Utilizing an Interactive Website for Elementary School Students to Learn about the Universe

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Abstract– Students in 6th-grade MI Ya BAKII Kesugihan 01 are not well informed about websites and using interactive websites to support their studies. One of the interactive websites is The Scale of The Universe. The website contains one of the materials at school that already being recognized by students, such as science material of the universe subchapter. This community services intended to improve the ability of 6th-grade students of MI Ya BAKII Kesugihan 01 to use interactive web technology and increase students' interest in studying through technology. This community service activity implemented through four phase which are the pre-implementation, the implementation, the monitoring and evaluation, and the post-service phase. The training conducted for the participants used the interactive website "The Scale of The Universe" which has interactions such as zoom-in and zoom-out sequentially to compare the size of objects in the universe, including interactions by clicking an objects to get their descriptions. In addition, there are click and voice control features that help to increase user interest. The results of the training showed three indicators of improvement. There was a 24% improvement in elementary school students' understanding of the difference between computers that are connected or not to the internet. There was an 8% improvement in elementary school students' knowledge of what a website is. Also, there was a 26% improvement in the ability to access the website.

Keywords: interactive websites; 6th-grade students; Scale of The Universe; zoom-in; zoom-out; computers

1. INTRODUCTION

Currently, the internet is widely spread around the world so that more activities can be done by utilizing the internet network (Andrianingsih & Mustika, 2022; Wahyudiyono, 2019). One technology that is used in utilizing the internet as a source of information is web technology (Rahman, 2021). A website is a collection of web pages that are connected to the internet in a domain and can be accessed by anyone, anywhere. This ease of access makes the website the choice to help various human activities. Based on the arrangement of the content, websites can be divided into dynamic websites and static websites.

The number of web users makes the web have a variety of platforms according to its usefulness. Web platforms are used as information delivery tools, such as news portals, blogs, or online encyclopedias, including electronic buying and selling platforms with various types of transactions. In addition, web platforms can also have several uses at once, such as providing a source of information and learning a topic. Web platforms used for these functions are usually built as an interactive web. The web allows users to communicate and engage with a variety of multimedia elements, such as text, images, animation, sound, and video (Aziz et al., 2021), Furthermore, users can interact with these elements through control buttons, zooming in and out, and other interactive features, which can enhance user engagement and usefulness (Parker et al., 2022).

The Scale of the Universe is an interactive web-themed introduction to objects in the universe and size comparisons between them. The content is presented in animated form. Users can interact with the web content with the zoom-in and zoom-out features to see the size

comparison of objects in the universe, and click to find out the object's profile. User interaction with the web creates a sense of interest and makes users want to explore the entire web content. Further interest and curiosity can encourage web users to better understand the content presented by the web (Lawarde et al., 2023; Vishtak et al., 2022), compared to the static web. Interactive websites can also improve students' critical thinking skills (Febliza et al., 2023).

The 6th-grade students of MI Ya BAKII Kesugihan 01 are children around 11-12 years old. They have already been introduced to the Internet and have learned how to use computers at school. During the previous pandemic, students also learned from home and were connected to learning activities at school via the internet. With the skill of utilizing information technology that has been applied in education in the last 10 years , a home study can be done. The internet and websites are often used to find additional materials that support their studies and assignments done from home. They use browsers and search engines to find the desired materials, so the websites they visit are static websites that only contain information and do not offer interaction with users. Based on these conditions, it is found that 6th-grade students of MI Ya BAKII Kesugihan 01 do not know well about this interactive website and its use to support their studies. Because of this, it is important to introduce an interactive website with a suitable theme based on the lessons they have learned at school. The interactive website used is The Scale of The Universe because the web content is one of the materials in elementary school that students need in their studies. This community service is implemented as a training or workshop on utilizing interactive websites for students and their teachers. This community service is expected to improve the ability of 6th-grade students of MI Ya BAKII Kesugihan 01 to utilize interactive web technology and increase students' interest in their studies through technology utilization.

2. IMPLEMENTATION METHOD

The implementation of this service has four phases. The pre-service phase is the survey stage, formulation of problems determination of solutions, and preparation for implementation. The service phase is the core step of implementing solutions to the partner's problems through a training or workshop program. Furthermore, the monitoring and evaluation phase is used to determine the results of service programs based on the predetermined objectives. The last phase is the post-service phase. The team processed and analyzed the data obtained in the previous two phases until conclusions and recommendations were obtained from the entire service series. **Figure 1** shows all the phases required in Community Service at MI Ya BAKII Kesugihan 01.
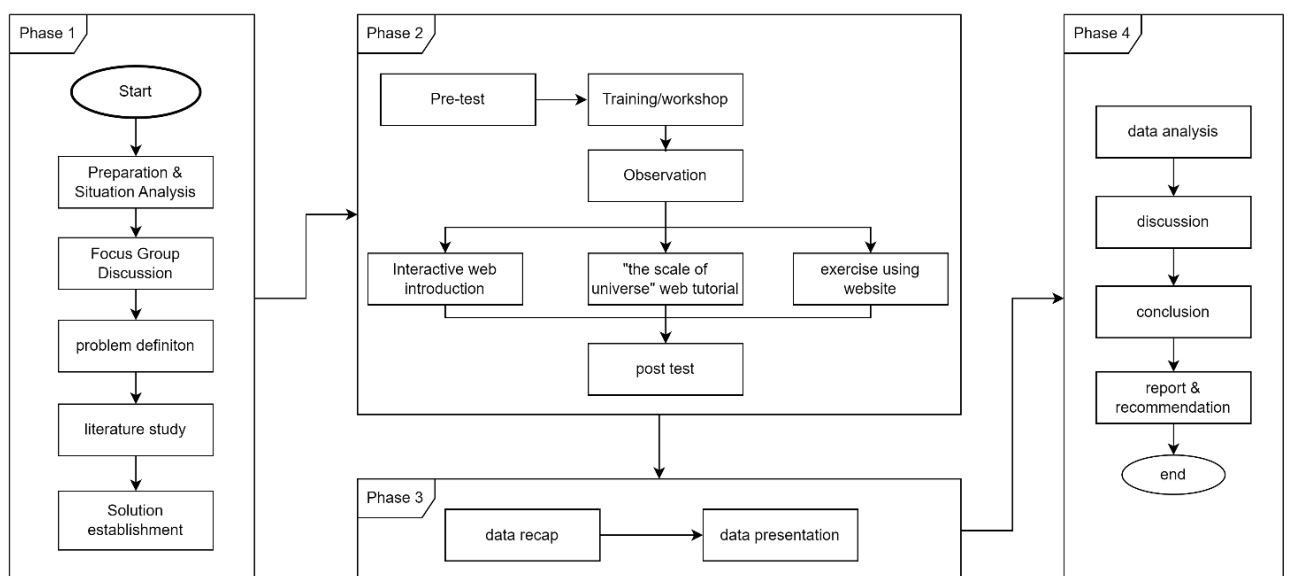

Figure 1 Implementation phase of community service at MI Ya BAKII Kesugihan 01

2.1 Phase 1: pre-community service

The first phase began with a situation analysis of MI Ya BAKII Kesugihan 01 partners as an introduction and analysis of conditions through location surveys and interviews with the teachers. The survey and interview showed that 6th grade students have already used the website to find information, but have not used an interactive website in their study of certain topics. Furthermore, the determination of partner problem solutions through team discussions and literature studies. Based on the predetermined solution, the team made preparations for the implementation of the service.

2.2 Phase 2: Community service implementation

The implementation of the service through training or workshops on the utilization of interactive web for teaching about the universe. Workshop activities consist of (1) an introduction to the interactive website "The Scale of the Universe", (2) an explanation of how to interact with the website, and (3) practice and exercise of website utilization. Participants will be divided into small groups assisted by a facilitator during the activities. The tools used in the implementation of the workshop are shown in **Table 1** below.

Table 1. Materials of workshop "Utilizing interactive web"

No	Hardware dan Software	Description
1	Laptop and Mouse	The main device for connecting to the Internet
2	Internet connection	A network that connects users and web servers
3	Google Chrome browser	as a portal to an interactive website

2.3 Phase 3: Observation, surve and data presentation

Monitoring and evaluation of workshop activities are performed using observation and survey techniques. Observations were conducted by the community service team during the program activities by carefully observing the activities of the workshop participants. The survey was made available as an online pre-test (before the workshop) and post-test (after the workshop) accessed on the https://s.id/bermainweb page. After conducting the survey, in phase 3, the data that has been collected is then processed and presented in charts and simple statistical analysis.

2.4 Phase 4: Data analysis and recommendation

Quantitative data from the pre-test and post-test were then analyzed by comparing partner conditions before and after the training/workshop. The results were then taken into consideration for the formulation of recommendations to partners for the sustainability of the teaching process that partners will continue to implement in the future.

3. RESULTS AND DISCUSSION

3.1 Interactive Web training
Workshop or training programs were held at MI Ya BAKII Kesugihan 01. The participants of the program were students in the 6th grade. Participants were divided into several groups to optimize the activeness of each participant during the activities and were assisted by a facilitator. The workshop begins with an introduction to the interactive web "The Scale of The Universe", starting by opening the Google Chrome browser, typing the web URL https://www.htwins.net/scale2/, and selecting the Language on the web, until the main page is displayed. The topic used in this interactive website is the scale of the universe. This web is a YouTube channel that is ported into a pixie.js-based website. Pixie.js is an HTML5-based engine that can be used to create interactive graphics with cross-platform applications. Because it is based on pixie.js, this web is also available in iOS-based applications.
Some of the features used in the web are as follows:

a. Language and web menu settings

The language feature offered by The Scale of The Universe 2 web consists of 16 languages. Once the user has selected the language, there is a start screen with instructions on how to use the interactive web, namely using the scroll bar to zoom in and out (**Figure 2** - left) and clicking on objects to learn more (**Figure 2** - right).
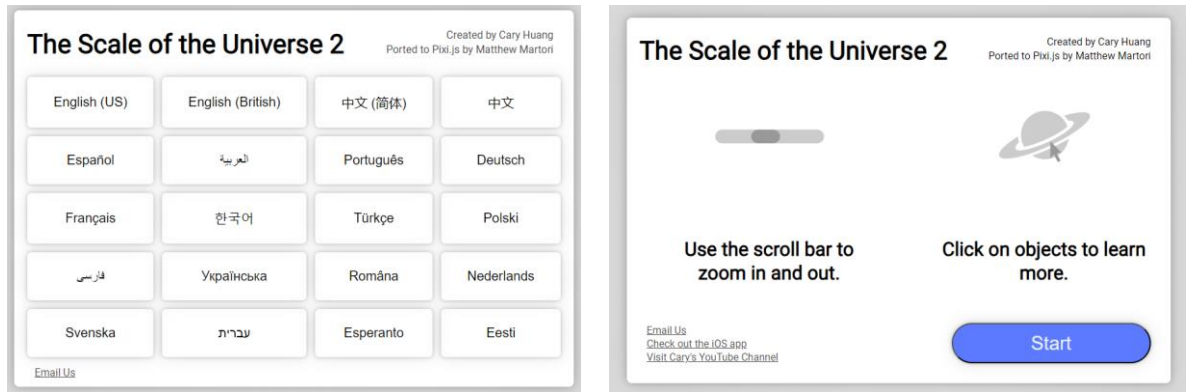

Figure 2 Language option and setting information

b. Zoom-in and Zoom-out using scroll bar

Once the user has entered the main display of the Scale of the Universe, they can zoom in to see small objects (**Figure 3** - left) and zoom out to see large objects (**Figure 3** - right).
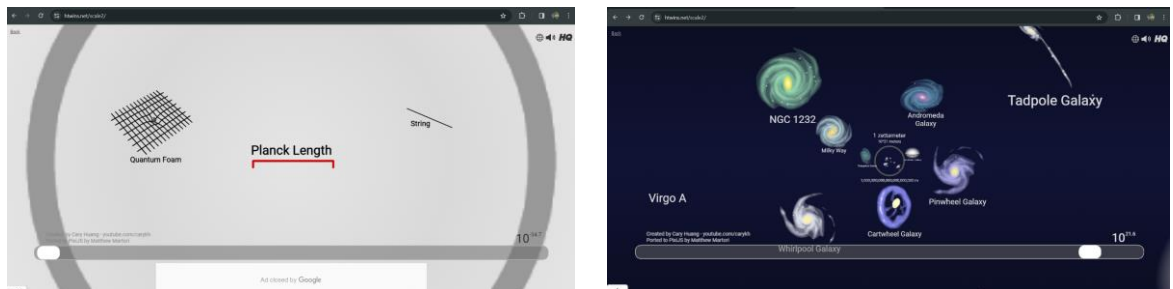

Figure 3 Smallest to largest object feature using zoom-in and zoom-out scroll bar

c. Object information window pop up using click feature in object

The user can click on any object to get information about it. **Figure 4** below shows the display of the click results in the form of an information box containing the name, size, and general description of the object.
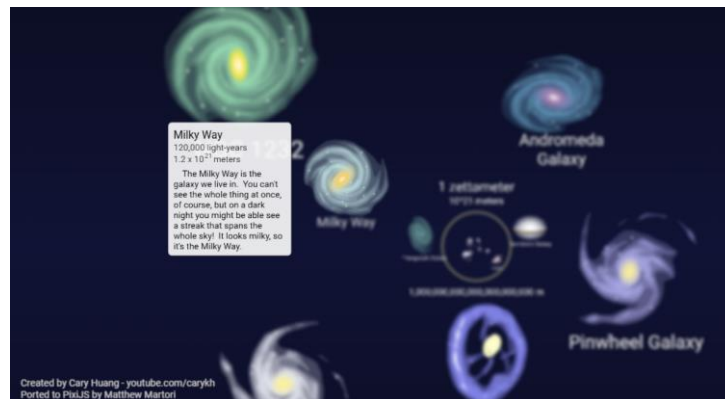
Figure 4 Clickable object display the addition information via pop up window

Next, during the training/workshop, the facilitator explained how to interact with "The Scale of The Universe" web using both mouse and touchpad controls on the Laptop (shown in **Figure 5**). This activity was accompanied by an explanation of "The Scale of The Universe" web material. The types of participant interaction with the web are presented in **Table 2** below.

Table 2. Mouse and touchpad control for features on "The Scale of the universe" to interact with th web

No	Features	Mouse and Touchpad control
1	Zoom-in	Scroll up / click and drag scale bar to the right
2	Zoom-out	Scroll down / click and drag scale bar to the left
3	Sound / Silent	Click the speaker button
4	Information of objects	Click the object

Figure 5. Interactive web introduction session by the facilitator

In the third session of the workshop, participants practiced and exercised using an interactive website with the features in **Table 2**. Participants interacted with The Scale of The Universe web by clicking and dragging on the scale bar or scrolling up and scrolling down the mouse to run the zoom-in and zoom-out features. From these interactions, participants can see the animation displayed on the web. When zooming in, the web display animates like a lup so that small objects are increasingly visible. When the participant stops the zoom-in process, the participant can click on one of the objects on the web page to view the profile of the object.

Figure 6 Practice session using laptop to surf the interactive web

Participants enjoyed the activities well. Each participant practiced exploring the interactive web using either mouse or touchpad controls. Most of the participants practiced smoothly, although there were some students who still forgot and needed to be guided in accessing and exploring the web by the facilitator.

3.2 Understanding Level of Interactive Web Utilization

Based on the monitoring and evaluation process through pre-test and post-test as well as observation during the workshop activities, the results showed an improvement in understanding of computers and the internet (**Figure 7**), introduction to websites (**Figure 8**), and understanding how to access websites through computers (**Figure 9**). **Figure 7** shows that there is a 24% improvement in the participant's ability to recognize the difference between computers with internet connection and those without. Participants who are 6th grade MI / SD students can operate smartphones and computers daily, but there are still 33% of students who previously did not know about the internet connection on the Gadget they use. This data was also obtained from interviews, that sometimes students only use gadgets for their purposes, without knowing how the gadgets work. In this workshop, students are given an understanding of how to access a website by typing the URL in the address bar and the necessity of an internet connection when they want to get that access.
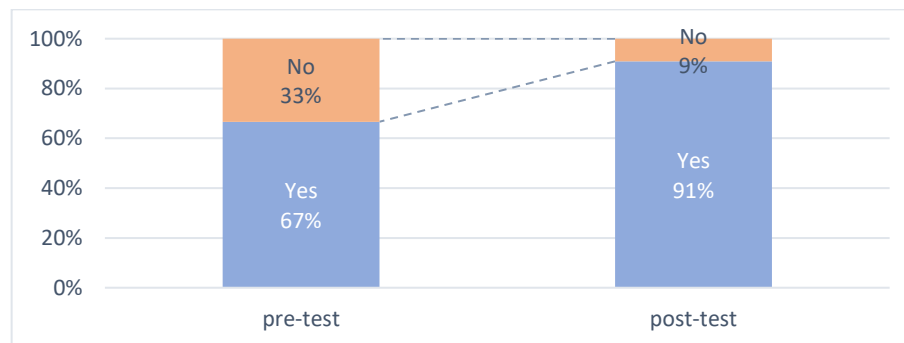

Figure 7 Percentage of participants' understanding the difference between computer with internet or not (before and after the workshop)

Based on **Figure 8**, 83% of the participants already knew about the website but 17% of participants did not know. After the workshop, there was an 8% improvement in the participants' understanding of the website. Based on observations during the workshop, some participants still did not complete the practices and exercises so 9% of participants did not know well about interactive websites.
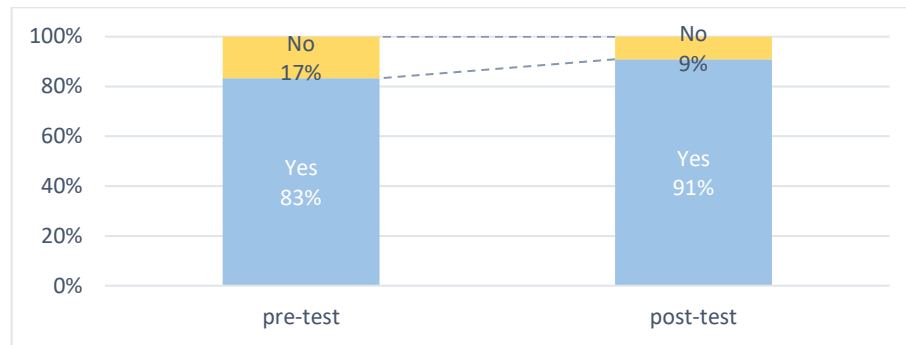
Figure 8 Percentage of participants' understanding of what website is

The data in **Figure 9** below shows an increase of 28% in the participants' understanding of how to access the website using a computer/laptop. While 9% answered otherwise, which is the same percentage as the statement in the previous point. Participants who are not familiar with the website also do not know how to access the website.
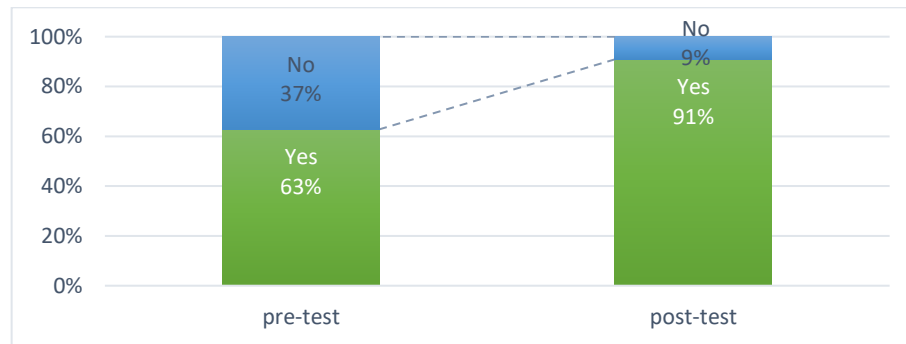

Figure 9 Percentage of participants' understanding of how to access an interactive website in a computer

Other data obtained from the observation is that participants obtained knowledge and experience that a web can contain a certain topic or theme that is presented interactively. Students who previously only knew how to access the web by opening a browser and typing keywords in a search engine, then got the understanding that website users can type in a specific URL address to go to that web page. Moreover, participants also came to understand that web users can interact with the web they visit through an interactive web, not just looking for information. The interactive experience obtained by the participants were selecting objects and displaying information through the click feature as desired and also zooming in and out to see the real scale of the object.

From this program, participants also gained new knowledge about objects in the universe with their respective scales. Some of the things that were most remembered by the students were the smallest size of objects in the universe, the size comparison between the earth, other planets, the sun, and stars, as well as recognizing the names of many objects that they had just seen on the web. In general, the key success factors for the implementation of this community service are as follows:

    a. utilizing a relatively new technology among participants
    b. High participation rate from the participants, as seen from the enthusiasm in practicing and exercises using the interactive web
    c. Fairly decent basic understanding of the participants in utilizing computer technology
    d. the facilitators interacted well with the participants
    e. Interactive website technology that shows graphics and interactions that draw participants' interest.

This is aligned with the statement that interaction based on graphics (Kuo et al., 2022), such as interactive menus (Ahn et al., 2021) can increase attention and success in the goal of increasing understanding, especially for processes and requirements in learning (Mutiawani et al., 2022).

4. CONCLUSION

The utilization of the interactive web for 6th-grade students at MI Ya BAKII 02 Kesugihan with the web theme "The Scale of The Universe" has been implemented through training/workshops. Community service activities are carried out through four phases based on the specific conditions of the Partners. These phases are pre-service, implementation of community service, monitoring & evaluation, analysis & recommendations phase. In the implementation phase, training was implemented using an interactive website "The Scale of The Universe" with the following forms of interaction, voice and language settings, and sequential zoom-in and zoom-out features to compare the size of objects in the universe. In addition, there is a feature to click on an object that displays an information window about the selected object. The training results showed three indicators of improvement. An improvement in elementary school students' understanding of the difference between computers that are connected to the internet and not, with a value of 24%. An 8% improvement in elementary school students' understanding of website knowledge. A 26% improvement in the understanding of how to access the website.

The observation results also confirmed that students enthusiastically embraced the material presented in the form of an interactive web. With the introduction of an interactive web, school students can study not only through viewing the information presented on the web, but also through controls such as zooming in and out, clicking to find out details, and sound settings. With this, it is expected that the utilization of interactive web can be used further as a means to improve students' interest in learning through the utilization of technology. The students also managed to gain new knowledge and a new learning model on the topic of the universe from this community service activity.

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