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IMPROVING WEB PROGRAMMING COMPETENCE THROUGH LARAVEL BOOTCAMP FOR VOCATIONAL HIGH SCHOOL STUDENTS

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ABSTRACT

The rapid development of digital technology requires vocational high school graduates to master practical competencies that align with current industrial needs. However, initial observations at SMK Negeri 2 Cimahi revealed that students in the Software Engineering department were still dependent on procedural programming and had very limited exposure to modern frameworks such as Laravel. This competence gap resulted in low readiness to face professional challenges in web development. To address this issue, a community service program was implemented in the form of a Laravel bootcamp that applied a project-based learning approach. The program involved 40 students who were guided through structured activities including technical preparation, introduction to Laravel concepts, project development of a To-Do List application, and comprehensive evaluation. The evaluation results demonstrated clear improvement, with the average pre-test score of 46.25 increasing to 72.80 in the post-test. Further analysis of competency achievement showed that 85% of participants understood the MVC concept, 90% successfully implemented CRUD functions, 80% mastered authentication, 75% presented projects effectively, and 88% demonstrated strong teamwork. These outcomes confirm that project-based bootcamps can effectively bridge the gap between theory and practice, while strengthening technical competence and enriching teaching resources available for schools and higher education institutions.

***Keywords**: Laravel, project-based learning, web programming, vocational school, bootcamp*

1. INTRODUCTION

The evolving landscape of vocational education in Indonesia, particularly within vocational high schools (SMK), highlights the critical need for curricula that are responsive to the demands of a rapidly changing digital industry. The current educational framework at SMK Negeri 2 Cimahi reveals a significant gap between the skills imparted to students and the expectations from the job market. Observations indicate that students are primarily exposed to basic procedural PHP programming without the advanced knowledge required for modern frameworks such as Laravel. These deficiencies underscore the necessity for an enhanced educational approach that integrates practical, industry-relevant skills alongside theoretical knowledge.

Laravel has gained prominence within the software development community due to its user-friendly structure and support for advanced programming paradigms, such as the MVC architecture, which aligns well with the requirements of complex web applications. The suitability of Laravel as a teaching tool is underscored by research conducted by (Hamdani et al., 2021) which discusses the necessity of adapting vocational education to meet the technological demands of industries (Hamdani et al., 2021). Furthermore, its increasing adoption in industry settings necessitates a curriculum update across vocational schools, where the focus traditionally has been more on foundational procedural programming (E. Okoye & Nkanu, 2020;Rosina et al., 2021).

In discussions of educational reform, it's essential to consider service-learning as a foundational element. Programs proposed by higher education institutions can effectively bridge practical training with academic knowledge. Such initiatives, including workshops and boot camps tailored to current industry standards, provide students with hands-on experience while directly addressing existing skill gaps. For instance, service learning models have been shown to greatly enhance students' technical competence while fostering crucial soft skills such as teamwork and problem-solving (Marcus et al., 2020; Yoto, 2021). These findings highlight the value of project-based learning strategies that align educational experiences with real-world applications, thus preparing students for immediate employment (Hidayat et al., 2024)

Moreover, effective partnerships between vocational schools and the industry are crucial for ensuring that graduates possess the competencies that employers seek. Collaborative efforts in curriculum design can aid in closely aligning educational outcomes with job market requirements, thereby increasing employability rates among graduates (Buntoro Wahjono & Kristianto, 2022; Khoerunnisa et al., 2020; Subiyantoro et al., 2023). This synergy is essential in ensuring that vocational education evolves alongside technological advancements and industrial needs.

In conclusion, enhancing the vocational education landscape in Indonesia requires not only an update of curricular content to include modern programming frameworks like Laravel but also a commitment to innovative learning methodologies that integrate practical experiences and industry collaborations. This multifaceted approach will not only equip students with the requisite technical skills but will also enhance their adaptability and readiness for the labor market, thereby fulfilling the overarching goals of vocational education in an increasingly digital world.

2. METHOD OF IMPLEMENTATION

2.1 Location and Time

The program was conducted at SMKN 2 Cimahi, located in Cimahi, West Java, approximately 7.9 kilometers from Universitas Logistik dan Bisnis Internasional (ULBI). The activities took place in September 2025 and involved students from the Software Engineering department. The close proximity of the partner institution to ULBI facilitated regular mentoring, direct supervision, and effective coordination throughout the two-day program.

Fig 1. Software Engineering Laboratory Classroom

This Fig 1. shows the practical laboratory classroom of the Software Engineering department at SMK Negeri 2 Cimahi, which served as the main venue for the Laravel bootcamp. The facility was used for lectures, coding practices, and mentoring sessions during the program.

Fig 2. School Yard of SMK Negeri 2 Cimahi

This Fig 2 captures the outdoor school yard of SMK Negeri 2 Cimahi with participants of the Laravel bootcamp. The photo illustrates the enthusiasm and active participation of students in group activities outside the classroom setting.

2.2 Target Audience

The participants of this program were 40 students from the Software Engineering (RPL) department of SMKN 2 Cimahi. They represented a diverse range of abilities, with some students already familiar with basic web development, while others had limited exposure. The selection of participants was based on teacher recommendations and student interest. The program was specifically designed for vocational high school students because they are at the critical stage of preparing for either direct entry into the workforce or continuing their studies at the tertiary level.

2.3 Service Methods

The service program adopted a project-based learning approach, where students were guided to complete a real project development of a To-Do List application. The program was divided into several stages. First, technical preparation was conducted to install XAMPP, Composer, and Laravel, and configure the database. This step ensured all students had the same learning environment. Second, students were introduced to the core concepts of Laravel, including MVC architecture, routing, Blade templating, and middleware. This Fig 3 shows students actively engaged in a simulation session during the Laravel bootcamp. Each participant worked individually on their computer to practice coding tasks and apply the concepts of MVC, CRUD, and authentication that had been introduced in the learning sessions. The simulation activity provided students with hands-on experience that helped strengthen their technical understanding. This theoretical foundation was crucial for building the project.

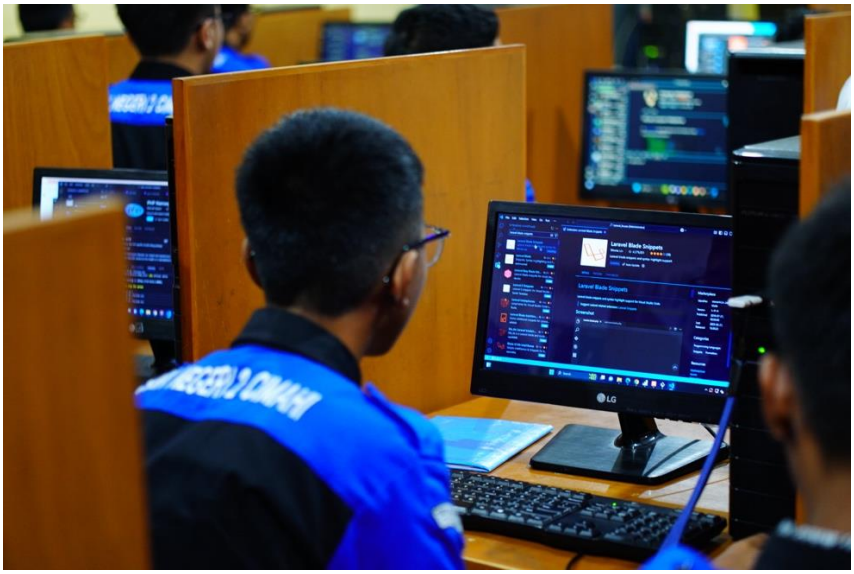

Fig 3. Student Simulation Activity

The next stage was the main project development. Students worked on building a To-Do List application that included CRUD features, authentication (login and registration), and role-based access control for administrators and users. The project was selected for its simplicity and scalability, allowing students to apply essential Laravel concepts while also leaving room for creativity and extension. To contextualize learning, case studies relevant to school and small business needs were provided, simulating real-world challenges. Throughout the process, facilitators provided guidance while encouraging students to solve problems independently and collaboratively.

2.4 Success Indicators

The success of the activity was measured by several indicators: (1) improved scores in post-test compared to pre-test results, (2) completion of the To-Do List application by each participant or group, (3) students' ability to explain and present their projects, and (4) increased motivation and active participation during discussions and group work.

2.5 Evaluation Methods

Evaluation was conducted using both quantitative and qualitative methods. Quantitative evaluation was based on pre-test and post-test results to assess knowledge gain. Qualitative evaluation was based on project outputs, group presentations, and observations of student engagement. Documentation in the form of photos, reports, and project files was also collected to support the evaluation process.

3. RESULTS AND DISCUSSIONS

3.1 Bootcamp Preparation

During the initial stage, students successfully installed and configured the required tools, including XAMPP, Composer, and Laravel. Although some students encountered technical difficulties, peer-to-peer learning and facilitator support ensured that all participants were able to proceed. This stage highlighted the importance of creating a standardized development environment before deeper learning could occur.

3.2 Introduction to Laravel Concepts

The introductory sessions focused on understanding the Laravel framework, particularly the MVC architecture and its application in real-world projects. Students learned about routing, controllers, and views through simple examples. Blade templating was introduced to simplify the presentation layer, while middleware was discussed to emphasize the importance of security and access control. Feedback from students indicated that the clear separation of logic and presentation in Laravel made programming more systematic compared to procedural PHP.

3.3 Project Development: To-Do List Application

The core of the bootcamp was the development of a To-Do List application. Students were divided into small groups, each tasked with building the application step by step. The project involved user authentication, CRUD operations for managing tasks, and role-based access management. By working on this application, students could directly apply theoretical knowledge while also learning practical skills such as debugging, version control, and teamwork. The project also encouraged creativity, as some groups added additional features like notifications and task categorization.

3.4 Evaluation and Reflection

Based on Table 1 Evaluation results showed a significant improvement in the technical competence of the participants. The evaluation was conducted on **40 students (N=40)**. Pre-test scores averaged **46.25 out of 100**, while post-test scores increased to an average of **72.80**, indicating an improvement of approximately **35%**. Group presentations revealed that students could not only build functional applications but also explain the logic behind their code. Reflections collected at the end of the program showed that students felt more confident in tackling programming challenges and were motivated to explore further projects independently.

Table 1. Average Results of Participants' Pre-test and Post-test (N=40)

Tahap Evaluasi	Nilai Rata-rata	Standar Deviasi	Persentase Kenaikan
Pre-test	46,25	8,12	-
Post-test	72,80	7,85	+35%

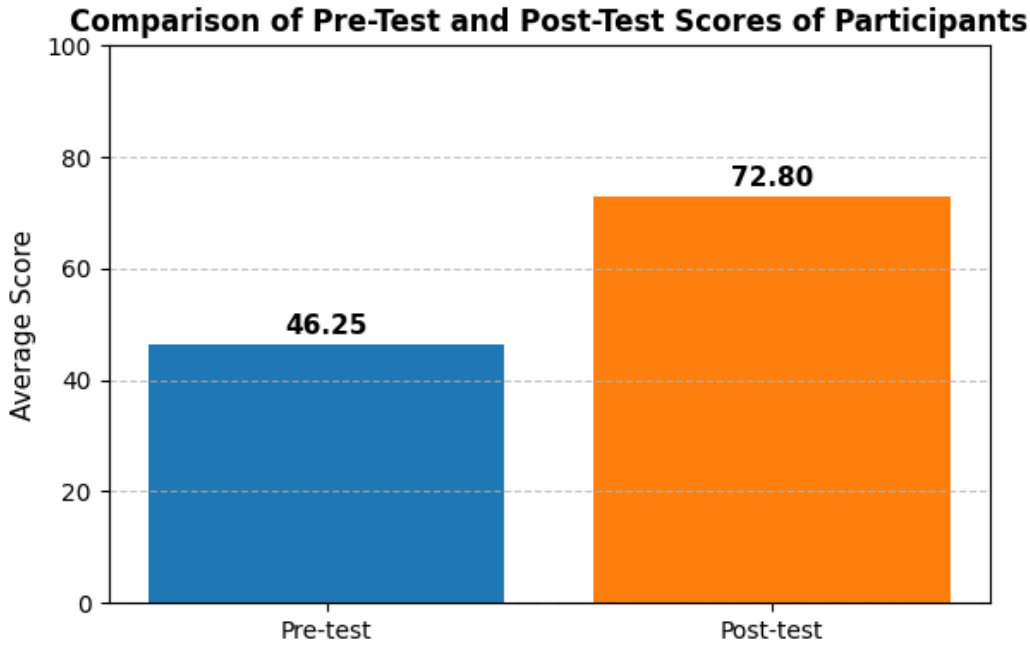

Figure 4. Comparison of Pre-Test and Post-Test Scores of Participants

Fig 4 illustrates the difference between the average pre-test and post-test scores of participants in the Laravel Bootcamp. The blue bar represents the pre-test average score of 46.25, while the orange bar represents the post-test average score of 72.80. The 35% increase demonstrates a substantial improvement in students' understanding and skills after participating in the project-based learning program.

3.5 Activity Success

Overall, the program achieved its objectives. The bootcamp significantly improved students' competence in various aspects of web development as shown in **Table 2**. The evaluation results indicated that **85% of students were able to explain the MVC concept**, **90% successfully implemented CRUD functions**, and **80% managed to apply authentication and user management features**. Furthermore, **75% of the participants delivered project presentations effectively**, while **88% demonstrated active collaboration within their groups**. These achievements highlight that the hands-on approach helped bridge the gap between theory and practice, while project-based learning created a meaningful and engaging learning experience. Teachers also benefited from the program, as they could adopt the learning module and student project examples for future classroom use. These findings are consistent with Sukmawati et al. (2021), who emphasized the effectiveness of project-based learning in improving vocational education outcomes.

Table 2. Learning Outcomes of Laravel Bootcamp Participants

Competence	Success Indicator	Percentage of Participants
MVC Understanding	Able to explain MVC flow	85%
CRUD Implementation	Successfully created CRUD functions	90%
Authentication & User Management	Login, register, role-based access	80%
Project Presentation	Able to explain project results	75%
Team Collaboration	Active in group work	88%

4. CONCLUSION

This community service program successfully demonstrated the effectiveness of a Laravel bootcamp workshop in enhancing the web programming competencies of vocational high school students. Based on evaluations involving 40 participants, there was a notable increase in both knowledge and skills, reflected in the significant improvement of test scores and competency achievements across key aspects such as MVC understanding, CRUD implementation, authentication, project presentation, and teamwork. The application of project-based learning not only facilitated deeper technical comprehension but also fostered collaborative and independent learning among students. In addition, the program produced tangible outputs in the form of a learning module and project documentation that can be integrated into classroom teaching. These results underline the importance of innovative, practice-oriented learning methods to strengthen vocational education and bridge the gap between academic instruction and industry demands.

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