Using HTML-Based Worksheet to Support Students in Active Mathematics Learning

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Abstract. This developmental research aims to create an HTML-BW application. This technology is an alternative that serves to support teacher teaching activities and student learning. By utilizing this technology, the stimulus and response principles will work interactively. There are five students from SMA Unismuh Makassar getting engaged to be observed during the process of research. In terms of research instruments and data collection, this study applies three kinds of research instruments, such as HTML-Based worksheets, observation sheets, and response sheets. To support the interactive principle to be achieved, this application was built with due observance of guidelines, learning support, and values. Then so that it can be seen this research asks users to respond to directing user understanding, good learning media, media that supported learning activities, media that supported interests, and including modern media. The results of their opinion poll showed that this device was dominantly responded positively for the five things. Overall, it shows that HTML-BW is very supportive of active learning because it utilizes the stimulus-respond principle in its use. In other words, HTML-BW will direct teachers and students to engage in interactive activities.

Keywords: HTML-Based Worksheet, Active Learning

1. Introduction
The involvement of technology in mathematics learning became important during the Covid-19 Pandemic. Various creations and innovations have sprung up to help and complement the learning activities carried out in the classroom [1]. Teachers who are not accustomed to using computer-based devices or smartphones are changing. They have to learn to use these devices. Likewise with students where they have to try and follow these digital learning activities. From this process, the interactions that occur between teachers and students no longer only take place in the real world, but turn to the virtual world.

So far, active learning that students do for mathematics learning is still a challenge for teachers ([2]. Not only because mathematics is not easily absorbed by students, but the equipment that supports the transfer of knowledge is not yet feasible.

Nowadays, technology has developed so rapidly that many people say this is the era for the development of technology and information [3]. This development has had many impacts on the learning process, especially mathematics learning. For example, Geogebra, which is known to many people, is a geometry learning tool that can help visualize mathematical tasks [4]. There are so many mathematical
modelling visualizations that are usually done on paper or lined paper so that students can easily use these tools to review the modelling which is no longer abstract and limited in form. The same can be seen in the HTML developer tool which supports and helps learning device creators to produce innovations in the form of student worksheets.

Student Worksheet (SW) is a tool that is close to student activities. Near means that one thing that supports the success of students in achieving the expected learning competencies is the use of the SW. Therefore, this SW must be designed in such a way as to help and support students to participate in learning actively.

For learning mathematics, one of the challenges faced by teachers when carrying out this learning activity is to organize active learning. Mathematics is a subject that is taught from elementary to high school levels. This learning material and concept are hierarchical so that there are aspects of sustainability that affect the knowledge transfer process when students learn. The hierarchy that is meant in this case is the relationship between one material and the next material, the initial concept with the concept of development, the basic working principle with the next working principle, even one symbol with the next symbol is interrelated. If according to Johnson & Johnson [5] that the idea of active learning is reflected in cooperative learning activities. Students will be active in learning activities with cooperative learning because in it they will share ideas, help to solve problems, argue intellectually to reach an understanding, and work to achieve goals.

Indeed, this is also relevant to learning activities, especially for learning mathematics. By using the research results by Freeman, et. al [6] that students in a class with traditional lectures are 1.5 times more likely to fail than students in an active learning class. That way, active learning becomes an important target in carrying out learning activities.

Concerning what is developing in the era of the Covid-19 pandemic, it is seen that many teachers have used digital technology to support their teaching activities. Likewise, with students, their involvement in digitally designed learning activities is one thing to pay attention to. To make teachers and students interactively involved in digital learning experiments while responding to the challenges of integrating technology into the classroom [7]. The digital learning environment becomes a place for students who are already familiar with it. In other words, where students gain knowledge and shape their learning experiences in the digital learning environment [8];[9].

It is undeniable that the digital learning environment does not only contain devices with advanced technology. However, its attractive and interactive appearance can provide a stimulus so that users respond with curiosity and a desire to use it. Things like this are needed in mathematics learning activities where internal support comes from enthusiasm and willingness to try to support students' interest in learning and their motivation to learn it. For this reason, the role of the SW tool studied in this article is directed to link the stimulus and response of its users so that it combines the interest and motivation of trying SW together with learning mathematics. The SW function as a learning medium can work well in this regard.

In this study, digital SW development is part of an effort to get students involved in active learning, especially mathematics learning. As we know that mathematics is a general lesson that needs to be given to all students in school. However, the learning process sometimes requires a different strategy or approach from what is generally done.

The digital SW developed in this study is the HTML-Based Worksheet (HTML-BW). This SW uses the HTML language which is usually used in computer programming. HTML-BW will be used with computers or laptops so that students will study in a digital learning environment. For this reason, students are expected to have the ability to adapt and accommodate digital devices, especially computers or laptops. It does not rule out the possibility that so far students are more familiar with using smartphones than computers or laptops so that it needs adjustments in using the latter device. Although the SW in mathematics learning has not yet discussed the relationship between the hierarchy of learning in the preparation of SW materials, at least the system built from the contents of the SW takes into account the hierarchical principle. As an example that can be developed for one topic is taken and then arranged in order of the topic.

For testing HTML-BW, several aspects are also observed in this tool, such as those carried out by Nasrullah & Baharman [8] in which see M3LC as a learning tool by reviewing social programming,
knowledge use, valuing, knowledge construction, and evaluation practices. Meanwhile, for HTML-BW, the 3 major parts seen are linked and match with learning, supporting internal and external attitude, and good and updating. Also, the expected responses from users are given for things such as support for internal and external factors, the feasibility and usefulness of media for learning, and conformity with current conditions.

Based on this review, the study in this article shows what HTML-BW looks like so that it is suitable for use as a learning tool that supports active learning.

2. Method

This research was conducted about the research and development of a device [10]. The device in this study is HTML-BW for senior high school students. There are five students from SMA Unismuh Makassar getting engaged to be observed during the process of research. In terms of research instruments and data collection, this study applies three kinds of research instruments, such as HTML-Based worksheets, observation sheets, and response sheets. The procedure of development are applied into four stages as follows:

1. Expert review, this is done to ask for expert consideration to review the strengths and weaknesses of the instrument is made.
2. In a one-on-one trial, this activity shows the need for respondents to be involved in reviewing instructions in the instrument with the evaluator. Where the evaluator will observe respondents who use the instructions in the instrument, record respondents' comments, and respondent's questions during and after giving the instrument.
3. Small group trial, evaluators try out unfinished instructions with a group of respondents and record their performance and comments.
4. In field testing, the evaluator observes instructions that have been tested in an actual environment with a group of respondents.

3. Result & Discussion

To carry out development activities, several steps are taken including:

1. Analyze the knowledge and content of school mathematics at the level of senior high school in SMA Unismuh Makassar
2. Construct HTML based-Worksheet design as shown in the image below

![Figure 1. Design of HTML based-Worksheet](image)

3. Construct the HTML based-Worksheet using Hot Potatoes as the supporting software in creating the intended virtual displays. As shown in the image below.
4. Convert the HTML-based Hot Potatoes Worksheet design format into a Zip Package format so that it is easy to open using a browser such as Google Chrome, Internet Explorer, Firefox, or any other browser.

![Figure 2. Format of Design HTML based-Worksheet Using Hot Potatoes](image)

After the HTML-based Worksheet device has been completed, it is designed according to the intended purpose. Next is to ask the experts for the validity of the devices that have been designed. The results are described in the table below.

| No. | Observation Aspect                  | V1 | V2 |
|-----|-------------------------------------|----|----|
| 1   | Guidelines HTML based-Worksheet    | 5  | 5  |
| 2   | Learning Support                    | 4.75 | 5 |
| 3   | Value                               | 4.5 | 4.75 |
|     | **Total**                           | **4.75** | **4.92** |

This table shows that the result of the assessment of the two experts involved in the study, they agree that the HTML-based Worksheet is included in the very valid category. In other words, the feasibility level of HTML-based Worksheets to be applied in learning activities is very good.

After going through a stage called expert review and the HTML-based worksheet tool is declared valid to be applied in a learning activity. Next is to do one-on-one and small group trials, as shown in the image below.
Finally, the HTML-based Worksheet tool enters the field test phase to see how the user responds to the construction results of this tool when used in learning activities. This testing activity is shown in the figure below.

**Figure 4.** One-to-One Trial to HTML-based Worksheet

To illustrate what the user responds to the HTML-based Worksheet tool. The following shows a diagram that illustrates this response.
From the figure 6, it can be seen that the distribution of opinions of users who strongly agree and agree is much higher than those who are fair. This shows that user satisfaction with the HTML-BW equipment can be justified with the construction product of this research. The figure presented 5 statements to which they are asked to respond based on the performance shown by the HTML-BW application. The five responses were positively dominant, while the intended responses involved directing user understanding, good learning media, media that supported learning activities, media that supported interests, and including modern media.

4. Conclusion
This developmental research has been carried out by producing an HTML-BW application. Use in conjunction with using a computer or laptop so that it works digitally. This technology is an alternative that serves to support teacher teaching activities and student learning. By utilizing this technology, the stimulus and response principles will work interactively. Therefore, there are three main things that the experts from HTML-BW pay attention to, namely guidelines, learning support, and values.

Then for use, users are given a questionnaire to provide their responses related to internal and external factors, the feasibility and usefulness of media for learning, and conformity with current conditions. About these factors, the questionnaire is conveyed to respondents in the form of directing user understanding, good learning media, media that supported learning activities, media that supported interests, and including modern media. The results of their opinion poll showed that this device was dominantly responded positively for the five things.

Overall, it shows that HTML-BW is very supportive of active learning because it utilizes the stimulus-respond principle in its use. In other words, HTML-BW will direct teachers and students to engage in interactive activities.

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