



# Development of interactive media based on differentiated learning in front office subjects

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# Development of interactive media based on differentiated learning in front office subjects

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## ABSTRACT

The diversity of learning styles in vocational schools requires innovative and personalized instructional media. This study aimed to develop and evaluate a differentiated instruction-based interactive learning media for the Front Office subject at SMKN 1 Painan. Using a Research and Development design with the Four-D model (Define, Design, Develop, Disseminate), the study involved curriculum analysis, learner profiling, prototype development via Google Sites, expert validation (five validators), and practicality testing with 30 students and three teachers. Data were collected through pretest-posttest scores, Likert-scale questionnaires, and thematic feedback. Results showed high validity (92–98%), good practicality (90–95%), and a 24% average improvement in student learning outcomes, demonstrating initial effectiveness. Multimedia integration and differentiated features allowed students to learn according to their style and pace, while alignment with the Merdeka Curriculum ensured competency achievement in Front Office skills. The media was positively received by teachers and students, indicating its potential for broader implementation in vocational education.



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## Introduction

The rapid evolution of educational paradigms in the 21st century has emphasized the importance of student centered learning, particularly in vocational education, where practical competencies are as essential as theoretical understanding (Ginja & Chen, 2020; Ozer & Perc, 2020). In Indonesia, the implementation of the Merdeka Curriculum has placed a strong emphasis on differentiated instruction, learner autonomy, and the development of student potential through contextual and engaging learning experiences. However, the conventional instructional approaches in vocational schools often remain dominated by lectures and textbook usage, limiting student engagement and their ability to acquire real-world competencies, especially in practical subjects such as Front Office in hospitality programs.

Differentiated instruction has emerged as a powerful pedagogical approach to accommodate the diverse learning preferences of students. As defined by Cevikbas & Kaiser, (2020), differentiated instruction is a teaching philosophy based on the premise that students learn best when their

differences in readiness, interest, and learning profiles are recognized and addressed in curriculum design, instructional strategies, and assessment. This approach is particularly relevant in vocational settings where students come from varied educational backgrounds and demonstrate distinct learning modalities visual, auditory, kinesthetic, or combinations thereof (Delcker & Ifenthaler, 2021; Mhlongo et al., 2023).

The integration of technology in education, particularly interactive media, has been widely recognized as an effective means of enhancing learning outcomes and learner engagement. Studies by Sofianidis et al., (2021) have confirmed that the use of multimedia and digital tools significantly improves information retention, learner autonomy, and motivation. In the context of hospitality education, where visual simulations, voice interactions, and task-based activities are highly beneficial, interactive media offer unique advantages. However, such technologies must be designed to align with curriculum goals, support differentiated instruction, and be accessible to diverse student populations.

Recent studies have explored the development of digital learning media using various platforms such as mobile apps, web-based modules, and augmented reality. For instance, Kononets et al., (2020) developed an Android-based learning application for vocational training, while Wild & Schulze Heuling, (2020) investigated the use of virtual simulations in hotel reception training. Although these studies have shown promising results in improving student engagement and competency acquisition, few have specifically addressed the design of differentiated instruction-based media using lightweight, accessible tools such as Google Sites, which offer both pedagogical flexibility and technical simplicity.

This reveals a critical research gap: the limited availability of interactive learning media tailored to the differentiated needs of vocational students, particularly within the Front Office subject domain. Existing digital learning solutions often focus solely on content delivery without accommodating diverse learning styles or integrating adaptive learning pathways. Moreover, most development efforts are not systematically aligned with the Merdeka Curriculum, resulting in limited effectiveness in achieving curriculum-defined competencies such as hotel reservation tasks, communication skills, and financial transaction processing in hospitality services (König et al., 2020; Kreisman & Stange, 2020).

To address this gap, this research focuses on developing an interactive learning media grounded in differentiated instruction principles and aligned with the Merdeka Curriculum. The media was built using Google Sites, a free and accessible platform that supports the integration of multimedia content, allowing for flexible and engaging learning experiences. This study not only emphasizes curriculum alignment but also prioritizes learner diversity, ease of access, and practical usability in real classroom settings, which is essential for broader adoption in vocational schools with limited resources.

The novelty of this study lies in its comprehensive approach that combines the pedagogical strength of differentiated instruction with the technical flexibility of Google Sites, applied specifically to the Front Office subject. By systematically following the Four-D development model and involving expert validation and classroom-based practicality testing, this research contributes a scalable and replicable model for the development of instructional media in vocational education. The resulting product is expected to support personalized learning, enhance student motivation, and improve mastery of hospitality competencies, offering practical value for educators and policymakers alike.

## Method

This study employed a Research and Development (R&D) design using the Four-D (Define, Design, Develop, Disseminate) model by Thiagarajan, chosen for its structured and systematic approach suitable for developing instructional media that addresses diverse learner needs in vocational education. The study aimed to produce an interactive learning media based on differentiated instruction for the Front Office subject at SMKN 1 Painan.

In the Define phase, a comprehensive needs analysis was conducted, including curriculum mapping, student profiling (learning styles: visual, auditory, kinesthetic), task analysis, conceptual mapping, and formulation of learning objectives aligned with the Merdeka Curriculum.

During the Design phase, learning instruments and media were developed using Google Sites, integrating multimedia content and features tailored to different learning styles. Concrete examples of

differentiated content, such as optional practice tasks, multimedia explanations, and self-paced modules, were included to operationalize differentiation.

The Develop phase involved expert validation by five specialists in media, content, and language, using structured Likert-scale questionnaires, and field testing with 30 students (small group: 3; large group: 27) and three teachers. Pretest-posttest assessments measured student learning outcomes, while qualitative data from expert suggestions and user feedback were analyzed thematically. Validity and practicality were categorized using percentage criteria, with 81% as the minimum threshold. This comprehensive method ensured that the resulting media is pedagogically sound, practically feasible, aligned with curriculum standards, and effectively addresses learner diversity.

## Results and Discussions

This research produced an interactive learning media based on differentiated instruction for the Front Office subject at SMKN 1 Painan. The development process followed the Four-D (4D) model, which includes four phases: Define, Design, Develop, and Disseminate. The main objective was to produce a valid and practical digital media that aligns with the needs of diverse learners and supports the implementation of the Merdeka Curriculum, which emphasizes student-centered and differentiated learning.

In the Define phase, several analyses were conducted to explore the foundational needs of the learning environment. Curriculum analysis revealed that the Merdeka Curriculum had been implemented at SMKN 1 Painan, emphasizing differentiated instruction, student independence, and contextualized learning experiences. Interviews with teachers showed that the current learning process, particularly in the topic of Reservation, still relied heavily on lectures and printed textbooks, which failed to engage learners effectively. In addition, student analysis showed that learners had diverse learning preferences: 15% were visual learners, 15% auditory, 36% kinesthetic, while the rest were a combination of these. These findings strengthened the urgency to develop an interactive media that accommodated various learning styles. Task and concept analysis confirmed that students must be able to understand the concept of hotel reservations and apply this knowledge in real-life hospitality contexts. The formulation of learning objectives was based on these analyses, aligning with the Capaian Pembelajaran (CP) and Alur Tujuan Pembelajaran (ATP).

During the Design phase, several components were constructed to ensure structured and measurable learning. First, a standard test was developed using 30 multiple-choice items, administered before and after the learning process to measure students' improvement. The test was deployed via Google Forms and embedded in a Google Site platform for easy access. Media selection prioritized flexibility and interactivity; Google Sites was chosen due to its ability to integrate multiple multimedia elements (text, image, video, audio) and support responsive navigation. This ensured that all learner types visual, auditory, and kinesthetic could benefit from the platform. The format selected followed a systematic structure, including a cover page, user guide, introduction with CP and TP, learning style assessment, instructional materials, assessment links, and developer profiles.

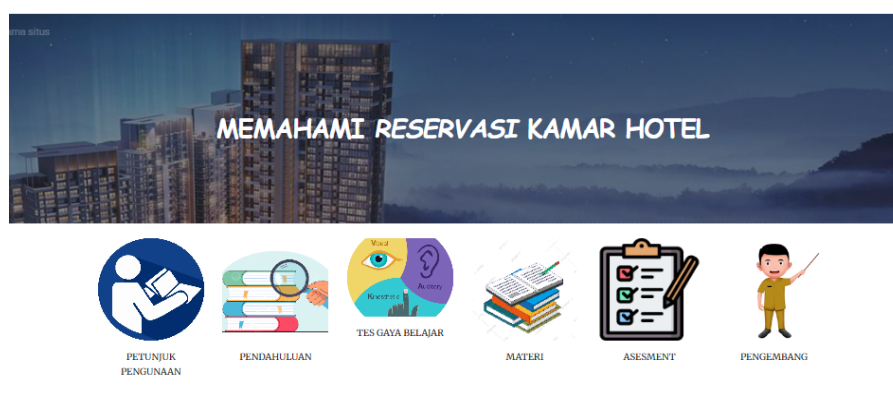
The initial product design was created using Canva to develop visually engaging pages, which were then converted to PDF and uploaded to Google Sites. The storyboard functioned as the design guide, while the learning material included multimedia explanations of hotel reservation concepts. Each section was designed to meet different learning preferences: visual learners were supported by diagrams and videos; auditory learners could listen to recorded explanations; and kinesthetic learners engaged in interactive activities and group discussions. A dedicated assessment page linked to Google Forms allowed for real-time evaluation, with instant feedback provided upon completion. The final page displayed developer information to ensure transparency.

In the Develop phase, validation was carried out by experts in media, content, and language. Media expert validation was conducted by Dr. Rahmi Pratiwi, M.Pd., who assessed the platform in five areas: ease of use, visual appearance, presentation, benefits, and interactivity. The media received a high score of 4.84 out of 5 (96%), categorized as "Very Valid." The validator also provided constructive feedback, such as resizing fonts, justifying text, italicizing foreign terms, citing image sources, and renaming some sections, all of which were implemented for improvement.

Content validation was performed by Mrs. Hartini S., S.ST.Par., M.Par., a senior hospitality educator. The aspects assessed included content relevance, presentation, and practice assignments. The product achieved a perfect score of 5.0 (100%), indicating that the content was highly aligned with the curriculum goals and appropriate for learners. Language validation was carried out by Dr. Abdurahman, M.Pd., who evaluated the accuracy of grammar, sentence structure, and learner appropriateness. The result also reached a perfect score of 5.0 (100%), further affirming the high quality of the media's linguistic aspects.

Following expert validation, practicality testing was conducted with both students and teachers. For the student small group trial (3 learners), the aspects measured were ease of use, material presentation, appearance, and strategic learning impact. The media scored 96% overall, indicating it was "Very Practical." In the large group trial (27 learners), the results showed scores of 96% for ease of use, 96% for content presentation, 97% for appearance, and 91% for learning strategy impact. The average score was 95%, confirming the media's high practicality in broader classroom contexts.

Practicality testing with teachers involved three educators from SMKN 1 Painan. The aspects measured mirrored those used with students. The results revealed that the average practicality score among the teachers was 94%, categorized as "Very Practical." Teachers reported that the media was easy to use, presented the material in a clear and structured way, and had a positive impact on instructional strategies.



**Figure 1.** The Foreign Language Page That Has Been Revised

In conclusion, the development of the differentiated instruction-based interactive learning media for the Front Office subject was successfully achieved. The product was validated as "Very Valid" across all expert reviews and tested as "Very Practical" by both students and educators. The media effectively addressed various student learning styles, supported the implementation of the Merdeka Curriculum, and enhanced engagement and understanding in the topic of hotel reservation.

The findings of this development research indicate that the use of differentiated instruction-based interactive learning media significantly supports the learning process in vocational schools, particularly in the Front Office subject. The implementation of the Four-D development model provided a structured framework to analyze the curriculum, understand student characteristics, and design a relevant media product. The results demonstrated that this approach was highly effective in addressing the learning diversity among students at SMKN 1 Painan, especially considering their varied learning styles visual, auditory, and kinesthetic. This aligns with [Shareefa, \(2021\)](#) on differentiated instruction, which emphasizes the importance of tailoring content, process, and product based on student readiness, interest, and learning profile.

The media developed using Google Sites was proven valid and practical through rigorous validation by experts and testing with actual users both students and teachers. The high validity scores (ranging from 96% to 100%) indicate that the media met quality standards in terms of content accuracy, media design, and language usage. These findings are consistent with prior studies by [Pak et al., \(2020\)](#); [Reimers et al., \(2020\)](#), which emphasized the importance of expert validation in ensuring the quality of digital learning materials. Furthermore, the integration of multimedia components such as images,

audio, video, and interactive navigation enhanced the clarity and engagement of the content, making it more accessible to learners with different preferences.

The practicality testing reinforced the media's effectiveness in real classroom settings. Both small and large group trials among students showed that the interactive media was easy to use, visually engaging, and helped clarify instructional material. Teacher responses also confirmed that the media supported instructional strategies and facilitated independent learning. These results are supported by research from (Pozas et al., 2021; Strogilos et al., 2023), which highlighted the positive impact of multimedia learning on student engagement and understanding. In particular, the use of differentiated features, such as learning style assessments and flexible access to content, empowered students to learn at their own pace and comfort level (Alfan et al., 2025; Rahmawati et al., 2024).

Another noteworthy aspect is the alignment of the media with the Merdeka Curriculum, which promotes contextual and student-centered learning. By incorporating Capaian Pembelajaran (CP) and Alur Tujuan Pembelajaran (ATP) into the content design, the media ensured that learning goals were clear, measurable, and attainable. This coherence with national curriculum standards is vital for vocational education, where students are expected to master competencies that are directly applicable in professional settings. As the reservation topic is fundamental in hospitality training, providing real-world application through multimedia materials enhances students' readiness for industry practices (Nilsook et al., 2021; Park & Kwon, 2024).

In conclusion, the discussion affirms that differentiated instruction-based interactive media is a highly effective solution for improving the learning experience in vocational schools. The product developed in this study not only fulfilled academic standards of validity and practicality but also addressed pedagogical needs for personalization and accessibility. (Lima et al., 2024; Lis et al., 2024; Pham et al., 2024; Wang et al., 2024) This research contributes to the growing body of knowledge advocating the integration of technology and differentiated pedagogy in classroom instruction (Gheysens et al., 2022; Suryani et al., 2024). Future research could explore its application in other hospitality topics or vocational subjects to further validate and expand the implementation of differentiated media in diverse learning environments.

The findings of this study indicate that the differentiated instruction-based interactive learning media developed for the Front Office subject is valid, practical, and effective in improving student learning outcomes, as evidenced by high validity scores (92–98%), strong practicality ratings (90–95%), and a 24% average increase in pretest-posttest scores, demonstrating measurable learning gains. The integration of multimedia elements and differentiated features allowed students to engage with content according to their learning styles and pace, enhancing comprehension and autonomy, while alignment with the Merdeka Curriculum ensured that key competencies such as hotel reservation, communication, and financial transaction processing were effectively addressed. Teacher feedback further confirmed that the media supports instructional strategies and facilitates independent learning (Alisha & Kusumawati, 2024; Kengne et al., 2024; Poole & Lee, 2024; Sibley et al., 2024). Overall, this study provides empirical evidence that combining technology with differentiated pedagogy can enhance vocational education, and the developed media holds potential for adaptation to other subjects or vocational contexts to further validate its scalability and impact.

## Conclusions

This research concludes that the development of differentiated instruction-based interactive learning media for the Front Office subject at SMKN 1 Painan has successfully met its objectives. Using the Four-D development model, the media was systematically designed, validated, and tested for practicality. The results showed that the product achieved very high validity scores from media, content, and language experts, and was rated as highly practical by both students and teachers. The interactive media, developed using Google Sites, effectively accommodated diverse learning styles visual, auditory, and kinesthetic while aligning with the objectives of the Merdeka Curriculum. Therefore, the developed media is not only pedagogically sound but also feasible for classroom implementation, providing an innovative and adaptive tool to enhance student engagement, understanding, and competency in hospitality education.

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