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# DEVELOPMENT OF CHATBOT LEARNING 4.0 PLATFORM FOR OFFICE ENVIRONMENT IN IMPROVING THE QUALITY OF HUMAN RESOURCES OFFICE MANAGEMENT IN INDONESIA

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**Abstract**

The development of the quality of human resources (HR) in office management in Indonesia is becoming increasingly important amid the dynamics of the Industrial Revolution 4.0, which demands adaptation to digital technology in the work environment. Despite various efforts to improve human resource competence, there are still limitations in the effective and efficient application of educational technology for office managerial training needs. This study aims to develop and determine the feasibility of chatbot-based learning in the office environment, especially in improving the quality of office management human resources. The results of the study show that the validation of the material obtained an average score of 85.99% (very valid category), media validation with a score of 87% (very valid category), and validation of the chatbot learning platform with a score of 84.5% (very valid category), indicating that the platform developed is feasible and effective to be used in learning in the office environment. The implications of this study show that the integration of chatbot learning technology can be an innovative solution to improve the quality of human resources in the field of office management in Indonesia, as well as answer the challenges of the Industrial Revolution 4.0.

**Keywords :** Platform, Chatbot, Human Resources, Office Management

**Abstrak**

*Pengembangan kualitas sumber daya manusia (SDM) dalam manajemen perkantoran di Indonesia menjadi semakin penting di tengah dinamika Revolusi Industri 4.0 yang menuntut adaptasi teknologi digital di lingkungan kerja. Meskipun telah dilakukan berbagai upaya untuk meningkatkan kompetensi sumber daya manusia, namun masih terdapat keterbatasan dalam penerapan teknologi pendidikan yang efektif dan efisien untuk kebutuhan pelatihan manajerial perkantoran. Penelitian ini bertujuan untuk mengembangkan dan mengetahui kelayakan pembelajaran berbasis chatbot di lingkungan perkantoran, khususnya dalam meningkatkan kualitas sumber daya manusia manajemen perkantoran. Hasil penelitian menunjukkan bahwa validasi materi memperoleh skor rata-rata 85,99% (kategori sangat valid), validasi media dengan skor 87% (kategori sangat valid), dan validasi platform pembelajaran chatbot dengan skor 84,5% (kategori sangat valid), menunjukkan bahwa platform yang dikembangkan layak dan efektif untuk digunakan dalam pembelajaran di lingkungan perkantoran. Implikasi dari penelitian ini menunjukkan bahwa integrasi teknologi pembelajaran chatbot dapat menjadi solusi inovatif untuk meningkatkan kualitas sumber daya manusia di bidang manajemen perkantoran di Indonesia, sekaligus menjawab tantangan Revolusi Industri 4.0.*

***Kata Kunci** : Platform, Chatbot, Sumber Daya Manusia, Manajemen Perkantoran*

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**Introduction**

Technological advances in the world of Industry 4.0 have brought significant changes to various aspects of life, especially in the work environment (Patton, 2019). Integrating innovative solutions in office management is the primary need to improve the quality of human resources in the world of work (Ezechukwu et al., 2021). Indonesia's economic growth makes it essential to fulfill worker skills in the office management sector in line with the increasingly complex flow of global development (Basuki, Churiyah, et al., 2023). The technological revolution has been heavily encouraged by governments to support the development of dynamic businesses and the circular economy (Ammirato et al., 2023). Office management systems can provide space for the demands of a rapidly growing workforce and changing organizational structures, so it is necessary to take advantage of advances in digital technology (Mayangsari et al., 2015). In addition, the COVID-19 pandemic has accelerated the digital transformation of office management practices in Indonesia and globally (I N Suputra et al., 2021). The increase in users towards virtual technology, communication, and work management has been widely adopted during the work-from-home period in the pandemic era (Cichosz et al., 2020).

Based on existing research data, 86% of company leaders have taken digital transformation initiatives in response to this pandemic by managing the risk of transmission through digital-based technology (Hensher et al., 2023). In addition, 50% of Indonesia's workforce needs the digital skills and access to training necessary to meet evolving job standards (Lopus et al., 2019). This gap is further exacerbated by the fact that Indonesia ranks 61st out of 63 countries in the IMD World Digital Competitiveness Ranking, which indicates a significant lag in digital readiness compared to global countries (Inderanata & Sukardi, 2023). In addition, data from the World Bank shows that the labor force participation rate in Indonesia stands at around 64%, which shows that a large portion of the population lacks the necessary skills to compete in a digital economy (Kusumawardhani et al., 2023). The initiative and successful integration of technology in office management in Indonesia requires a multi-faceted approach that includes technological infrastructure, regulatory frameworks, human resource development, and cultural adaptation (Harrigan et al., 2020).

The development of the business world requires office workers to support and implement business processes (Audrin et al., 2024). Office workers are not only carrying out administrative tasks but also the backbone that ensures smooth operations (Basuki, Suputra, et al., 2023). Office management is a fundamental component in office management services to optimize the workforce's role (I Nyoman Suputra et al., 2023). Office management includes various aspects, namely human resource management, document management, and structuring a conducive work environment (Davidescu et al., 2020). Office workers play a role in ensuring that all processes run following established procedures (Szalay et al., 2017). Professionals in office management are responsible for maintaining the orderliness of the workflow and supporting managerial functions for decision-making (Ardiansyah et al., 2021). Therefore, developing office workforce skills and competencies must be a priority for every organization that wants to excel in office management services (Wu et al., 2024).

This research aims to overcome this gap by proposing the development of a Chatbot Learning 4.0 Platform tailored for office environments. This learning platform utilizes the technological capabilities of Industry 4.0 artificial intelligence in the learning process. This platform seeks to revolutionize the way office management is carried out in Indonesia. The proposed platform seeks to improve the quality of human resource management in the office environment through personalized interactions, real-time assistance, and seamless integration with existing office systems.

The urgency of this research comes from the rapid advancement of AI technology in office management in Indonesia to support the readiness of human resources (Liang, 2023). Existing research can bridge the skills gap of prospective workers so that they are qualified to compete at the national and global levels (Summerscales, 2024). A particular chatbot platform tailored to Indonesia's needs to encourage sustainable workforce development (Longo et al., 2023).

## Method

The chatbot's edu-kit development journey follows a structured Agile methodology lasting eight months. This method consists of 7 main stages to achieve the predetermined target (Mayo-Alvarez et al., 2024).

1. Planning Stage

The Agile process begins with comprehensive research and planning to lay the project's foundation. Market research is conducted to identify potential customers and competitors. At the same time, the project team determines the features and functions of the chatbot edu-kit based on user needs and organizational requirements. A detailed product roadmap outlines critical milestones and achievable outcomes to guide project progress (Jardim et al., 2023). Expected outcomes include identifying the target market, initiating discussions regarding intellectual property protection, drafting research articles for future publications, planning poster presentations, preparing social media profiles, and researching relevant industry exhibitions for potential participation (Cimini et al., 2024).

2. Chatbot Prototyping

The second stage focuses on designing and developing a basic prototype of the edu-kit chatbot. Essential features such as interactive learning modules and assessment tools are implemented to create functional prototypes. Simultaneously, initial marketing materials and promotional content are developed to support commercialization efforts (Zahid Iqbal & Campbell, 2023). Discussions on protecting intellectual property began, and preparations for future publications and exhibition participation began. The project team actively engages with stakeholders and provides up-to-date information on prototype development through social media channels (Mayo-Alvarez et al., 2024).

3. User Input and Iteration

The critical and user input stages emphasize the importance of user feedback and iteration to improve chatbot education tools. Iterations are made to improve the user experience and functionality, ensuring that the chatbot meets users' needs effectively. Commercialization efforts are refined based on initial inputs, and legal consultations on intellectual property protection continue (Rialti & Filieri, 2024). The project team also refined research articles, poster content, and social media engagement strategies in response to user feedback.

4. Feature Development

The fourth stage focuses on developing additional features and functions based on user feedback and stakeholder needs. Features such as gamification elements, personalized learning paths, and interactive simulations are prioritized to improve the chatbot's capabilities (Zahid Iqbal & Campbell, 2023). The documents required for protecting intellectual property have been finalized, and the research articles are revised and finalized for publication. A social media campaign is planned for the launch of the chatbot education kit and exhibition participation (Rialti & Filieri, 2024).

5. Testing and Quality Assurance

The fifth stage emphasizes the importance of thorough testing and quality assurance to ensure reliable products. The edu-kit chatbot undergoes rigorous testing to identify and address any bugs or issues, with user acceptance testing validating functionality and usability. Commercialization efforts are shifting to preparations for the official launch of the chatbot edu-kit in the market (Zhang & Huang, 2024). Completed research articles were submitted for publication, social media activity was increased to build anticipation, and exhibition logistics were completed.

6. Implementation and Training

The sixth stage focuses on applying the edu-kit chatbot to the market and providing training and support for users and administrators. The edu-kit chatbot was officially launched, and a marketing campaign was started to promote its implementation. Social media channels document the rollout and share updates to engage with users. In addition, the project team showcased the chatbot's educational device at the exhibition to interact with potential customers and collect leads for future engagement (Priandika et al., 2022).

7. Continuous Monitoring and Improvement

The final stage emphasizes continuous monitoring and improvement based on user feedback and performance metrics. The project team monitors the usage and performance of the chatbot's educational tools, gathering feedback from users and stakeholders to inform future iterations and

improvements. The effectiveness of exhibition participation is assessed, and prospects are collected for future business engagement and opportunities (Irawan, 2023). The Agile methodology guides the development of chatbot education, ensuring a systematic and iterative approach to achieving project goals and providing value to users.

## Result And Discussion

### Preliminary Study

Analyzing student needs in human resources (HR) learning is crucial in designing an adequate and relevant curriculum. This analysis aims to identify the needs, interests, and skills students need to master the field of HR comprehensively. The first step in this needs analysis is to understand the background and goals of students in studying human resources. Teachers can adjust the most appropriate learning materials and methods. The needs analysis should also include an assessment of the student's level of initial knowledge about HR.

Additionally, it is crucial to consider the student's learning preferences. Teaching methods with student learning styles can increase learning engagement and effectiveness. The needs analysis must also include aspects of technological developments and the latest trends in human resources. The following are the needs analysis results that respondents from among students have filled in.

**Table 1. Analysis of Learning Media Needs**

| No | Question | Answer Options | Percentage (%) |
|---|---|---|---|
| 1 | Do you need a chatbot-based learning platform in an office environment? | a. Urgently needed | 45 |
| | | b. Necessary | 35 |
| | | c. No need | 15 |
| | | d. Very unnecessary | 5 |
| 2 | How often do you use digital learning media today? | a. Very Often | 30 |
| | | b. Often | 40 |
| | | c. Infrequently | 20 |
| | | d. Very Rare | 10 |
| 3 6 | What learning media do you use most often in an office environment? | a. Video Tutorial | 35 |
| | | b. Interactive Modules | 25 |
| | | c. Articles or Ebooks | 20 |
| | | d. Podcast or Audio Learning | 10 |
| | | e. Other | 10 |
| 4 | What are some of the advantages you can expect from a learning chatbot platform? | a. Quick Access to Information | 40 |
| | | b. Interactive and Responsive | 30 |
| | | c. Personalization of Learning | 20 |
| | | d. Easy to UseEasy to Use | 10 |
| 5 | Do you agree that chatbot platforms can improve the quality of HR in office management? | a. Strongly Agree | 50 |

| | | | |
|---|---|---|---|
| | | b. Agree | 35 |
| | | c. Disagree | 10 |
| | | d. Strongly disagree | 5 |
| 6 | What methods do you think are effective for learning evaluation through chatbots? | a. Interactive Quiz | 40 |
| | | b. Online Tests | 30 |
| | | c. Tasks and Projects | 20 |
| | | d. Live Discussion and Feedback | 10 |
| 7 | Are you comfortable learning with the help of chatbots? | a. Very Comfortable | 25 |
| | | b. Comfortable | 35 |
| | | c. Less Comfortable | 25 |
| | | d. Uncomfortable | 15 |
| 8 | What features do you think are most important in a learning chatbot? | a. Automated Q&A Feature | 30 |
| | | b. Learning Content Recommendation Feature | 25 |
| | | c. Learning Progress Monitoring Feature | 25 |
| | | d. Gamification Features | 20 |
| 9 | How do you access the most frequent learning chatbots? | a. Via Computer/Laptop | 40 |
| | | b. Via Smartphone/Tablet | 50 |
| | | c. Through Other Devices | 10 |
| 10 | How important is the integration of chatbots with other systems in the office? | a. Very Important | 55 |
| | | b. Important | 30 |
| | | c. Less Important | 10 |
| | | d. Not Important | 5 |
| 11 | How do you assess the quality of the material delivered by the learning chatbot? | a. Excellent | 30 |
| | | b. Good | 40 |
| | | c. Enough | 20 |
| | | d. Less | 10 |
| 12 | Do you feel that the chatbot feature can replace the role of a human instructor? | a. Yes, completely | 10 |
| | | b. Yes, most of the time | 30 |
| | | c. No, but it can complement | 40 |
| | | d. Not at all | 20 |

| | | | |
|---|---|---|---|
| 13 | What is the difficulty level in using a learning chatbot platform? | a. It is effortless | 20 |
| | | b. Easy | 50 |
| | | c. Difficult | 20 |
| | | d. Very Difficult | 10 |
| 14 | Do you need training before using a learning chatbot platform? | a. Yes, it is indispensable | 25 |
| | | b. Yes, it is necessary | 45 |
| | | c. No need | 20 |
| | | d. unnecessary | 10 |
| 15 | How much do you expect a learning chatbot to be accessible outside of business hours? | a. Highly hopeful | 50 |
| | | b. Hope | 30 |
| | | c. Less hope | 15 |
| | | d. Did not expect at all | 5 |
| 16 | What is your view on data security on a learning chatbot platform? | a. Highly Secure | 25 |
| | | b. Safe | 40 |
| | | c. Less Secure | 25 |
| | | d. Insecure | 10 |
| 17 | Do you feel that a learning chatbot platform needs to be accompanied by a discussion forum? | a. Indispensable | 35 |
| | | b. Necessary | 40 |
| | | c. No need | 20 |
| | | d. unnecessary | 5 |
| 18 | How do you assess the chatbot's response speed in answering questions? | a. Very Fast | 30 |
| | | b. Fast | 45 |
| | | c. Fast Enough | 20 |
| | | d. Slow | 5 |
| 20 | Do you need an analytics feature to monitor learning progress on chatbot platforms? | a. Indispensable | 50 |
| | | b. Necessary | 35 |
| | | c. No need | 10 |
| | | d. unnecessary | 5 |

Previous research has provided an in-depth understanding of various aspects of using chatbot platforms in learning in an office environment. A key finding from previous research is a significant demand for innovative learning solutions such as chatbots (Zhang & Huang, 2024). This is reflected in

most respondents (80%) who feel that having a chatbot-based learning platform is necessary. Other research also shows that the digitization of learning has become an integral part of the learning process in the office, with the majority of respondents (70%) admitting to using learning media frequently (Ayanwale & Ndlovu, 2024).

There is a clear preference for more visual and interactive learning media. These findings align with previous research highlighting the effectiveness of visual and interactive learning in capturing students' attention (Kim & Su, 2024). In addition, the high approval rate (85%) of the potential of chatbots to improve the quality of human resources in office management confirms the high trust in chatbot technology in supporting professional development (Ortega-Ochoa et al., 2024). However, some respondents (30%) still believe that chatbots can replace instructors to a large extent, indicating varying levels of readiness for the role of technology in learning (Cortés-Cediel et al., 2023).

Most respondents feel comfortable using chatbots to learn, but few still feel uncomfortable or have difficulties using them. Therefore, it is essential to pay attention to the user-friendly interface design and provide users with initial training before using a chatbot platform (Lin & Chang, 2023).

Data security is also a paramount concern, with some respondents (35%) feeling less secure or insecure about data security. The information obtained confirms the need to emphasize security in developing chatbot platforms (Azmi et al., 2023). In addition, it is also essential to update the content regularly and provide discussion forums to support social interaction in learning (Haristiani, 2019).

The high level of satisfaction with the chatbot's response speed (75%) and the need for analytics features to monitor learning progress (85%) also indicate that chatbot platforms have great potential to improve efficiency and effectiveness in the learning process in office environments (Azmi et al., 2023).

**Chatbot Learning 4.0 Platform Development Concept**

The development of the Chatbot Learning 4.0 Platform for office environments in Indonesia aims to improve the quality of human resources (HR) in office management by applying artificial intelligence (AI) technology. Learning 4.0 refers to an educational paradigm that integrates digital technology. Chatbot platforms in office learning function as virtual assistants that can provide employees with real-time training, guidance, and information. These chatbots can be designed to answer questions, provide tutorials, suggest learning materials, and measure individual progress. Additionally, using chatbots in HR training allows for the personalization of materials according to employees' needs and ability levels so that each individual can learn at the pace and in the most effective way for them. The development of the Chatbot Learning 4.0 Platform is a strategic step that can increase the company's competitiveness by improving the quality of more skilled and adaptive human resources.


**Figure 1. Chatbot Learning 4.0 Platform Development Concept**

**Preparation of Learning Materials and Videos**

The learning materials are arranged systematically, from basic concepts to practical applications. Each learning module is designed with a clear, specific purpose and is accompanied by practical exercises to ensure participants can apply the knowledge gained. Learning videos become essential to this process, offering engaging and interactive visualizations. Each video is designed with an effective duration to maximize participants' concentration. In addition, the e-learning platform that

supports the program is equipped with interactive features such as discussion forums, quizzes, and collaborative projects.

**Design of Learning Materials and Media Related to Introduction to Human Resource Management**

The development of learning materials and videos related to Human Resource Management (HR) must be structured to ensure comprehensive and practical learning. First, an introduction to HR management provides the basics of HR management concepts that include the definition, objectives, functions, and importance of HR management. This material should also discuss the role of HR managers in supporting business strategies and introduce various relevant HR management theories.


**Figure 2. Design of Introductory Materials for Human Resource Management**

**Design of Learning Materials and Media Related to the Employee Recruitment and Selection Process**

The employee recruitment and selection process outlines the essential steps in finding and selecting suitable candidates. This material includes planning workforce needs, drafting job descriptions, recruitment sources and methods, selection techniques such as interviews and tests, and candidate evaluation. Learning videos can feature job interview simulations and case studies of successful selection processes.


**Figure 3. Draft Materials for Employee Recruitment and Selection Process**

**Design of Learning Materials and Media Related to Human Resource Development**

HR development focuses on strategies and methods to improve employee skills and competencies. This material includes training and development, career planning, mentoring, and

continuous learning programs. Videos can showcase best practices from different organizations and interviews with experts in the field of HR development.


**Figure 4. Design of Human Resources Development Process Material**

**Design of Learning Materials and Media Related to Employee Performance Evaluation**

Employee performance evaluation discusses how to measure and assess individual and team performance. This material includes performance evaluation objectives, assessment methods such as KPIs (Key Performance Indicators), and constructive feedback techniques. Learning videos can show examples of performance appraisals and how to provide effective feedback.


**Figure 5. Design of Performance Evaluation Materials**

**Design of Learning Materials and Media Related to Conflict Management and Negotiation**

Conflict management and negotiation teach how to handle conflicts in organizations constructively and effectively negotiation strategies. This material covers the types of conflicts, causes of conflicts, mediation techniques, and win-win negotiation strategies. Learning videos can be in negotiation simulations and case studies of successfully resolved conflicts.


**Figure 6. Draft Conflict Management and Negotiation Materials**

With the preparation of interactive and in-depth learning materials and videos, students can gain a robust and practical understanding of HR management so that they are ready to apply this knowledge in a natural work environment.

**Chatbot Development**

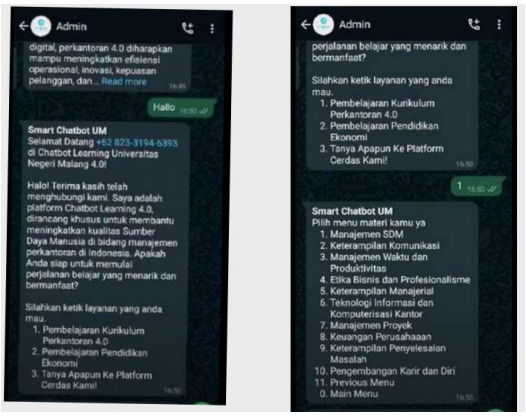


**Figure 7. Homepage Chatbot**

Chatbot Learning 4.0 platform to improve managerial skills. After entering the system, users will be greeted with a welcome message providing a brief guide to using the platform. This message includes clear instructions on choosing a number that fits the needs of the service and training materials. Users are asked to select a menu number relevant to the topic they want to study or the problem they want to solve. This process is designed to make it easy to navigate, ensure that users can quickly access the information they need, and maximize efficiency in training.


**Figure 8. Access Learning Materials and Videos**

After the user selects a number on the material menu, the system will display advanced instructions on selecting the submaterial number relevant to the selected material. These instructions are designed to guide users in determining the specific topics they want to learn more about. Once the submaterial is selected, the user will be redirected to a page that contains links to the material and related learning videos. This page provides direct access to relevant resources, including text materials and video tutorials, designed to deepen users' understanding of the sub-material. This process ensures that users can easily explore and access information that suits their learning needs.

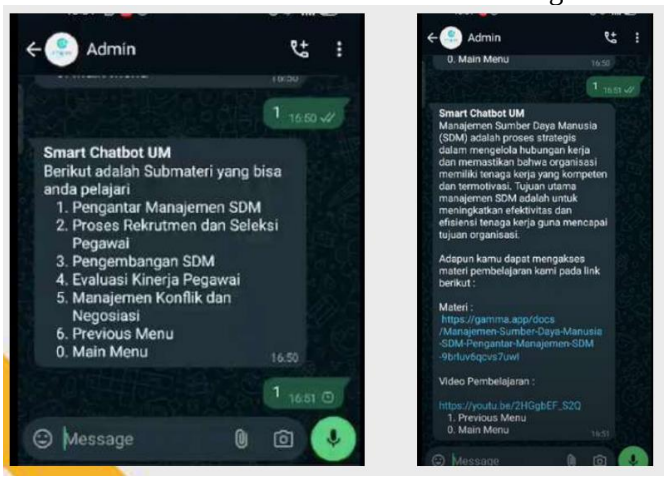


**Figure 9. Ask Me Anything Menu**

When the user selects number 3 on the menu at the top right, the system will activate the innovative chatbot feature, allowing users to type their questions manually. If the question is unrelated to economic learning or the answer is unavailable in the learning chatbot database, the system will reply that the requested information is unavailable. On the other hand, if the question follows the context of the economy or is contained in the learning chatbot database, the system will provide an answer relevant to the question. This process is designed to ensure that users get accurate responses that are relevant to the topic.

### Material Validation Questionnaire

This material expert test is carried out by validators who are experts in their fields to provide advice and assessment on the development of learning materials so that it can be known whether the learning materials developed have met the valid category. The assessment data of the Office Management HR learning material test can be seen in Table 2.

**Table 2. Material Validation Questionnaire Results**

| No | Criteria assessed | Validator Value 1 | Validator Value 2 | Validator Value 3 | Total Score | Percentage (%) | Criteria |
|---|---|---|---|---|---|---|---|
| 1. | Clarity of Purpose | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| 2. | Material Relevance | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 3. | Compatibility with the Curriculum | 4 | 4 | 4 | 12 | 80 | Valid |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4. | Dressing in the world of work | 5 | 5 | 4 | 14 | 93,33 | Highly Valid |
| 5. | Kemudahan Dipahami | 4 | 4 | 3 | 11 | 73,33 | Valid |
| 6. | Interaktif | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 7. | Practical examples | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| 8. | Actualization of Materials | 5 | 5 | 5 | 15 | 100 | Highly Valid |
| 9. | Completeness of Materials | 4 | 4 | 4 | 12 | 80 | Valid |
| 10. | Emphasis on key points | 4 | 3 | 4 | 11 | 73,33 | Valid |
| 11. | Visual Presentation | 5 | 4 | 5 | 14 | 93,33 | Sangat Valid |
| 12. | Languages spoken | 4 | 4 | 4 | 12 | 80 | Valid |
| 13. | Material Consistency | 4 | 4 | 4 | 12 | 80 | Valid |
| 14. | Simplicity | 5 | 4 | 4 | 13 | 86,67 | Highly Valid |
| 15. | Regularity of the material | 4 | 4 | 4 | 12 | 80 | Valid |
| 16. | Timeliness of learning | 4 | 3 | 4 | 11 | 73,33 | Valid |
| 17. | Alignment with learning objectives | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18. | Relevance to Technary Technology | 5 | 5 | 5 | 15 | 100,00 | Highly Valid |
| 19. | Material Flexibility | 4 | 4 | 4 | 12 | 80 | Valid |
| 20. | Evaluation and Feedback | 5 | 5 | 4 | 14 | 93,33 | Highly Valid |
| Average Score | | | | | | 85,999 | Highly Valid |

Based on the material test results above, it can be concluded that the learning material has undergone various assessments regarding its validity. First, regarding the clarity of learning objectives, the validation results showed that the material was considered valid, with a total score of 13 and a percentage of 86.67%. These findings are consistent with previous research, as described by (Marenden et al., 2021), about the importance of setting clear goals in improving learning effectiveness.

The material was considered very valid in terms of relevance to the needs of students, with a total score of 14 and a percentage of 93.33%. This aligns with previous research findings, including research by (Manca et al., 2023), which highlight that material relevance is critical in increasing students' interest and motivation. The material is considered valid in supporting the achievement of the expected competencies following the curriculum, with a total score of 12 and a percentage of 80%. This emphasizes the importance of ensuring the conformity of learning materials with the competency standards set in the curriculum, as also highlighted by (Safitri & Kabiba, 2020). The material was rated as very valid in practical applicability in the work environment, with a total score of 14 and a percentage of 93.33%. These findings align with previous research emphasizing the importance of materials that can be applied directly in the work context, as explained by (Brown and Hesketh, 2004).

However, the validation results also showed that the material needed improvement in presentation to make it easier to understand, with a total score of 11 and a percentage of 93.33%. This shows the need to pay attention to effective material presentation strategies in designing learning that can provide a better learning experience for students, as also affirmed by (Pandaleke et al., 2020).

**Media Validation Questionnaire**

This media expert test is carried out by validators who are experts in their fields to provide advice and assessment on the development of learning materials so that it can be known that the learning materials developed have met the sufficient or blank category. The assessment data of the learning material test can be seen in Table 3.

**Table 3. Data on learning media test**

| No. | Criteria assessed | Validator Value 1 | Validator Value 2 | Validator Value 3 | Total Score | Presented | Criteria |
|---|---|---|---|---|---|---|---|
| 1 | Availability of learning materials | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | Relevance of materials to office needs | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 3 | Ease of navigation of the platform | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 4 | Quality of interaction with chatbots | 3 | 5 | 4 | 12 | 80 | Valid |
| 5 | The responsiveness of the platform to users | 5 | 5 | 5 | 15 | 100 | Highly Valid |
| 6 | Availability of help or guidance features | 4 | 4 | 5 | 13 | 86,67 | Highly Valid |
| 7 | Quality of material visualization | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| 8 | Availability of practice or exams | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 9 | Integration with other platforms | 5 | 4 | 4 | 13 | 86,67 | Highly Valid |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | Ease of access to the platform | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| 11 | Quality of technical assistance | 4 | 3 | 4 | 11 | 100 | Highly Valid |
| 12 | Platform compatibility with the curriculum | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 13 | Ease of use of communication features | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| 14 | Availability of technical support | 3 | 4 | 3 | 10 | 70 | Valid |
| 15 | Quality of troubleshooting | 4 | 3 | 4 | 11 | 73,33 | Valid |
| 16 | Availability of feedback from users | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| 17 | Availability of updates or updates | 4 | 5 | 4 | 13 | 86,67 | Valid |
| 18 | Quality of user engagement | 3 | 4 | 3 | 10 | 70 | Valid |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19 | Platform availability in a variety of devices | 5 | 5 | 4 | 14 | 93,33 | Highly Valid |
| 20 | Quality of technical support | 4 | 4 | 4 | 12 | 80 | Valid |
| | | Average Score | | | | 87 | Highly Valid |

Learning: The platform is rated as excellent in providing learning materials, with a total score of 13 and a percentage of 86.67%. The availability of complete and relevant material is one of the main advantages. Previous research has highlighted the importance of the availability of complete and relevant learning materials in supporting the educational process, especially in the context of digital learning platforms. In a study conducted by (Zhou, 2024), the availability of digital learning materials was a critical factor in the success of e-learning platforms. Another study (Schuhmacher & Hummel, 2019) highlights that the relevance of learning materials to user needs, particularly in the context of vocational or professional education, greatly influences students' perception of the value of the learning platform.

Validators assessed that the materials provided were relevant to office needs, reaching a score of 93.33%. This shows that the platform has successfully met the specific needs of users working in the office sector. A study found that the material's relevance is one of the critical factors determining the success of technology-based training among employees.

Interaction with the chatbot is rated quite well, with a score of 80%. There is room for improvement, especially regarding the chatbot's ability to provide more in-depth and relevant responses. (Lin & Chang, 2023) shows that the chatbot's ability to understand and respond to user questions appropriately dramatically influences the quality of interaction with chatbots. Additionally, a study by (Annamalai et al., 2023) states that the relevance and depth of chatbot responses are essential for ensuring user satisfaction. The study suggests that chatbot improvements, both through more sophisticated machine learning and by adding more complex information processing layers,

The visualization aspect of the material received a score of 86.67%, indicating that the presentation of the material visually is good, although there may be some areas that could be improved. Studies by (Yazar & Arifoglu, 2012) show that when learning materials are presented visually, especially in combination with text or narrative, it can improve students' comprehension. Another study (Pradnyan & Juliana, 2021) supports that good visualization can improve cognition and learning.

This aspect received a high score of 93.33%, indicating that the platform is flexible and accessible through various devices, which is crucial to support user accessibility. A study by (Shokhnekh et al., 2022) on mobile learning shows that high accessibility allows users to learn anywhere, anytime, without being bound by time. Another study by (I. Nyoman Suputra et al., 2023) emphasizes that cross-device accessibility is essential in supporting lifelong learning.

**Chatbot Platform Validation Test Questionnaire**

The expert test of this platform is carried out by validators who are experts in their fields to provide advice and assessment on the development of the platform so that it can be known that the learning materials developed have met the category. The technology test assessment data in the form of a platform can be seen in Table 4

**Table 4. Platform Validation Test Evaluation Data**

| **Criteria assessed** | **Validator Value 1** | **Validator Value 2** | **Validator Value 3** | **Total Score** | **Presented** | **Criterion** |
|---|---|---|---|---|---|---|
| User Interface | 4 | 5 | 4 | 13 | 86,67 | Highly Valid |
| Feature | 5 | 4 | 4 | 13 | 86,67 | Highly Valid |
| Data Availability | 5 | 5 | 5 | 15 | 100 | Highly Valid |
| Performance | 4 | 3 | 5 | 12 | 80 | Valid |
| Security | 5 | 5 | 4 | 14 | 93,33 | Highly Valid |
| Ease of Use | 4 | 5 | 3 | 12 | 80 | Valid |
| Availability of Documentation | 5 | 5 | 5 | 15 | 100 | Highly Valid |
| Integration with Other Systems | 4 | 4 | 5 | 13 | 86,67 | Highly Valid |
| Availability of Support | 5 | 5 | 4 | 14 | 93,33 | Highly Valid |
| Data Analysis Capabilities | 4 | 3 | 5 | 12 | 80 | Valid |
| Scalability | 4 | 4 | 4 | 12 | 80 | Valid |
| Learning Availability | 5 | 4 | 3 | 12 | 80 | Valid |
| Customizability | 4 | 4 | 4 | 12 | 80 | Valid |

| | | | | | | |
|---|---|---|---|---|---|---|
| Availability of Integration with Indonesian Language | 3 | 5 | 4 | 12 | 80 | Valid |
| Integration Availability with Office | 4 | 4 | 3 | 11 | 73,33 | Valid |
| Availability of Integration with Security Systems | 5 | 4 | 5 | 14 | 93,33 | Highly Valid |
| Adaptive Learning Capabilities | 3 | 4 | 3 | 10 | 70 | Valid |
| Ability to Provide Relevant Responses | 4 | 5 | 4 | 13 | 86,67 | Valid |
| Availability of Integration with Enterprise Needs | 4 | 4 | 3 | 11 | 73,33 | Valid |
| Problem-Solving Skills | 5 | 4 | 4 | 13 | 86,67 | Highly Valid |

| | | |
|---|---|---|
| Average Score | 84.5 | Highly Valid |

The results of the validation of the platform show that the user interface aspect gets a total score of 13 with a percentage of 86.67%, so this criterion is considered very valid. An intuitive and easy-to-understand user interface is an essential aspect of attracting users. A study conducted by (Ramírez et al., 2020) confirmed that good UI design is not just aesthetics but also how the interface facilitates user interaction efficiently. Research by (Yu et al., 2021) also supports this view by highlighting that an effective UI must meet the cognitive needs of users.

The performance aspect of the system received a score of 12 (80%) in the valid category, so it needs to be improved to reach a very valid level. One of the relevant studies is a study by showing (Guo, 2024) the impact of system performance on user perception of a platform. Research by (Al-Gerafi et al., 2024) highlights the importance of scalability and reliability in system performance. The research team showed that along with the increase in the number of users or the volume of data managed by the platform.

The aspect of ease of use received a score of 12 (80%) in the valid category but can be improved, especially regarding user comfort and accessibility in using the platform. One of the studies that delves into this topic is a study by (Kletzander & Musliu, 2024) related to the principles of usability heuristics so that it can be known that high ease of use is achieved when the platform can be operated efficiently. The study by (Ramaul et al., 2024) also discusses the concept of affordance, which refers to how interface design can provide visual or contextual hints that help users understand how to use certain features without additional explanation.

The aspect of learning availability gets a score of 12 (80%) or valid, but there is room to improve the learning materials provided. One of the relevant studies is research by (Ramaul et al., 2024) explaining that multimedia design principles can maximize learning effectiveness. Research (Razak, 2010) continues this discussion, focusing on the cognitive theory of multimedia learning. The findings suggest that content presented in a format that matches how the brain processes information can improve comprehension and retention.

The availability of integration with the office received a score of 11 (73.33%). It was included in the valid criteria, but more attention is needed to improve integration with the office system to make it more seamless. The study by (León-Romero et al., 2024) explores how information technology-based information systems can be effectively integrated into the work environment to support various business functions. Research by (Rodríguez et al., 2024) discusses the importance of system integration in the context of enterprise resource planning (ERP). The study's results emphasized that integrating ERP systems with office applications allows for better data flow and consistency of information throughout the organization.

## Conclusion

This research focuses on developing the Chatbot Learning 4.0 Platform to improve the quality of human resources in office management. The study successfully identified the advantages and disadvantages of the platform and found several aspects of improvement. The main findings of this study include strong validation of the material, media, and the platform itself. However, several aspects need improvement, such as ease of use, availability of learning, and integration with office systems. These findings significantly affect theory and practice in office management and educational technology. The integration of chatbot technology in HR training shows the potential to improve learning effectiveness by offering a more personalized and adaptive learning experience. This research has several limitations that need to be considered. Fundamental limitations include a lack of in-depth evaluation of the user experience in a broader context and system integration that still requires attention. The researchers suggest that future research further explore how improved integration with office systems can be achieved and that the platform can be adapted to meet more diverse training needs.

## Confession

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