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Training in HSS Learning Coding Platform to Enhance Students' Competence in Web Design

Denny Sagita Rusdianto*, Issa Arwani, Fajar Pradana, and Faizatul Amalia
Faculty of Computer Science, Universitas Brawijaya, Indonesia
*denny@ub.ac.id

Abstract: Website training is becoming increasingly important for students in today's digital era. This is due to the growing use of the internet as a source of information and communication. Website training can help students develop the information technology skills needed in various aspects of life, including education and careers. Additionally, website training can help students broaden their horizons and enhance their creativity in creating digital content. Thus, students will be better prepared to face future challenges that increasingly rely on information technology. The training method provided to students in this community service project uses service learning. The website training is structured in schools or through community service programs involving 32 vocational high school students in Malang City. The HSS Learning Coding Platform Training was conducted as a gamification-based learning medium through this community service activity. Both platforms, namely W3Schools and the Gamification Application, have proven effective based on tests given to improve students' understanding of HTML. This is evidenced by the increase in median scores from the pre-test to the post-test. Website training helps students develop essential digital skills and positively contributes to their future careers and lives.

Keyword: gamification; information technology skill; interactive learning; website training

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INTRODUCTION

The use of websites has had a significant impact on human life. Websites are an essential source of information and knowledge for human life. A website is defined as a collection of web pages, which are usually part of a domain name or subdomain on the World Wide Web (WWW) on the Internet (Azizah & Iskandar, 2021). Website membantu masyarakat dalam mengakses informasi (Asmara, Sasanti, Moertodjo, & Ekawati, 2023) tentang berbagai topik, dari berita terbaru hingga bahan ajar untuk pembelajaran secara lebih mudah dengan akses internet, dan dapat digunakan sebagai media promosi dan sumber belajar (Wiryotinoyo et al., 2020).

In today's digital era, websites have become one of the main sources of information. Additionally, websites facilitate human communication with others worldwide. Various platforms such as email, chat, and discussion forums allow people to connect with others with similar interests or goals, even from different locations. This has sharply increased website access, with 215.63 million users in 2022-2023 (Indonesiabaik.id, 2023).

The utilization of websites in education can be seen in web-based learning, which can improve the quality of education (Abdurrokhim et al., 2022), increase student motivation (Karyati, 2023; Meiliyanthi et al., 2022) and education. Schools and universities can use websites to provide teaching materials, assignments, and online exams through e-learning (Septyanto et al., 2020). Websites also provide access to online courses such as Coursera (Coursera, 2024) or Udemy (Coursera, 2024) atau udemy (Udemy, 2024), and training (Kominfo, 2024; Skillhub, 2024) that can help people enhance their skills. The community feels many positive benefits from website use. Websites have changed how people communicate, learn, seek information, do business (Anggraini et al., 2023), and seek entertainment (Jumirah, Aliyah, & Ilhamdi, 2021). Therefore, websites have become an integral part of human life today.

In this era, vocational high school students need to be able to understand and apply knowledge in the field of websites. Currently, the need for website designers and developers ranks third after IT system programmers and IT software engineers at 10% (Wiryasti et al., 2021). This proves that the demand for IT-skilled labor remains high. Therefore, learning web design will provide good career opportunities in the future. Websites that provide quality information, usefulness, and website appearance quality influence user satisfaction (Islami & Kusumahadi, 2023). These skills can enhance career opportunities, create attractive and effective websites, and possess multidisciplinary abilities useful in various fields.

The importance of mastering these skills necessitates that educational institutions, through vocational schools with Software Engineering (RPL) programs, are required to produce graduates skilled in website design. This also applies to one of the state vocational schools in Kedungkandang District, Malang City. To achieve this goal, training activities are needed to enhance students' understanding of web design. Training can improve students' performance, enrich their knowledge, and provide them with experience (Dewi & Rahmawati, 2020; Maulana, 2022).

Based on the observations conducted, it was found that the current learning process still employs conventional methods. The conventional method in web design learning needs to improve in terms of interactivity, hands-on practice, limitations of space and time, lack of dynamism, and poor responsiveness to individual participant needs. The conventional method is often carried out in a classroom or specific room, requiring participants to be physically present. This limits participants' access to learning materials and makes the learning process rigid. The conventional method tends to be static and lacks dynamism. The instructor and learning materials are often the same from one class to another, and participants need more room to experiment or develop their creativity. Therefore, new learning methods such as gamification, online learning, and self-learning can be more effective alternatives to learning web design. Gamification is using game elements in learning to reinforce positive learning behaviour (Ariani, 2020). Based on this, gamification is

used in this training during the web design learning process.

In addition to using gamification, which in this case utilizes HSS learning, the W3Schools platform is also used. W3Schools is an online web tutorial that students can access for free (W3Schools, 2024). This activity aims to provide students with new experiences and knowledge in learning web design. It is hoped that this activity will improve students' competence in web design.

METHOD

This training used the service learning method. Service learning is a learning and teaching strategy that provides students with experience (Nusanti, 2014). The partner school is a state vocational school in Malang City. This partner was chosen because it had previously collaborated with the author's institution, and the school principal expressed a need for activities that could enhance the school's community's competence, such as training. The main stages of this method are the preparation stage, the service stage, and the reflection stage, as shown in Figure 1.

The steps for implementing the training in vocational schools included: (1). Preparation Stage: (a) Field survey, (b) Partner problem identification, (c) Instrument preparation in the form of modules, (2). Implementation Stage: (a) Determining learning objectives, (b) Identifying student needs, (c) Designing activities, (d) Implementation, and (3). Reflection Stage: Evaluation.

The field survey was conducted by visiting the partner school. This aims to identify problems and seek permission to conduct the activities.

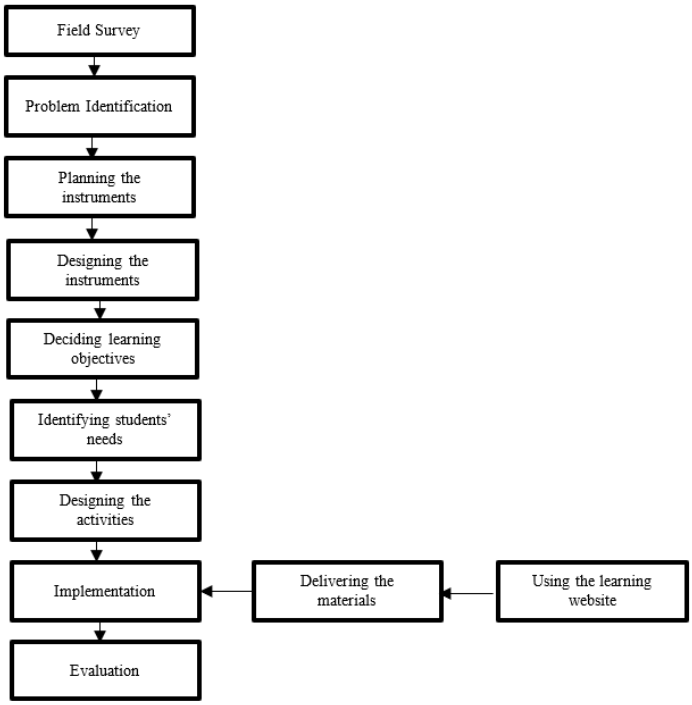

Figure 1 Stages of the training

The principal, the curriculum deputy, and the department head attended interviews with school officials to identify problems. From these interviews, it was determined that 32 students from the Software Engineering program, grade X, were suitable for this training.

The next step was to determine the learning objectives to be achieved. This

is important to design games or activities supporting the established learning objectives.

This stage identifies the needs of students and understands their preferences regarding certain types of games or activities. This is done through interviews or surveys with the department head.

At this stage, the media that the students will use are prepared, including gamification elements that can support learning objectives and meet student preferences.

This stage involves implementing gamification or activities in the vocational high school students' training process. The facilitator must ensure that the web-based learning media with gamification elements aligns with the learning context and supports the set learning objectives.

The final stage is to evaluate the training process. This is done by distributing pre-tests and post-tests via Quizizz to vocational students.

RESULTS AND DISCUSSION

The results of the community service activities can be summarized in several important stages. These stages were carried out carefully to ensure that the implementers' intervention was appropriate and effective. This activity was initiated with a series of preparation plans designed to understand the context and specific needs of the Vocational High School (SMK) that became the partner.

The first stage involved an in-depth survey at the implementation location, specifically at the SMK, which was the focus of our service. During this survey, the implementation team had the opportunity to dialogue with educators and school leadership to understand the dynamics and learning conditions on the ground. The review included available facilities and infrastructure and how teachers interact with web programming subjects, particularly HTML and CSS materials already in place.

The second stage involves observation and interviews with partners. The implementation team aimed to identify and prioritize problems identified during the survey phase. From these interviews, the team understood the need to update the learning methods for HTML and CSS materials to be more interactive and engaging for students, who often found the material boring and difficult to understand.

Next was the data collection stage. The implementation team concentrated on gathering relevant materials for the training process. The team collected various learning resources, compiled a training syllabus, and developed learning materials in accordance with the SMK curriculum but adapted them to the gamification approach to be applied.

The result of these preparations was a well-structured and organized training. The community service activities were conducted smoothly, with active participation from students and full support from the school on August 21 and 24, 2023, from 10:30 AM to 12:00 PM. The instructors delivered the material through lectures and practical sessions using HSS learning. Students showed noticeable enthusiasm for participating in the training, and teachers expressed their appreciation for the innovative teaching materials and methods. At the end of the training, feedback was collected, which will be very useful for further improving the program. This success indicates that the efforts of the implementation team in preparing and planning the activities were not in vain, and it is hoped that this positive impact will endure long after the activities have concluded.

Based on the stages of the HTML & CSS learning platform training implementation that were established,

this activity successfully achieved significant results in community service activities at the Vocational High School (SMK) in the software engineering field. The results of the learning platform implementation will be explained in the following sections.

The learning objectives were to enhance the abilities and understanding of SMK students in HTML and CSS so they could create basic web pages independently. Another target was improving students' problem-solving and logical programming skills. After the training was completed, it was found that these learning objectives were not only achieved, but the students also showed increased interest and confidence in developing their web projects.

Interviews before the training identified student needs. These interviews found that students needed a more practical and interactive approach to learning, so the training materials were designed to be more enjoyable.

The training activities were implemented in two RPL (Software Engineering) classes. According to the initial plan, the first class was taught using W3Schools and the other class was given website design training using HSS Learning, as seen in Figure 2.

Figure 2 (a) Training implementation using w3schools and (b) Training implementation using HSS learning

The training results showed that this approach successfully met the student's needs, with many expressing that the training was very helpful in understanding concepts they previously found difficult.

The activities were designed as games that allowed students to apply HTML & CSS code in real-world scenarios and solve simulated challenges. As a result, these activities were very popular among students, with many of them actively and competitively engaged. This improved their skills and increased their enthusiasm for learning and collaboration among students.

Overall, the results of this community service activity show a substantial improvement in students' skills and knowledge of HTML & CSS. Qualitative assessments from students and teachers indicate a high level of satisfaction with the training provided, and practical skills tests show that most students successfully applied what they learned. The impact of this activity will last long, providing students with the ability and confidence to pursue careers in software engineering and web development.

Analysis of Pre-Test and Post-Test Results

Several interesting findings emerged in the training conducted to compare the effectiveness of two learning platforms, W3Schools and a gamified application using HSS Learning. Initially, students using the W3Schools platform had an

average pre-test score of 34.18, varying by about 12.05 points. After undergoing training with this platform, there was a significant increase in student scores, with an average post-test score reaching 64.48 and a variation of about 13.44 points. This indicates that the W3Schools platform effectively improves student understanding and provides relatively consistent results among students.

On the other hand, the gamified application platform showed a slightly different profile. Although students using this platform initially had a slightly lower average pre-test score of 27.63 with a variation of about 10.23 points, they showed significant improvement after the training, with an average post-test score reaching 63.75. Interestingly, the variation in student performance after training with this platform was larger, with a standard deviation of 22.02 points. This indicates that although the gamified application effectively improves student understanding, the results are more varied among students than W3Schools.

Overall, both platforms have their respective advantages and effectively improve student understanding. However, to achieve more consistent results among students, W3Schools might be a better choice, while the gamified application might be more suitable for students who need a more varied learning approach.

To determine the most effective HTML learning platform between W3Schools and the gamified application, a comparison was made of the average score improvement of students after undergoing training with each platform. Based on the analysis, the gamified application platform showed an average improvement of 36.13 points, slightly higher than the improvement achieved by W3Schools, which was 30.30 points. This aligns with previous research explaining that gamification can enhance learning outcomes, student learning motivation (Wardana & Sagoro, 2019), and student interest (Syuhada, Hidayat, Mulyati, & Persada, 2024). This suggests that, from the perspective of average improvement, the gamified application provides slightly better results than W3Schools.

However, there is an important point to consider. Although the application of gamification through HSS Learning shows a greater improvement, the variation in student results after training with this platform is also larger. This means that while some students may benefit significantly from the gamified application, other students may receive different benefits. On the other hand, W3Schools offers more consistent results among students, which may be more desirable in a formal education context.

Thus, even though the gamified application shows higher average improvement, the decision to choose the best platform should consider other factors such as consistency of results and the specific needs of the students. If the goal is to achieve maximum improvement for most students, the gamified application might be the right choice. However, if consistency and reliability of results are a priority, then W3Schools might be a better choice. This is supported by previous research, which found that W3Schools is the most frequently visited website as a learning resource for programming languages (Ratnasari & Wibawa, 2020).

Figure 3 is a visualization of the distribution of Pre-test and Post-test scores for the W3Schools platform and the Gamification Application platform. Figure 3 is a Histogram for the W3Schools Platform. The histogram shows the distribution of scores before and after the test. Post-test scores are generally higher than Pre-test scores, indicating increased scores after using the platform. The Post-test score

distribution is shifted to the right, indicating that students generally performed better on the Post-test. The Histogram for the Gamification Platform Application shows the pre-test and post-test scores distribution. The Post-test scores also show an improvement compared to the Pre-test scores. The spread of post-test scores is wider, and there are higher scores than in the pre-test, indicating significant improvement for some students.

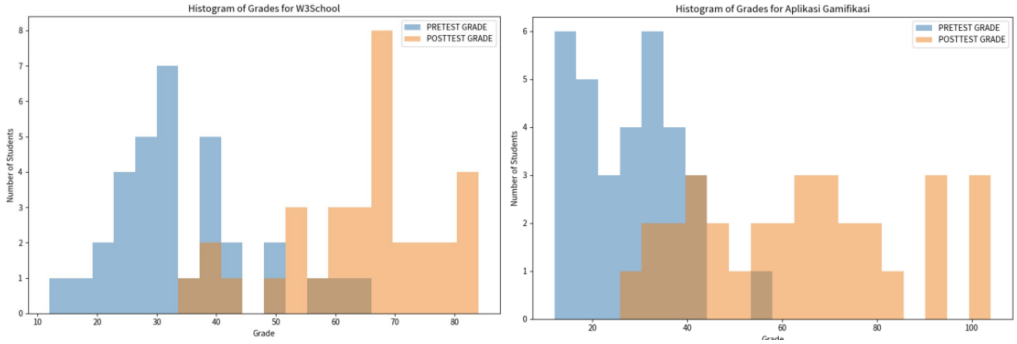

Figure 3 (a) Distribution of pre-test and post-test scores for students using w3schools, and (b) Distribution of pre-test and post-test scores for students using HSS

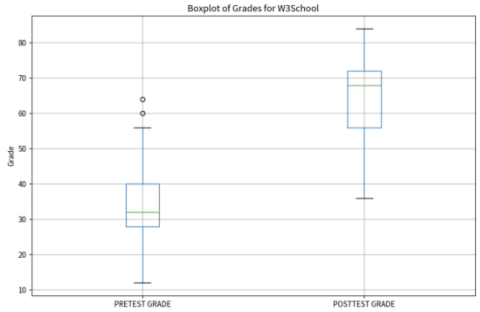

Figure 4 Boxplot for Learning with W3Schools

Based on the boxplot in Figure 4, learning with the W3Schools application improves student performance from pre- and Post-test. The median for "PRE-TEST GRADE" is around 40, while for "POST-TEST GRADE", it increases to just above 60. This indicates a significant increase in student scores after taking the test. Additionally, the variation in Pre-test scores appears more consistent with a narrower interquartile range, while the Post-test shows a wider distribution of scores.

Nevertheless, some students in the Pre-test showed outstanding performance, as indicated by the presence of outliers above Q3. Conversely, no outliers are visible in the Post-test, indicating that most students had relatively uniform and improved performance compared to the Pre-test. Overall, the data illustrate that most students benefited from the training or teaching between the Pre and Post-tests.

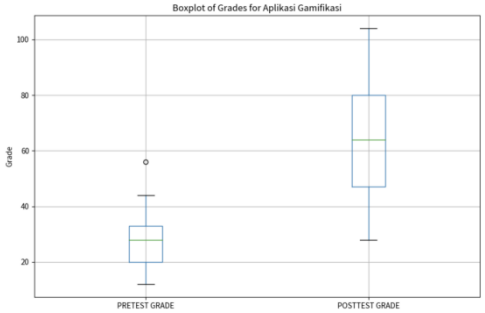

Figure 5 Boxplot for Learning with HSS

The boxplot in Figure 5, which shows "Grades for Gamification Application," reveals several key points. In the "PRE-TEST GRADE," the median student score is around the 40s. This score distribution appears relatively narrow with a not-so-wide interquartile range, indicating consistent performance among most students. However, an outlier around 60 shows that some students performed significantly better than their peers at this stage.

On the other hand, the "Post-Test Grade" shows a higher median, in the range of 60. This indicates an average performance improvement of students after the intervention or implementation of the gamification application. The interquartile range on the Post-test appears wider than the Pre-test, showing greater variation in student performance after the intervention. Nevertheless, there are no outliers visible on the Post-test.

Overall, this boxplot shows that the gamification application has a positive effect on student performance, with an increase in median scores from the Pre-test to the Post-test. Additionally, the greater variation in Post-test scores shows a difference in student responses to the gamification-based learning method.

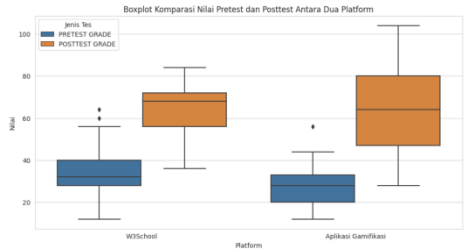

Figure 6 Comparative Analysis of W3Schools and HSS Boxplots

Based on the boxplot analysis in Figure 6, which depicts the distribution of Pre-test and Post-test scores of vocational high school students using the W3Schools platform and the Gamification Application, it can be concluded that both platforms are effective in enhancing students' understanding of HTML. This is marked by an increase in median scores from the Pre-test to the Post-test on both platforms. The W3Schools platform shows higher consistency in score improvement, with a narrower interquartile range on the Post-test, indicating that students on this platform experienced more uniform score increases. On the other hand, the Gamification Application shows greater variability in student score improvements, which may indicate that some students benefited significantly while others did not as much. The presence of outliers on both platforms shows scores that differ greatly from the majority, which may require further investigation to understand the contributing factors. Overall, there is insufficient evidence to state that one platform is superior based solely on score improvement. The choice between the W3Schools platform and the Gamification Application may depend more on individual preferences or other supporting factors not covered in this analysis.

CONCLUSION

The community service activity at SMK Negeri 9 Malang went smoothly according to the established plans. Based on the training results, both platforms, W3Schools and the Gamification Application, proved effective in improving students' understanding of HTML, as shown by the increase in median scores from Pre-test to Post-test. This can encourage teachers to use gamification-based learning media to teach other productive subjects.

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