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# HTML5 package media: How does it affect junior high school students' concept understanding and self-efficacy?

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**Abstract**

**Background:** HTML5 Package media, equipped with features and displays, provides a clearer visual display in learning geometry compared to traditional lecture-based teaching. This approach facilitates students in observing and understanding geometry concepts, positively impacting their self-efficacy.
**Aim:** The study aims to assess the impact of HTML5 packages on students' understanding of geometry concepts and their self-efficacy.
**Method:** The research, a quasi-experimental study, used simple random sampling to select 63 students. Data were collected through tests and questionnaires, and the analysis was conducted using MANOVA.
**Result:** The findings reveal a significant effect of the HTML5 Package on both concept understanding and self-efficacy. The experimental group scored higher than the conventional group, with significant values in Pilae Trace, Wilk Lambda, Hotelling Trace, and Roy's Largest Root analyses.
**Conclusion:** The HTML5 Package media effectively enhances the understanding of geometry concepts and self-efficacy among students. While the effect size is modest, it is notably better than conventional learning methods. The study suggests broader application and research involving more students and diverse mathematical topics could yield more influential results.

## INTRODUCTION

Mathematics is the science of logic about form, structure, magnitude, and concepts related to one another, a large number of which are divided into three fields, namely algebra, analysis, and geometry (Supriyati et al., 2019; Wahyusukma, 2022). The concepts in mathematics are interrelated between one subject matter and another. Therefore, students are required to understand the concepts of a subject in order to solve mathematical problems (Ritonga & Azis, 2022; Que et al., 2022). One important aspect of learning mathematics is how students understand mathematical concepts (Artika, 2023; Utami et al., 2022), because by understanding concepts, one can solve problems in a better way (Batubara, 2019). In solving problems, there are rules based on concepts and ideas to understand the mental representation of an object, process, or opinion. But in reality, students' understanding of mathematics concepts is still low (Aprilianti & Zanthy, 2019; Dini et al., 2018). Students' concept understanding of mathematics is low because many students think that mathematics is only full of formulas and abstracts. This

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is because teachers only explain conventionally without showing forms of mathematical applications in everyday life (Rahman et al., 2018).

This difficulty also occurs at one of the government junior high schools in North Sumatra Province, which still uses conventional methods and very rarely uses media when teaching in class. So that students often feel bored when the lesson takes place. This results in many students not understanding the material presented by the teacher. The use of technology such as mobile phones or laptops is rarely used in the teaching and learning process. Students' understanding of mathematics concepts at one of the government junior high schools in North Sumatra Province tends to be low, so students are reluctant to ask questions if there are concepts that have not been understood and are reluctant to answer questions for fear of being wrong. Another thing that is found is that students find it difficult to understand the concepts in learning mathematics, especially in geometry material. In the geometry subject, many students do not understand the concept because they find it difficult to imagine the real form or visual image of the subject matter described. Whereas geometry is one of the important aspects of learning mathematics that must be understood by students because the concept of geometry is closely related to the context of everyday life (Kozlowski et al., 2019).

Therefore, this problem needs to be resolved in terms of how teachers instill understanding of mathematical concepts that lead to the growth of students' self-efficacy (Waluya, 2020; Rich et al., 2017). Based on previous research, there are several factors that cause low student understanding, including learning delivered by teachers that is less interactive (Noverdika, 2021; Sakinah & Effendi, 2021); teachers do not use learning media during the learning process, so student understanding is still low (Novitasari, 2016; Suweken, 2013). Teachers have difficulty using the media available at school, and teachers have difficulty finding the right method to present active and creative learning (Anggraini, 2021; Utami & Dewi, 2020). In addition, teachers lacked in directing and motivating students to relate existing problems to everyday life and bring up creative ideas, managing the class, and providing a supportive learning atmosphere for students.

One of the solutions offered is the use of interactive media, because the function of the media is very dynamic in learning. Teachers need to pay attention to media utilization in every learning activity (Kuo, 2016). Therefore, teachers need to learn how to determine learning media in order to streamline the achievement of learning objectives during the learning process. Within the scope of the school, the teacher acts as a communicator (messenger) and the students as communicants (message recipients). Learning media are needed by teachers to help the teaching and learning process at school. Media makes it easier for students to understand what is explained by the teacher (Moghavvemi et al., 2018). Currently, students have a low interest in learning mathematics because it is boring. So interactive learning media are needed so that students are more happy when learning mathematics. The use of learning media in schools is rarely used by teachers because it is considered difficult when making it. Whereas interactive learning media can encourage students to understand the concept of the material being taught.

One of the interactive learning media that can be used in the learning process is the HTML5 Package, commonly called H5P. H5P is an interactive learning medium in which there are several interactive contents such as interactive videos, drag-and-drop, fill-in-the blank and evaluation of the material explained (Addhiny, 2021). So, with this interactive medium, it is hoped that students will easily understand the concepts of mathematics subject matter. The

media used in H5P can be in the form of images, videos, ppts, games, quizzes, and others, so that H5P is able to become a much more interesting and easy learning medium so that users are able to capture and understand every piece of content in the material provided. Learning media is everything that is used to channel messages (learning materials) that can stimulate students' attention, interests, thoughts, and feelings in teaching and learning activities so as to achieve learning objectives (Thamrin, 2017). One of the characteristics of individuals who have high self-efficacy is having an interest in doing activities.

The use of technology can support the learning process if supervised by the teacher (Patrick & Middleton, 2023). In the learning process, mobile phones can have a positive impact on students, such as interactive learning media that can be accessed through mobile phones by students. However, this, of course, must be supervised by the teacher. Interactive learning media can influence learning activities in the classroom to be more fun. If students feel happy while learning, it can increase their' understanding of the material presented by the teacher. The use of learning media can foster students' interest in learning new things in the learning material delivered by the teacher so that it can be easily understood. Learning media that are interesting for students can be a stimulus for them in the learning process. Students need to be equipped with powerful interactive learning media so that they are able to observe, explore, and discover concepts in learning. Interactive media is precisely able to distinguish the relationship between the elements of an object. Interactive media is categorized as constructivistic media, which consists of learning media, learners, and the learning process. Interactive media is a medium that combines several elements, such as text, graphics, images, photos, audio, video, and animation, that are integrated with each other. Interactive learning multimedia can help teachers innovate in designing learning so that the learning process is more interesting and interactive.

Learning mathematics, especially geometry, needs to be combined with interactive media to help students explore and investigate geometry material. Dynamic interactive learning media are very important to use so that students can visualize various geometric objects and abstract concepts. This will affect students' confidence in doing math problems related to geometry. Through H5P interactive content, abstract concepts in geometry can be visualized in a more tangible form, so studying and analyzing geometry concepts is expected to be easier. Not only that, this learning medium also provides an evaluation of the material taught, and there are discussions that will make it easier for students to understand the material quickly.

Geometry material is one of the most important materials to master because the benefits are very attached to everyday life. There are at least three benefits to mastering geometry, namely that students can clearly describe, classify, and understand the relationship between the types of two-dimensional and three-dimensional shapes using their definitions and properties. Secondly, understanding the relationship between angle, side length, perimeter, area, and volume of the same shape. Third, make and criticize inductive and deductive arguments about geometry ideas and relationships, such as congruence, similarity, and the Pythagorean relationship. But the reality in the research location is that the low understanding of student concepts in geometry material causes students to lack confidence in dealing with mathematical problems presented by the teacher. This will have an impact on the low knowledge, attitudes, and skills of students in learning geometry.

Therefore, research is important to do with the aim of knowing the effect of HTML5 Package (H5P) interactive learning media on students' concept understanding and self-efficacy

and how much influence the HTML media has. The general objective is that with the interactive learning media HTML5 Package (H5P), it is hoped that the student learning process will be more varied and not monotonous. And students can easily understand the material being taught. For teachers, it is useful as a reference for interactive learning media for mathematics, so that there are more choices in making learning media.

## METHODS

### *Design:*

This research was a quasi-experiment in which two groups were given different treatments. The experimental group was taught to learn by using HTML5 package media for geometry. While the control group was given conventional learning or teaching that is usually applied by teachers in the classroom, This study uses a post-only control group design. The design of this experiment is as follows in Figure 1.

| Group | Treatment | Result |
|---|---|---|
| Experiment | X | $O_1$ |
| Control | - | $O_2$ |

**Figure 1.** Posttest Only Control Group Design

Note:
X = The treatment is the implementation of learning by using HTML5 Package Media
$O_1$ = Posttest scores in the experimental group
$O_2$ = Posttest scores in the control group.

The goal is that during the experiment the researcher can control all variables that will affect the implementation of the experiment. This design has a control group, but cannot function fully to control outside variables that affect the implementation of the experiment, each class is only given a posttest. the experimental class will be given H5P (HTML5 Package) learning media while the control class will be given conventional learning. The research flow can be seen in figure 2.

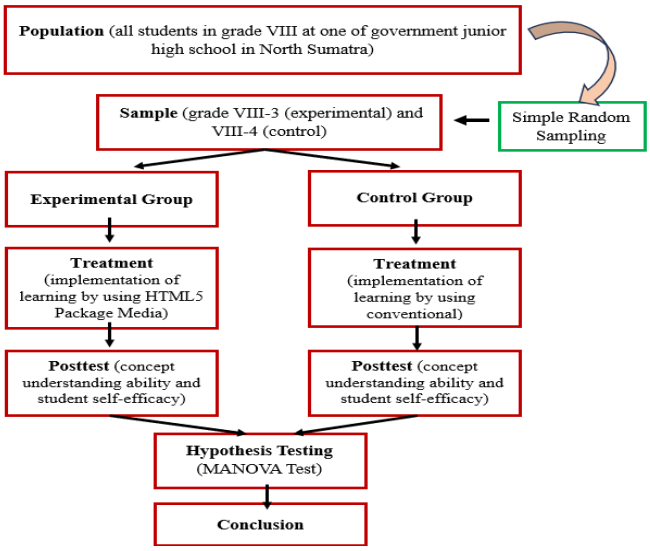


**Figure 2.** Research Prosedure

### *Participants:*

The participants in this study were 63 students in class VIII at one of the government junior high schools in North Sumatra Province, with details consisting of 32 students (the experimental group) in class VIII-3 and 31 students (the control group) in class VIII-4. Determination of class VIII as a research target: the reasons are: a) the results of preliminary analysis through observations and interviews that the most difficult material to be understood by students in class VIII is geometry, especially in determining the area and perimeter of a plane figure; b) the low comprehension of students making it difficult to understand geometry; and c) the impact of the difficulty of concept understanding on the low self-efficacy of students. Therefore, HTML5 package media will be tested on students to see how much effect it has on their concept understanding of geometry and their' self-efficacy.

### *Instruments:*

The instruments used were tests and questionnaires. Tests are used to obtain data on the ability of students to understand the concept of geometry. The test was arranged in the form of open-ended questions related to geometry subject matter. The test has been tested on 30 students outside the sample and declared valid with a correlation value of more than 0.3 and significant Cronbach alpha, which also shows a value exceeding 0.7, which means reliable, so that it can be used to measure concept understanding. The test was given only after treatment to determine the extent of students' understanding of geometry and the differences between the two groups. Furthermore, a self-efficacy questionnaire is used to determine the extent of student confidence in learning mathematics and geometry.

### *Data Analysis:*

The analysis technique is carried out by hypothesis testing using MANOVA because it is a technique for analyzing the relationship between one independent variable and one or more dependent variables. Before testing the hypothesis using the MANOVA test. There are several requirements that must be met, namely the variance homogeneity test, Box's M test, and multivariate (MANOVA) test. The purpose of the MANOVA test is to determine whether there is a statistically significant effect on several variables that occur simultaneously between two levels in one variable. The hypothesis that can be made to answer this problem is:

- $H_0$: There is no effect of HTML5 Package (H5P) learning media on understanding mathematics concepts.
- $H_1$: There is an effect of HTML5 Package (H5P) learning media on students' understanding of mathematics concepts.
- $H_0$: There is no effect of HTML5 Package (H5P) learning media on students' self-efficacy.
- $H_2$: There is an effect of HTML5 Package (H5P) learning media on student self-efficacy.
- $H_0$: There is no simultaneous effect of HTML5 Package (H5P) learning media on students' understanding of mathematical concepts and self-efficacy.
- $H_3$: There is an effect of HTML5 Package (H5P) learning media simultaneously on the understanding of mathematical concepts and student self-efficacy.

Based on these hypotheses, the criteria used to determine the conjecture are: if Sig in the table is <0.05, then H0 is rejected, and if Sig. > 0.05, then H0 is accepted. The coefficient of determination (R2) measures how far the H5P learning media explains variations in the

dependent variable, namely how much effect the H5P learning media (HTML5 Package) has on students' concept understanding and self-efficacy. The coefficient of determination is between zero and one ($0 < R^2 < 1$). If the ability of the independent variables to explain the variation in the dependent variable is very limited, the R2 value is small. If the value is close to one, it means that the independent variables provide almost all the information needed to predict the variation in the dependent variable.

# RESULTS AND DISCUSSION

## *Result*

In this study, the data obtained came from the results of post-tests and questionnaires. The post-test was used to measure students' concept-understanding ability, and then the questionnaire was used to measure students' self-efficacy level. Before the research was carried out, the researcher tested the test instrument, which was tested on 30 students outside the sample, and obtained the instrument used to get a validity value above 0.3 and reliability above 0.7, so it is feasible to be tested on the research class. Before testing the hypothesis, it is necessary to test the basic assumptions, namely the variance homogeneity test and Box'M test. The results of the basic assumption test are presented as follows:

### 1. Variance Homogeneity Test

The variance homogeneity test is a mandatory requirement before conducting a multivariate analysis test (MANOVA). If the value based on the mean > α, where the value of α = 0.05, then the variance is said to be homogeneous. The following are the results of the variance homogeneity test.

**Table 1**. Variance Homogeneity Test

**Levene's Test of Equality of Error Variances[a]**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Concept Understanding | Based on Mean | ,486 | 1 | 61 | ,488 |
| | Based on Median | ,251 | 1 | 61 | ,619 |
| | Based on Median and with adjusted df | ,251 | 1 | 59,525 | ,619 |
| | Based on trimmed mean | ,559 | 1 | 61 | ,458 |
| Self_efficacy | Based on Mean | 1,629 | 1 | 61 | ,207 |
| | Based on Median | 1,085 | 1 | 61 | ,302 |
| | Based on Median and with adjusted df | 1,085 | 1 | 45,879 | ,303 |
| | Based on trimmed mean | 1,540 | 1 | 61 | ,219 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Kelas

If the value based on the mean understanding of concepts and self-efficacy > 0.05, then H0 is accepted, meaning that the variation in each group is the same (homogeneous). So it can be said that the research sample comes from the same variance.

### 2. Box'S M Test

The second requirement before testing MANOVA is Box's M test. Researchers use SPSS 29. With the criteria, if the significant value is above 0.05, then the data is homogeneous. The results of the variance-covariance homogeneity test can be seen in the table below:

**Table 2**. Box'S M Test

| Box's Test of Equality of Covariance Matrices[a] | |
|---|---|
| Box's M | 9,895 |
| F | 3,181 |
| df1 | 3 |
| df2 | 693137,195 |
| Sig. | ,023 |

From Box's Test of Equality of Covariance Matrix Table, a significance value of 0.023 is obtained. Suppose the research significance level is set at Sig. > 0.05, then the obtained significance value is more significant than 0.05. Therefore, the null hypothesis (H0) is accepted. This means that the variance/covariance matrix of the dependent variables is the same, allowing the MANOVA analysis to proceed.

## 3. MANOVA Test

The manova test is used to measure the effect of independent variables with a categorical scale on several dependent variables at once with a quantitative data scale to determine whether there is a statistically significant effect on several variables that occur simultaneously. The manova test was conducted with the assistance of SPSS 29.

**Table 3**. Average Values

| | Class | Mean | N |
|---|---|---|---|
| Concept Understanding | Experiment | 78,84 | 32 |
| | Control | 69,67 | 31 |
| | Total | 148,51 | 63 |
| Self Efficacy | Experiment | 83,78 | 32 |
| | Control | 71,48 | 31 |
| | Total | 155,1 | 63 |

The decision-making criteria for hypothesis testing are:

- If the Sig value <0.05 then $H_0$ is rejected
- If the Sig value> 0.05 then $H_0$ is accepted

**Table 4**. Subjects Effects Test

| Tests of Between-Subjects Effects | | | | | | |
|---|---|---|---|---|---|---|
| **Source** | **Dependent Variable** | **Type III Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Corrected Model | Concept_Understanding | 1323,007[a] | 1 | 1323,007 | 25,355 | <,001 |
| | Self_efficacy | 2381,202[b] | 1 | 2381,202 | 78,295 | <,001 |
| Intercept | Concept_Understanding | 347334,436 | 1 | 347334,436 | 6656,440 | <,001 |
| | Self_efficacy | 379593,646 | 1 | 379593,646 | 12481,177 | <,001 |
| Class | Concept_Understanding | 1323,007 | 1 | 1323,007 | 25,355 | <,001 |
| | Self_efficacy | 2381,202 | 1 | 2381,202 | 78,295 | <,001 |
| Error | Concept_Understanding | 3182,993 | 61 | 52,180 | | |
| | Self_efficacy | 1855,211 | 61 | 30,413 | | |
| Total | Concept_Understanding | 352609,000 | 63 | | | |
| | Self_efficacy | 384881,000 | 63 | | | |
| Corrected Total | Concept_Understanding | 4506,000 | 62 | | | |
| | Self_efficacy | 4236,413 | 62 | | | |
| a. R Squared = ,294 (Adjusted R Squared = ,282) | | | | | | |
| b. R Squared = ,562 (Adjusted R Squared = ,555) | | | | | | |

First Hypothesis Testing

- $H_0$: There is no effect of H5P (HTML5 Package) learning media on concepts understanding.
- $H_1$: There is an effect of H5P (HTML5 Package) learning media on concepts understanding.

On the concept understanding, the calculated F value is 25.355 with a significance value of 0.001. This shows that the significance value is smaller than the significance level of 0.05, or 0.001 < 0.05. Then the decision according to the criteria is rejected. Thus, it can be concluded that "There is an Effect of H5P (HTML5 Package) Learning Media on Concept Understanding". This indicates an effect of H5P on concept understanding, with an effect of 29.4%.

Second Hypothesis Testing

- $H_0$ : There is no effect of H5P (HTML5 Package) learning media on student self-efficacy
- $H_2$ : There is an effect of H5P (HTML5 Package) learning media on student self efficacy

On the self-efficacy questionnaire, the F value is 78.295 with a significance value of 0.001. This shows that the significance value is smaller than the significance level of 0.05 or 0.001 <0.05. Then the decision according to the criteria is H0 rejected. Thus it can be concluded that "there is an effect of H5P (HTML5 Package) learning media on student self-efficacy". This indicates an effect of H5P on student self-efficacy, with an effect of 56.2%.

**Table 5**. Multivariate Test

**Multivariate Tests[a]**

| Effect | | Value | F | Hypothesis df | Error df | Sig. |
|---|---|---|---|---|---|---|
| Class | Pillai's Trace | ,565 | 39,015[b] | 2,000 | 60,000 | <,001 |
| | Wilks' Lambda | ,435 | 39,015[b] | 2,000 | 60,000 | <,001 |
| | Hotelling's Trace | 1,301 | 39,015[b] | 2,000 | 60,000 | <,001 |
| | Roy's Largest Root | 1,301 | 39,015[b] | 2,000 | 60,000 | <,001 |
| a. Design: Intercept + Class | | | | | | |
| b. Exact statistic | | | | | | |

Third Hypothesis Testing

- $H_0$ : There is no effect of H5P (HTML5 Package) learning media on students' understanding of concepts and self efficacy
- $H_3$ : There is an effect of H5P (HTML5 Package) learning media on students' understanding of concepts and self efficacy

The sig value for Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest, and Root is 0.001. Then the sig value is smaller than the significance level of 0.05, or 0.001 < 0.05. So that the $H_0$ decision is rejected. Thus, it can be concluded that "there is an effect of H5P (HTML5 Package) learning media on students' understanding of mathematical concepts and self-efficacy.

## *Discussion*

This study shows that there is a significant difference in students' concept understanding and self-efficacy on the subject matter of geometry subject area, and perimeter of a figure plane between students taught using the HTML5 package and students taught with conventional. This proves that the teaching and learning process using HTML5 Package visual media can significantly improve and strengthen students' conceptual understanding of the subject matter.

This is because HTML5 Package visual media helps students to visualize the concepts of geometry and relate geometry concepts to everyday life that they can easily imagine. The findings of this study support the statement of Utari et al. (2022) that the HTML5 package makes it easy for students to clearly see abstract concepts, so this helps students to understand concepts well and meaningfully.

Conceptual understanding is the initial foundation in the learning process of mathematics. Learning mathematics through HTML5 package media helps students understand geometric shapes and the relationship between a figure plane and another, as well as linking examples of geometry in the environment around them. Teachers must realize that knowledge cannot simply be transmitted from one person to another; knowledge is built by students themselves through the process of interacting with the learning environment (Stahl, 2013). Thus, the culture and environment around students can be used as a real medium and become a link between mathematical ideas and students' experiences.

Students taught with the HTML5 package showed a change in student self-efficacy on the topic of geometry. This shows that the HTML5 package has a positive effect and helps students' concept understanding, so that students' confidence arises in dealing with problems presented by the teacher. Students who have high confidence have a good understanding of learning, so there is no fear in them to perform and express their ideas. This HTML5 package is designed so that users, regardless of ability, can easily understand abstract geometry concepts. HTML5 Package also helps students apply these concepts. This is in accordance with the opinion of Pratiwi & Wiarta (2021) that the use of the HTML5 package helps students to clearly see abstract concepts and make connections between concepts so that they have a better understanding.

Students who have low conceptual understanding experience a slight increase in self-efficacy when learning geometry. This means that the help of HTML5 Package media in learning geometry will not be maximized. If student interest in learning is low, it requires teacher creativity in designing attractive geometry images and patterns on HTML5 Package media because the media is the teacher's vehicle in achieving the desired learning objectives. In addition, the challenge for teachers in applying learning media is limited time because it is difficult for students who have low conceptual understanding abilities to quickly develop their own understanding. However, this supports the findings of research conducted by Engelbrecht et al in (Hutkemri, 2014), who found that students' conceptual understanding was reduced when they were orally introduced to a new method that used visuals. This is most likely due to time constraints, as they were only taught the new method for a short period of time.

The use of HTML5 package media is beneficial for students because it provides clear information through the use of attractive images, which is actually good for students' concept understanding. According to Daryanes et al. (2023), HTML5 package media helps students clearly see abstract concepts and then relate these concepts to mathematics. Therefore, good concept understanding helps students grow their self-efficacy. The use of HTML5 package media in teaching and learning helps students repeat learning topics and connect topics with more complex environments. In addition, it allows students to learn geometry independently with ease, and they can explain the questions. According to Wicaksono (2021), the use of HTML5 package media in the teaching and learning process provides an opportunity for

students to personally engage in a real environment that they can imagine. Thus, students can diagnose their own processes for solving mathematical problems.

This study successfully proved that the HTML5 package positively affects students' concept understanding and self-efficacy in geometry. The results of this study support Adayeye et al. (2016) statement on how HTML5 package media can be used to explain concepts. This is because the use of HTML5 Package media allows teachers to convey mathematical concepts through animation-based activities as designed in the software, where this software is designed to provide detailed procedures or steps to solve the problems presented by the teacher. Attractive features are also presented directly in this medium. The use of the HTML5 package in the classroom offers several advantages, as it allows teachers to be more creative in teaching, making it more effective, especially through the teaching and learning process.

### *Implication*

HTML5 Package learning media affects students' understanding of concepts, especially in geometry subject matter, with a large influence of 29.4%, which means the use of HTML5 Package media can be a recommendation rather than conventional learning that only relies on group discussions and lectures, and a focus on improving students' understanding of concepts in geometry material has an impact on the growth of students' understanding of concepts. 4%, which means that the use of HTML5 package media can be a recommendation rather than conventional learning by relying on lectures and group discussions. Furthermore, the focus on improving students' understanding of concepts in geometry material has an impact on the growth and development of better student self-efficacy (56.2%). This result is very necessary for educators to know that self-efficacy is largely determined by students' understanding of a material concept.

### *Limitation and Suggestion for Further Research*

This study still has weaknesses and limitations, namely that it was carried out using only a small sample of 63 grade VIII students at one of the government junior high schools in North Sumatra Province. Apart from that, the conclusion stage only stops at the effect magnitude of the HTML5 package media without taking into account the variables that affect the research process. The subject matter used is also limited to geometry (area and circumference). Based on these limitations, further relevant research can be carried out by involving more students in various schools, broader mathematics subject matter, and taking into account the variables that affect the research process.

## CONCLUSIONS

HTML5 package media is a supporting medium for learning geometry because it is equipped with various features and visual appearances that are very appropriate for learning geometry. The effect of the HTML 5 package media tested on grade VIII at one of the government junior high schools in North Sumatra Province proved that there was a significant effect of 29.4%. This shows that the use of media affects the conceptual understanding of geometry, even though it has a small effect but is better than conventional. Another impact of using HTML5 package media is that it also affects students' self-efficacy in class. evidenced by 56.2% that HTML5 package media influences self-efficacy. This is a good reference for teachers in utilizing

HTML5 package media in teaching geometry so that learning is more visual and has an impact on students' concept understanding and self-efficacy.

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## AUTHOR CONTRIBUTIONS STATEMENT

This research was conducted at one of the government junior high schools in North Sumatra Province, which was conducted by AA, whose job it was to provide learning using HTML2 package media in the experiment group and control group. The research process was assisted by EA, who was in charge of taking care of all research equipment and administration at the school, and then all supporting instruments were validated by CN and HZ, as well as the calculation and analysis of the data obtained by AA and the testing of the hypothesis by HZ.

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