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Implementation of Cisco Packet Tracer–Based Learning Media Integrated with a Learning Management System (LMS) at SMK Bangun Negeri Hu'u

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Abstract
The development of technology-based learning media is a strategic necessity in vocational education to improve instructional quality and teacher competence. Computer networking instruction often encounters limitations related to the availability of practical equipment and the high cost of laboratory infrastructure. This study aims to develop and implement learning media based on the Cisco Packet Tracer simulator integrated with a Learning Management System (LMS) using the ADDIE development model. This research employed a Research and Development approach involving 20 teachers from SMK Bangun Negeri Hu'u as research participants. Data were collected through practicality questionnaires, effectiveness questionnaires, and observations. The results indicate that the developed learning media achieved an average practicality score of 3.52 and an effectiveness score of 3.47 on a four-point Likert scale, both categorized as very good. These findings demonstrate that Cisco Packet Tracer–based learning media integrated with an LMS are practical and effective in supporting computer networking instruction in vocational high schools.

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1. INTRODUCTION

Digital transformation in education necessitates the systematic integration of technology into instructional processes, particularly in vocational education. Vocational High Schools (Sekolah Menengah Kejuruan/SMK) are expected to produce graduates equipped with competencies aligned with workforce demands, especially in the field of computer networking. Therefore, the development of relevant and effective learning media is essential.

Computer networking instruction in vocational schools frequently faces challenges related to limited networking laboratory facilities and hardware availability, which negatively affect the achievement of practical competencies. Recent studies indicate that the use of digital learning media and Learning Management Systems (LMS) can enhance instructional effectiveness and educators' digital literacy. Network simulation tools such as Cisco Packet Tracer offer a practical solution by enabling hands-on learning through virtual simulations that closely resemble real-world networking environments. Integrating such simulators with an LMS allows learning activities to be managed in a more structured, flexible, and well-documented manner. Based on this context, the present study focuses on the implementation of Cisco Packet Tracer–based learning media integrated with an LMS at SMK Bangun Negeri Hu'u.

2. METHOD

This study employed a Research and Development (R&D) methodology using the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation.

The analysis stage involved identifying instructional needs, teacher characteristics, and the availability of infrastructure for computer networking instruction. The design stage focused on developing the structure of the learning media, instructional materials, learning scenarios, and research instruments. During the development stage, Cisco Packet Tracer–based learning media were created and integrated into an LMS, followed by validation from subject matter experts and media experts.

The implementation stage involved 20 teachers from SMK Bangun Negeri Hu'u who utilized the developed learning media during instructional and training activities. The evaluation stage aimed to assess the practicality and effectiveness of the learning media through questionnaires and observations. Data were analyzed using descriptive statistical techniques.

3. RESULTS AND DISCUSSION

The results show that the Cisco Packet Tracer–based learning media integrated with an LMS achieved a very high level of practicality, with an average score of 3.52. Teachers reported that the media were easy to use, featured a clear interface, and improved instructional time efficiency. These findings indicate that LMS integration plays a significant role in facilitating instructional management and enhancing user convenience.

In terms of effectiveness, the learning media achieved an average score of 3.47, which falls within the very good category. This result suggests that the media effectively enhance teachers' conceptual understanding and practical skills in computer networking. The use of the Cisco Packet Tracer simulator provides experiential learning opportunities, allowing teachers to explore network configurations and troubleshoot problems systematically without the risk of damaging physical equipment.

The success of the learning media is also attributable to the application of the ADDIE model, which offers a systematic and user-oriented framework for instructional development. Furthermore, the integration of simulation-based learning with an LMS supports adaptive and flexible learning environments, enabling teachers to access materials and practice activities anytime as needed. These findings reinforce previous research indicating that simulation-based learning combined with LMS platforms is an effective strategy for improving the quality of vocational education.

4. CONCLUSION

Based on the findings of this study, it can be concluded that Cisco Packet Tracer–based learning media integrated with an LMS and developed using the ADDIE model are practical and effective, as evidenced by implementation involving 20 teachers at SMK Bangun Negeri Hu'u. The learning media enhance conceptual understanding and practical networking skills while supporting more structured and adaptive instructional processes. Therefore, the developed learning media are suitable for implementation and further development in vocational education contexts.

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