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Development of the "Industrial Mandarin" MOOC for Practical Mandarin Language Learning in the Manufacturing and Technology Sectors

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Abstract

The development of the manufacturing and technology sectors requires effective cross-cultural communication skills. Mandarin has become a strategic competency in the workplace due to the large number of companies that interact with partners or experts from China. However, Mandarin language learning at the higher education level in Indonesia still tends to be academic and does not fully accommodate the practical language needs of the industrial environment. This study aims to develop a Massive Open Online Course (MOOC) called "Industrial Mandarin" as an interactive online learning medium that is contextual to the world of manufacturing and technology. The study uses the 4D (Define, Design, Develop, Disseminate) Research and Development (R&D) model. Data was obtained through interviews with industry partners and questionnaires administered to 85 respondents working in the manufacturing sector. The results show that the Industrial Mandarin MOOC has a validity rate of 91% (highly valid) and a practicality rate of 89% (highly practical). The final product includes ten learning topics, two digital modules, and explanatory videos uploaded to mooc.um.ac.id.

Keywords: *Industrial Mandarin, MOOC, media development, language learning, 4D.*

Introduction

Rapid economic globalization and the growth of the manufacturing industry in Indonesia require a workforce with cross-cultural communication skills, particularly in Mandarin. In this context, interactions between local workers and partners from China are common, whether in work coordination, technical instructions, or daily production reporting. Therefore, Mandarin language proficiency has become a real necessity for students and workers in the manufacturing and technology sectors (Murtadhoh & Arini, 2023).

Mandarin language learning in higher education is still oriented towards academic aspects, without paying sufficient attention to the needs of functional communication in the industrial world. Many graduates experience difficulties in understanding technical vocabulary, work order structures, and professional ethics specific to Chinese culture.

This indicates an urgent need for a more contextual, practical, and flexible model of Mandarin language learning so that students can be better prepared to face communication challenges in the workplace (Putri et al., 2025).

One solution that can be implemented to overcome this challenge is the use of Massive Open Online Courses (MOOC) platforms. MOOCs provide flexibility, affordability, and wide access for learners, and have been proven effective in improving communication skills, technological literacy, and cross-cultural language skills.This approach allows learners to study in a more interactive way that suits their needs in the workplace. Appropriate Mandarin language training programs, such as those designed in the form of MOOCs, can overcome the problem of limited Mandarin language skills among local employees and improve communication effectiveness in multinational environments.

To develop MOOCs that focus on practical Mandarin in the manufacturing and technology sectors, a systematic learning model approach such as the 4D model (Define, Design, Develop, Disseminate) is very useful. This model offers a structured framework to ensure that the learning products produced have high validity, practicality, and relevance to the needs of the workplace. The first stage, Define, involves needs analysis to determine the appropriate learning objectives. Next, in the Design stage, the course design is created by considering the functional elements to be taught. Then, in the Develop stage, the course is produced and tested, before finally undergoing the Disseminate stage, which involves distributing the course to a wider audience

By adopting this more practical and context-based method, it is hoped that Mandarin language proficiency among Indonesian students and workers will increase, so that they are better prepared to contribute to an increasingly globally integrated industrial world and are able to interact effectively with partners from China.

Method

This study uses a research and development (R&D) approach with the 4D model developed by Thiagarajan, Semmel, and Semmel (1974). This model consists of four systematic stages, namely: Define, Design, Develop, and Disseminate (Hariyanto et al., 2022) (Batubara et al., 2022). In the context of research conducted in the Mandarin Language Education Study Program, State University of Malang, which took place from February to November 2025, the research subjects involved subject matter experts, media experts, and 85 user respondents consisting of alumni and industrial sector workers.

In the Define stage, a needs analysis was conducted to formulate appropriate learning objectives. This was a critical first step to ensure that the product to be developed would meet the needs of users in the field (Dwikoranto et al., 2023). Next, in the Design stage, the course was designed by considering the characteristics of the audience and important aspects of practical Mandarin language learning (Hadiwinata & Wibawa, 2021).

The Develop stage focuses on course development and validation, ensuring that the resulting material can be used effectively in an industrial context. Important trials are conducted at this stage to identify and correct potential problems before the final product is disseminated. Finally, the Disseminate stage involves distributing the course to a wider audience, with the aim of ensuring accessibility and improving Mandarin language skills among students and workers in Indonesia's manufacturing sector.

Through this systematic approach, it is hoped that the development of the Industrial Mandarin MOOC can address the communication challenges faced by the local

workforce and make a positive contribution to improving language and cross-cultural communication skills in an industrial environment.

Results

The development of the Industrial Mandarin MOOC: Practical Mandarin in the Manufacturing and Technology Sector was carried out using the 4D model (Define, Design, Develop, Disseminate) to ensure that the content was relevant to the real needs of industry, particularly the manufacturing and technology sectors, which involve a cross-cultural and multilingual workforce.

Define

At this stage, the implementation team conducted a comprehensive needs assessment through two main approaches, namely interviews and questionnaire distribution. First, online group discussions were conducted via Zoom with representatives from PT. Smoore Technology Indonesia as an industry partner. These discussions aimed to obtain a concrete picture of the Mandarin communication needs in a modern manufacturing industrial work environment. The results of the discussion showed that cross-language interactions occur regularly in company operations, especially between local employees and supervisors or teams from China. In everyday work situations, there is a real need for Mandarin language skills, including the ability to introduce oneself professionally, convey one's position and job responsibilities, understand operational instructions, report work results, and maintain polite communication in both formal and informal contexts. It was also conveyed that communication errors often occur due to the limited technical vocabulary of local employees, especially in terms of work orders and reporting to superiors from China. Industry partners also strongly support the development of Mandarin learning content that is practical, concise, modular, and contextual to the world of work.

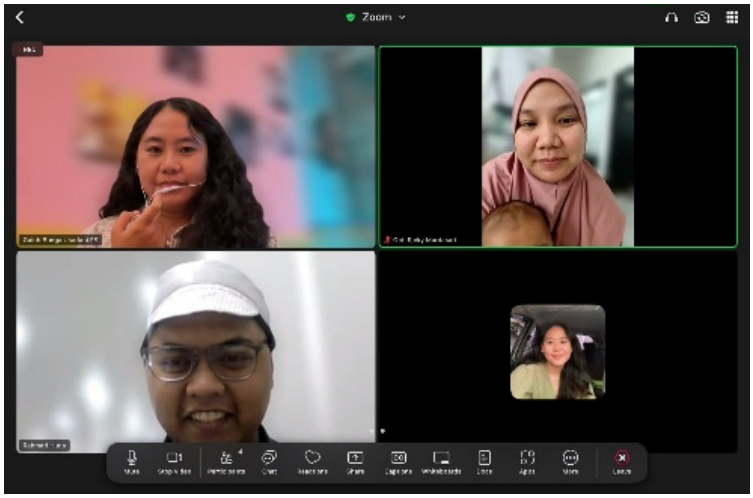

Figure 1. Discussion with Representatives of PT. Smoore Tech

Second, the team also conducted a questionnaire survey to gather the needs of alumni and employees in the manufacturing and technology sectors. The survey was successfully collected from 85 respondents who had direct work experience in an industrial environment. The questionnaire results showed that the most urgent Mandarin learning needs were in mastering work vocabulary and expressions that are often used in

real situations. A total of 92% of respondents stated that they had difficulty understanding Mandarin work instructions, while 88% stated the need for a glossary of work vocabulary and common technical expressions in factories. In addition, 85% of respondents fully supported the development of flexible online module-based learning, with short videos and interactive exercises.

Specifically, the contexts most frequently identified by respondents as urgent needs include: (1) self-introduction and professional job title presentation, (2) understanding and conveying operational instructions and daily work assignments, (3) reporting work results to superiors, (4) arranging shifts, overtime, and leave, and (5) responding to work corrections or orders from superiors. In addition to linguistic factors, respondents also highlighted communication challenges related to differences in professional customs between local and Chinese work cultures. This shows that learning needs are not limited to language structure, but also include mastery of cross-cultural communication contexts and professional etiquette.

Figure 2. Needs Questionnaire

The conclusion of the Define stage confirms that the main requirements for Mandarin language learning in the manufacturing and technology sectors are practical content, a focus on real work situations, and easy access for both current employees and prospective employees. Findings from industry partners and survey results form the main basis for syllabus formulation and learning design in the next stage.

As a continuation of this development effort, the research team has systematically formulated ten finalized learning topics, each representing a significant and distinctive aspect of communication within the industrial workplace context. The topics are outlined as follows:

1. 自我介绍与岗位说明 – Self-Introduction and Job Position Description
2. 设备操作指令与作业安排 – Equipment Operation Instructions and Work Arrangement
3. 公司常见设备与基础技术词汇 – Common Company Equipment and Basic Technical Vocabulary
4. 工作安全与操作规程 – Work Safety and Operational Procedures
5. 工作汇报与成果说明 – Work Reporting and Performance Description
6. 轮班制度与请假加班沟通 – Shift System, Leave, and Overtime Communication
7. 职场礼貌与跨文化沟通 – Professional Etiquette and Cross-Cultural Communication
8. 厂区与工作区域名称 – Factory Areas and Workplace Locations
9. 收货检验与质量控制 – Goods Receiving and Quality Control

10. 任务反馈、投诉与问题处理 – Task Feedback, Complaints, and Problem Solving

Each topic includes five situational work dialogues, practical grammar points, explanatory videos, exercises, and quizzes. In addition, a glossary is provided at the end of each module.

Design

Based on the results of the analysis in the define stage, it was found that the main needs of users are practical, contextual Mandarin language learning that can be accessed flexibly through an online platform. Therefore, the design stage focused on designing a learning system that not only contained linguistic material but also described the reality of communication in the industrial workplace. The learning structure was systematically organized into ten main topics that reflected the flow of communication in a manufacturing workplace, starting from the self-introduction process to quality control activities. Each topic is developed with a consistent and integrated pattern, including: (1) Bilingual technical vocabulary (Indonesian–Mandarin) relevant to work situations; (2) Contextual work dialogues that describe interactions between employees and superiors; (3) Interactive exercises to reinforce understanding; (4) Explanatory videos; and (5) Understanding of work culture to foster cross-cultural communication sensitivity.

Figure 3. Digital Module

Develop

The Develop stage is the implementation phase of the design into a tangible product. This process produced ten interactive course topics, two digital modules, and ten explanatory videos that were ready for testing. The product was tested through two stages of expert validation and feedback collection from students, which resulted in:

a. Expert validation of the material scored 92% (highly valid), indicating that the content is appropriate for industry communication needs and that the Mandarin grammar is accurate.
b. Media expert validation scored 90% (highly valid), indicating that the visual design, navigation, and functionality of the platform meet digital media standards.

Next, a practicality test was conducted on 60 students from the 2023 class of the Mandarin Language Education study program. The results showed an average score of 4.49 out of 5 (very practical category). The details of each aspect show:

a. Digital Module Materials (4.53): systematic, easy to follow, and relevant to the industry context;

b. Learning Videos (4.47): engaging, easy to understand, and with good audio-visual quality;
c. Interactive Quizzes (4.39): motivating and effective for independent practice;
d. Overall Usefulness (4.58): improves confidence in communicating in a work context.

This data shows that the Industrial Mandarin MOOC is not only practical to use but also begins to show positive learning effects (initial effectiveness). Some important notes and suggestions from the feedback include:

a. Separating the material into several levels so that learners can adjust it to their needs.
b. Adding visualizations such as Virtual Reality with an industrial background.
c. Add sub-sections such as the financial aspect in industry, including vocabulary related to invoices and simple financial reports.

Conclusion

This development research resulted in the MOOC Industrial Mandarin: Practical Mandarin in the Manufacturing and Technology Sector product through the application of the 4D development model (Define, Design, Develop, Disseminate). The results of the research show that all stages were effective and produced a product that is valid, practical, and relevant to the needs of cross-cultural communication in the industrial world.

The Define stage successfully mapped learning needs based on field data and input from industry partners, which confirmed the importance of contextual, modular, and accessible Mandarin language learning. The Design stage produced a systematic design with ten main topics and two bilingual digital modules integrated with explanatory videos and interactive quizzes. The Develop stage showed material expert validation results of 92% and media expert validation results of 90%, with a practicality test of users (60 students) obtaining an average score of 4.49 (very practical category).

Overall, this MOOC product not only meets the criteria for practicality but also shows initial indications of effectiveness in improving technical vocabulary comprehension, work communication skills, and awareness of Chinese professional culture. With its adaptive design and functional content, the Industrial Mandarin MOOC is considered suitable for wider implementation in the context of vocational education and industrial training.

Suggestions

This study still focuses on the aspects of content validity and practicality of use, so that long-term effectiveness testing of learning outcomes, communication performance improvement, and changes in user professional behavior has not been conducted in depth. Further research is recommended to conduct quasi-experiments or pretest–posttest designs to quantitatively measure the impact of MOOCs on improving working Mandarin language competence and cross-cultural literacy.

Future researchers can conduct more in-depth research on Mandarin language teaching in non-production functional areas, such as financial administration, purchasing, and logistics. s can examine how Industrial Mandarin can be expanded into a cross-departmental communication model that encompasses the entire industrial value chain. This is an area of that has been relatively unexplored in *Mandarin for Specific Purposes (MSP)* studies in Indonesia.

Thus, future research is expected to not only expand the dimensions of technology and content, but also deepen the aspects of effectiveness, sustainability, and competency transfer so that Industrial Mandarin MOOC can become a national model for industry-oriented and globally standardized vocational foreign language learning.

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