPT VBAmade for visualization of learning media.

The development stage, aims to develop mediaPPT VBAbased on NHT type cooperative model on work and energy matter.PPT VBAdeveloped and then validated. The visual basic application PPT media validation stage aims to determine the validity of the learning media carried out by 3 expert validators and 3 practitioner validators. As for the results of the validity of the mediaPPT VBAby the validator as follows.

Table 5. Results of PPT VBA Media Validation Analysis by Expert Validators

No	Expert validation	Scoring scores by expert validators			Amount	Average	Category
		V1	V2	V3			
1	Media expert	95%	86%	71%	252%	84%	Very valid
2	Material expert	95%	88%	70%	253%	84%	Very valid
3	Linguist	92%	87%	70%	249%	83%	Very valid
Average percentage						84%	Very valid

Table 6. Results of PPT VBA Media Validation Analysis by Practitioner Validators

No	Expert validation	Scoring scores by expert validators			Amount	Average	Category
		V1	V2	V3			
1	Media expert	89%	89%	92%	270%	90%	Very valid
2	Material expert	84%	91%	89%	264%	88%	Very valid
3	Linguist	90%	88%	88%	266%	89%	Very valid
Average percentage						89%	Very valid

Based on Table 5 and Table 6, shows the results of the media validity assessmentPPT VBAby expert validators and practitioner validators by 84% with a very valid category and the value of validity by a practitioner validator by 89% with a very valid category. This indicates that the mediaPPT VBA developed can be said to be valid to be applied in school learning.

The implementation stage is the stage where the mediaPPT VBA which has been developed and validated, then tested in teaching and learning activities involving students of class X MIA 5 as research subjects. The results at the implementation stage are the results of the practicality of the PPT VBA media by providing student response questionnaires, and the effective results in the form of learning motivation questionnaires and students' concept mastery tests. The practical results of the student response questionnaires are as follows:

Table 7. Practical Analysis Results from Student Response Questionnaires

No	Rated aspect	SS	S	TS	STS
1	The material in the PowerPoint media is complete and simple	78.26%	21.74%	-	-
2	KD and learning indicators are clearly formulated in PowerPoint media	73.91%	26.09%	-	-
3	Learning objectives are clearly formulated in PowerPoint media	82.60%	17.4%	-	-
4	Text or sentences in PowerPoint media are easy to understand	60.86%	39.14%	-	-
5	Sentences in PowerPoint using effective sentences	56.52%	43.48%	-	-
6	Use of language in PowerPoint according to EYD	43.47%	52.17%	4.36%	-
7	The writing of the formula is very clear	65.21%	30.43%	4.36%	-
8	The material presented is equipped with sample questions and practice questions	69.56%	30.44%		-
9	Examples of questions using formal language that are clear and easy to understand	82.60%	17.4%		-
10	Practice questions using formal language that is clear and easy to understand	69.56%	26.08%	4.36%	-
11	Instructions for easy-to-understand questions	69.56%	30.44%	-	-
12	Presenting material in order so that it is easy to understand	34.78%	65.22%	-	-
13	Presenting attractive and proportional images, animations, videos, and audio	78.26%	21.74%	-	-
14	Powerpoint media slide design is very interesting	60.86%	39.14%	-	-
15	The choice of colors for writing, pictures, and formulas is very precise	73.91%	26.09%	-	-
16	The selection of font size and typeface is clear and easy to read	73.91%	26.09%	-	-
17	This media display is eye-catching	78.26%	21.74%	-	-
18	The placement of the buttons in the PowerPoint media is also in accordance with the background design	68.56%	31.44%	-	-
19	The animations are simple and provide additional explanations that help in understanding the material	60.86%	39.14%	-	-
20	VBA PowerPoint media can increase motivation to learn physics	95.65%	4.35%	-	-
21	VBA PowerPoint media can improve mastery of concepts in business and energy materials	82.60%	17.4%	-	-
22	Menus and buttons can be used easily and effectively	73.91%	26.09%	-	-
23	Easy to operate VBA PowerPoint media	86.95%	13.05%	-	-
24	Programs can be opened and closed easily	82.60%	17.4%	-	-
Response Percentage		71.15%	28.31%	4.36%	-
Average Percentage of Response					99.45%
Criteria					Very Practical

Based on Table 7, it shows the results of students' responses to the mediaPPT VBAof 99.45% with a very practical category. This indicates that the mediaPPT VBA developed can be said to be practical to be applied in learning physics at school.

In addition, the results of the student motivation questionnaire were distributed to 23 students of class X

MIA 5, totaling 23 people. The results of the questionnaire on students' learning motivation after learning using PPT VBA are as follows:

Table 8. Results of the Effectiveness Analysis of the Learning Motivation Questionnaire

No	Statement	Percentage of motivation %	Category
1	I actively pay attention to the teacher's explanation in learning activities	82%	Tall
2	When the material is difficult, I rarely pay attention to the teacher when teaching	70%	Tall
3	I always try to complete the task as best as possible	91%	Very high
4	I rarely ask teachers or friends about material that I don't understand	65%	Currently
5	I'm not enthusiastic about taking physics lessons	60%	Currently
6	I always repeat the lessons given by the teacher at home	68%	Currently
7	I study physics only during physics lessons at school	51%	Low
8	When I don't understand the material, I look for references in other books and ask the teacher and friends	88%	Very high
9	I usually look for answers on the internet and the answers I find I review	86%	Very high
10	I usually look for answers on the internet and the answers I find I write down	68%	Currently
11	I can mention the application of physics concepts in everyday life	80%	Tall
12	I have difficulty understanding the concept of physics and its application in everyday life	77%	Tall
13	I always defend my opinion by stating a clear reason	77%	Tall
14	I often don't believe in myself when defending my opinion in front of other friends	66%	Currently
15	I try to do the task to the best of my ability	76%	Tall
16	I prefer to work on group assignments	70%	Tall
17	I always try to pay attention to the teacher when teaching even when I'm sleepy	74%	Tall
18	When the material feels boring and I don't understand, I choose to do something else	64%	Currently
19	I always do the assigned tasks on time	78%	Tall
20	I'm doing my schoolwork when it's going to be collected	50%	Low
Average percentage			71.09%
Category			Tall

Based on Table 8, shows the results of students' learning motivation using mediaPPT VBAof 71.09% in the high category. This indicates that the mediaPPT VBAdeveloped can be said to be effective to be applied in learning physics at school. The results of the concept mastery test are calculated using N-Gain as follows:

Table 9.X MIA 5 Student Concept Mastery Test Results

$\bar{X}$ $Pre-Test$	$\bar{X}$ $Post-Test$	$\bar{X}$ $N-gain$	Category
22.6	64.8	0.55	Currently

Based on Table 9, it can be seen that the average pre-test score obtained by 23 students in class X MIA 5 is 23.6, the post-test score is 64.8, and the N-Gain value of concept mastery obtained based on calculations is 0.55. Based on Table 4 criteria for normalized N-Gain, the N-Gain value of 0.55 is in the medium category. The results of the calculation of the N-Gain test of students' conceptual mastery per indicator are as follows:

Table 10.N-Gain Test Results Per-Indicator Concept Mastery

Concept Mastery Indicator	$\bar{X}$ *Pre-test*	$\bar{X}$ *Post-test*	$\bar{X}$ N-Gain	Category
Remembering (C1)	4.17	12.52	0.73	Tall
Understanding (C2)	4.17	11.13	0.67	Currently
Apply (C3)	4.72	12.35	0.74	Tall
Analyze (C4)	5.04	14.08	0.83	Tall
Evaluate (C5)	2.08	7.82	0.43	Currently
Create (C6)	2.43	6.96	0.41	Currently
Average				0.63
Category				Currently

Based on Table 10, the results of the calculation of the N-Gain test for mastery of the concepts of students per indicator are seen from 6 indicators, namely, remembering (C1) is 0.73, understanding (C2) is 0.67, applying (C3) is 0.74, analyzing (C4) is 0.83, evaluates (C5) of 0.43, and creates (C6) of 0.41. It can be concluded

that students' mastery of concepts is included in the medium category with an average N-Gain value of 0.63. The specifications for the acquisition of increasing mastery of concepts for students of class X MIA 5 which are classified into categories, high, medium, and low along with their percentages can be seen in Table 11 below

Table 11. Category Percentage Mastery of Student Concept X MIA 5

N-Gain Value	Category	Number of Students	Percentage
$0{,}00 < g < 0{,}030$	Low	0	0%
$0{,}30 < g < 0{,}70$	Currently	17	73.91%
$0{,}70 < g < 1{,}0$	Tall	6	26.09%

Based on Table 11 above, it shows the percentage of students per category of concept mastery. In the medium category there are 17 students with a percentage of 73.91%, and in the high category there are 6 students with a percentage of 26.09%. The calculation is obtained from the calculation of N-Gain for each student. This indicates that the mediaPPT VBAthat developed can be said to be effective to be applied in learning physics on work and energy materials at school.

The evaluation stage (evaluate), aims to make every revised activity even better. The stages evaluated are the analysis stage, the design stage, the development stage, the implementation stage, and the evaluation stage. At the analysis stage, a strong analysis is needed so that it can analyze the problem and can conclude well and can offer the right solution.

Discussion

Based on Tables 5 and 6, it can be seen that the calculation of the average percentage of validation carried out by expert validators is 84% with a very valid category. The average percentage of validation carried out by practitioner validators as material experts is 89% with a very valid category. This shows that the mediaPPT VBAdeveloped by researchers are in the very valid category and can be used or applied in school learning. According to Nurfillaili (2016), learning media is said to be valid if the results are in accordance with predetermined categories. Therefore, the learning media is said to be valid if the results of the analysis are in accordance with the categories that have been determined in Table 1.

Media practicalityPPT VBAobtained from a questionnaire of student responses to learning while being taught using mediaPPT VBAdeveloped. The response questionnaire was given to 18 students of class X MIA 5 consisting of 24 questions and calculated using a Likert scale. The results of the Likert scale calculation show that the average value of the percentage of student responses to the learning activities carried out is 99.45% and is classified into the very practical category.

This shows that the use of mediaPPT VBAon learning activities with the application of the NHT type cooperative-based model get a very positive response from students. This is in line with previous research conducted by Sari (2020) which concluded that the use of learning mediaPPT VBAshows a very valid category obtained from the average student response of 90.6%.

Media effectivenessPPT VBABased on the NHT cooperative model developed by researchers, it can be seen from the increase in learning motivation and mastery of students' concepts. Learning motivation questionnaires were distributed to 23 students of class X MIA 5 after learning using Visual Basic Application PPT media consisting of 20 questions and calculated using a Likert scale. The results of the Likert scale calculation show that the average value of the percentage of students' learning motivation towards the learning activities carried out is 71.09% and is classified into the high or very effective category. The highest score was obtained in statement number 3 by 91% with the statement "I always try to complete the task as best as possible" and the lowest score was obtained in statement number 20 by 50% with the statement "I do my schoolwork when it will be collected". From the results of the average percentage of learning motivation, it can be seen that there is an increase in students' learning motivation in business and energy materials after learning using mediaPPT VBAbased on the NHT-type cooperative model.

In addition, the results of students' mastery of concepts can be seen from the results of the pretest and posttest tests given to students in the form of 25 multiple choice questions. Pretest is done before learning and posttest is done after learning using mediaPPT VBAbased on the NHT-type cooperative model. The results of students' mastery of concepts can be seen in Table 9 which shows an average pretest score of 22.6 and a posttest score of 64.8. After the pretest and posttest scores were obtained, then an analysis of the increase in students' conceptual mastery was carried out using the N-Gain test. From these calculations, the average value of the N-Gain test is 0.55 in the medium category.

The results of the N-Gain test of students' conceptual mastery per-indicator contained in Table 10 were obtained after the calculations were carried out. There are six indicators of students' mastery of concepts, namely, remembering (C1) of 0.73, understanding (C2) of 0.67, applying (C3) of 0.74, analyzing (C4) of 0.83, evaluating (C5) of 0.43, and creating (C6) of 0.41. It can be concluded that students' mastery of concepts is included in the medium category with an average N-Gain value of 0.63. Furthermore, the percentage of students' mastery of concepts is categorised in Table 11.

Where there are three categories, namely low, medium, and high. In the low category there are no students, in the medium category there are 17 students with a percentage of 73.91%, and the high category there are 6 students with a percentage of 26.09%. From the data above, it shows that the mastery of students' concepts has increased. Based on the category and the average N-Gain results obtained, it shows that the use of mediaPPT VBANHT-based cooperative model is proven to be effective in increasing students' mastery of concepts

Conclusion

Based on the results of research and discussion, it was found that the validity results for the mediaPPT VBAbased on the NHT cooperative model to increase students' motivation and mastery of concepts in the developed business and energy material, it was proven to be in the valid category with an average of 84% and 89%, respectively. Practical results for mediaPPT VBAbased on the NHT cooperative model to increase students' motivation and mastery of concepts in the developed business and energy materials, it was proven in the practical category with an average of 99.45%. Effectiveness results for mediaPPT VBAbased on the NHT cooperative model to increase students' motivation and mastery of concepts in the developed business and energy materials, it is proven in the effective category with an average learning motivation of 71.09% in the high category and the concept mastery test of 0.55 in the medium category. As for suggestions for further research, it is necessary to develop mediaPPT VBAon other materials so that the resulting media can be used as an alternative learning source in learning that is able to attract the interest of students.

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