Automotive Industry Employee Online Training Platform: How Should It Develop Based on the Needs of Trainees?

Tafakur*, Ayu Sandra Dewi, and Moch Solikin

***Abstract*—Online employee training requires a good training platform to be more efficient. Therefore, this study aims to: 1) analyze the need for developing a Learning Management System (LMS); 2) develop an LMS; 3) test the feasibility of an LMS; and 4) understand employees perceptions of developed LMS for online automotive employee training. This research is development research with 4D models, consists of 4 main steps: define, design, develop, and disseminate. Data were collected from 70 automotive industry employees using a questionnaire. Product testing involved 5 experts in vocational education, information technology, and learning media. The data were analyzed through qualitative analysis and quantitative descriptive statistics. The results showed that, first, LMS needs to have an attractive appearance, simple, elegant, complete, neat, and structured menus, downloadable materials, updated logos, notifications, delivery status, separation of materials and questions, clear images, animation, and various learning media. Second, LMS results are developed without using the available platforms but as needed by customizing the web. Third, the LMS is feasible by fulfilling aspects of convenience, appearance, content arrangement, interaction, ease of monitoring, and facilitating independent learning. Finally, most employees consider that the LMS developed follows their needs, career development, and utilization in the workplace.**

***Index Terms*—Automotive, industrial training, learning management system, online training**

I. Introduction

For more than a decade, distance learning has evolved according to needs involving several advanced technologies. Education has been integrated through information and communication technology and supported by hardware to produce borderless education for everyone that can be accessed from anywhere and anytime [1]. This educational model is believed to offer various advantages in student interaction and involvement; access to the latest information; content sharing, and communication [2]. It is believed that distance learning can increase the effectiveness of learning and, in some ways, is not much different from face-to-face learning [3, 4]. Therefore, there is a need to expand cooperation between business, industry, and academia by providing innovative and high-quality distance learning education [5].

Distance learning is currently not only developing in formal education circles. Several MOOC programs are also widely offered to develop soft and hard skills. They provide various certified trainings through a series of online learning activities. Activities usually start from the beginner stage to the professional stage with competency test activities. The average training offered relates to developing IT skills by learning various programming languages. Some universities also develop MOOC programs according to the departments available at their universities. Of course, this can open up opportunities for many people who want to improve their abilities without attending a university that provides programs that suit their interests and talents.

Today's rapid changes also require several companies in the service and industrial sectors to motivate their employees to take part in a training series that can improve quality but also pay attention to efficiency in training, one of which is the automotive after-sales industry. Of course, the company will think about providing opportunities for its employees to improve their abilities without formal education, which takes a long time. Along with the development of this work, training is needed for industrial employees, which is indeed packaged at a particular time to increase the efficiency of employees' time in developing their skills. Every company needs to provide training, considering the form of training for employees that is recognized as capable of increasing productivity levels on an ongoing basis, increasing performance due to increased knowledge, skills, and competence, and even increasing self-confidence, job satisfaction and pride, as well as having an impact on cost savings accompanied by increased awareness and overall appreciation of employees for occupational health and safety [6].

Ideally, effective vocational learning and training are supported by innovative instructors, such as using blended learning, organized online learning using digital homerooms, and independent learning [7]. The development of digital innovation has enabled learning that supports classes to be carried out in a portable and customized manner through virtual access, known as Education 4.0. Thus, online training provided for employees in the industry also needs to pay attention to several aspects, starting with planning, implementing, and evaluating training provided by several MOOC platforms. Planning can be done by providing tutorials for trainees and trainers regarding using the Learning Management System (LMS) and information on training implementation, such as usage guidelines, timelines, and training achievement targets. LMS must also provide apparent features and help trainees if they experience problems during training [8]. Implementing training must be packaged as independent and guided learning, using interactive multimedia elements that are not monotonous, such as video tutorials, video conferencing, and e-modules. Training implementation should also involve problem-solving elements and evident achievements, which provide feedback through reflection and evaluation activities [9].

Training for industrial employees should not only be

Manuscript received March 1, 2023; revised March 22, 2023; accepted May 9, 2023.

The authors are with the Automotive Engineering Education Department, Yogyakarta State University, Indonesia.

*Correspondence: tafakur@uny.ac.id (T.)

carried out for new workers, but old workers also need to self-upgrade. Many industries have training centers that have curricula, methods, and training media according to the needs of each industry. Online distance employee training is a growing trend in line with current developments. Distance learning can offer vocational students various opportunities to notice, appreciate, use, and apply digital skills and technologies professionally in their workplace [10]. However, trainees are still faced with several challenges in improving the quality of exciting distance learning programs [3]. It is also essential to understand that in maintaining and increasing superior and competitive productivity and self-competence in the industry, various perspectives on training content must also be adapted to needs [11].

According to Keegan [12], several elements, such as differentiating elements between students and teachers, well-organized teaching programs, the use of technological media, and two-way communication, are the main keys to achieving the effectiveness of distance learning. In adopting distance learning, the communication system in distance training must have several functions: 1) presentation activities by students and educators; 2) practical activities with feedback such as questions and answers, discussion activities, and structured group activities; and 3) access to learning resources [13]. Furthermore, according to him, learning resources that can be used in distance learning systems include audio technology, video technology, and online technology. Distance learning activities can be carried out synchronously or asynchronously, depending on learning needs [14]. Therefore, facilities are needed for the training design to be carried out. Distance training requires learning facilities that participants can access online, including a learning management system.

Many LMS have been developed to fulfill all the previously described key elements [15]. Currently, various LMS are offered, both open-source and commercial, such as Moodle, Edmodo, Google Classroom, and others. The platform can be used according to the needs of teachers but also has limitations. A developer cannot arbitrarily modify some of the features and templates that have been provided. Even though an effective LMS should also be able to adjust to users' needs to improve their abilities. This means that some adjustments need to be made to create an LMS that can meet the goals of its users.

Furthermore, to produce an effective multimedia-based LMS, Woodill [16] suggests that: 1) in appearance, the LMS ideally has two separate screens to present material in visual and verbal modalities; 2) the LMS requires social media facilities so that students can work together, or interact with their instructors; 3) the LMS has a library where electronic documents and examples of exercises can be downloaded according to assignments; 4) the design of learning materials needs to be modular and in small units that can be combined according to the needs of learners; 5) the LMS can present material offline when there is no internet connection; 6) the LMS must have a method for quick and easy content creation; 7) the LMS is easy to sync videos or animations; 8) the LMS has the same standard features as other LMS; 9) the LMS is intuitive and easy to use for learners; 10) the LMS has features for creating and creating comments; 11) the LMS is easy to use for administration, tracking, recording and reporting, and materials can be exported to other devices. With LMS, online employee training can be carried out more effectively.

Based on this, it is necessary to develop an online training platform for employees in the industry so that training participants can understand the material well and be access it easily and flexibly. This research is limited to developing LMS for employees in the automotive aftersales industry. The research questions are: 1) What are the needs of the LMS for vocational training needed by trainers and trainees to help the online distance training activities? 2) What are the results of developing the LMS for online employee training activities? 3) What is the feasibility of the LMS for online distance training activities? 4) How do employees perceive online training with the developed LMS?

II. Methods

By the stated research objectives, this study attempts to design and develop an LMS to support online training of employees in the automotive aftersales industry. The automotive after-sales service industry in this study is car maintenance and repair workshops in Indonesia. The LMS development stage follows the 4D model (define, design, develop, and disseminate) with steps consisting of the LMS needs analysis stage, product design stage, product development, product feasibility assessment, and product dissemination. In the analysis phase, the researcher conducted a literature study and collected data related to employees' experiences in the automotive aftersales industry in training participation and continued with a study of the LMS needs to be expected by employees for future training. The research subjects at this stage involved 70 automotive industry employees in various work positions. Data were collected through open questionnaires and semi-structured interviews. These data have been analyzed through quantitative and qualitative analysis. At the design stage, researchers design LMS products, including layout, appearance, content systematics, and access. At this stage, product testing planning is also carried out. At the development stage, researchers make LMS products using a web platform so that LMS products can be produced that can be accessed easily.

Furthermore, to determine the product's feasibility, the product is evaluated based on the criteria of good product feasibility by vocational learning experts, information technology experts, and industry representatives, as many as 5 experts through the questionnaire. The data collected at this stage was analyzed using quantitative descriptive statistics to determine the feasibility category of the LMS being developed [17]. In determining the feasibility of each aspect of LMS development, score categories are formed according to the average indicator and ideal standard deviation. The feasibility intervals are described in Table I [18].

TABLE I: The Arrangement of Channels

No.	Category	Intervals
1	Very feasible	$x > 3.4$
2	Feasible	$2.8 < x \leq 3.4$
3	Decent	$2.2 \leq x \leq 2.8$
4	Less Eligible	$1.6 \leq x \leq 2.2$
5	Very inappropriate	$x < 1.6$

The next stage is disseminating the results of product development to 70 users, in this case, the automotive aftersales industry practitioners in Indonesia. Several aspects of user perception related to the usefulness of LMS, such as suitability of training to needs, compatibility of training with career development, and utilization of training for work, were measured using an online questionnaire to provide an assessment of the developed LMS. The data from this questionnaire were then analyzed using quantitative descriptive analysis.

III. Result

Following the research objectives, the results of this study consist of the results of each LMS development stage, including the define, design, develop, and disseminate stages. The research results include employees' need for LMS for online training, the results of LMS development, the feasibility testing of LMS development results, and employee perceptions of online training with the developed LMS.

A. Define a Learning Management System for Online Employee Training Activities

At this stage, the need for a vocational training LMS required by trainers and online training participants are defined. The need for LMS is obtained from open and closed questionnaires given to training managers, trainers/instructors, and prospective training participants. Several questions were asked regarding the experience of attending the previous training. As many as 70 respondents responded to the needs analysis questionnaire via a Google form. The 70 respondents can be classified based on gender, work position, age, length of work, experience in training, and duration of training attended. The distribution of the demographic aspects of the respondents can be seen in Table II.

TABLE II: Demographic Aspects of Employee Respondents

Category	Intervals
Gender	Male: 56 persons, Female: 14 persons
Position	Customer care: 11 persons; Part staff: 16 persons; Service advisor: 15 persons; Technician: 28 persons
Age	<25 years old: 32 persons; >25 years old: 38 persons
Length of work	>5 years: 6 persons; 3–5 years: 30 persons; <3 years: 34 persons
Training experience	Never before: 7 persons; 1 time: 29 persons; 2 times: 18 persons; >2 times: 16 persons
Training duration	≤ 1 week: 32 persons; 1–2 weeks: 28 persons; >2 weeks: 1 persons; Never before: 7 persons

The need for LMS for online employee training can be seen from the expected LMS features, LMS display, and expected learning media. The results of data analysis related to the need for an LMS for online employee training can be explained as follows:

1) Features employees need in an LMS

Fig. 1 shows that some of the features expected by most prospective online training participants are material files, appropriate learning media, and chat features. While others expect training groups, LMS login features, user profiles, quizzes, web meetings, assignment submissions, certificates, and notifications.

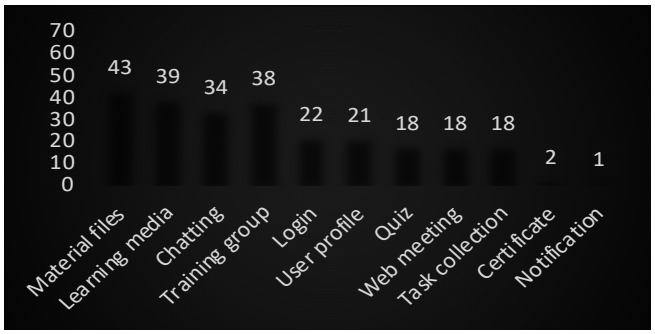

Fig. 1. LMS features employee expectations.

2) The LMS appearance that employees expect

Based on an open questionnaire that was filled out by 70 employees participating in the training, the appearance descriptions presented can be reduced to 12 themes, namely having an attractive, simple, elegant, complete appearance, neat and structured menus, downloadable material menus, using an updated logo, providing notifications, assignment submission status, separating material and questions, providing clear images, and providing animations. Thus, developing an LMS for online distance training must consider this view.

3) Learning media expected by employees at LMS

The learning media needs at LMS that employees expect can be seen in Fig. 2 below:

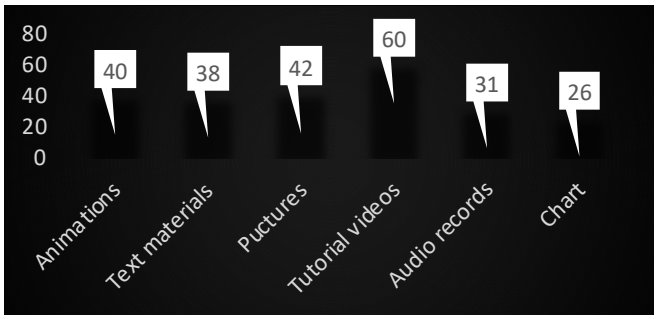

Fig. 2. The requirement for learning media in LMS.

Fig. 2 shows that most employees want to learn media through tutorial videos, pictures, animations, and text materials. Meanwhile, the media is in the form of sound recordings and more graphic forms for a few employees. However, it is also necessary to consider the use of learning media in light of the characteristics of the material presented.

B. Designing Learning Management System for Online Employee Training Activities

LMS development for online training is carried out based on the results of the needs analysis that has been carried out. After the needs analysis is carried out, the LMS is designed. At the design stage, the steps taken are selecting the media, selecting the format, and making an initial design draft. The selection of media for LMS development is based on the participants' needs related to LMS content in the form of video tutorials, images, text, animation, and graphics. The choice of LMS format must pay attention to the ease of access for users. The first step in choosing a format is to determine

learning content, online training strategies, methods, and learning resources. So, based on these steps, the menus displayed on the LMS must also be able to facilitate these needs, such as adding web meeting menus, chats, learning resource links, folders, and absences. The initial draft design is carried out after the selection of the LMS media and format has been completed. The design is in the form of an LMS prototype that presents menus according to user needs. At the design stage, validation from industry and media experts needs to be done so that the developed LMS is perfect.

C. Develop Learning Management System for Online Employee Training

The development process results in LMS products that will be used for online training for automotive industry employees. The development results is a training information system with 1) not using an existing platform, but developing it according to needs analysis, 2) including a section for logins for trainees and training instructors, and 3) providing information on training classes for trainees. In making the features in the LMS, researchers use adminLTE as the basic template for web pages. In order for the LMS to be developed effectively according to needs, the steps used are to make HTML and CSS code according to the menu that has been designed. To improve the appearance of the web so that the LMS is more functional, user authentication menus, profile pages, and others can be modified in a way that modifies JavaScript code and uses PHP My Admin server-side framework**.** So that the LMS can be accessed easily on mobile phones, the researchers also made a mobile version that can be downloaded for Android and iOS users, by converting web files into .apk and .ipa extensions. The display of LMS development results can be seen in Fig. 3.

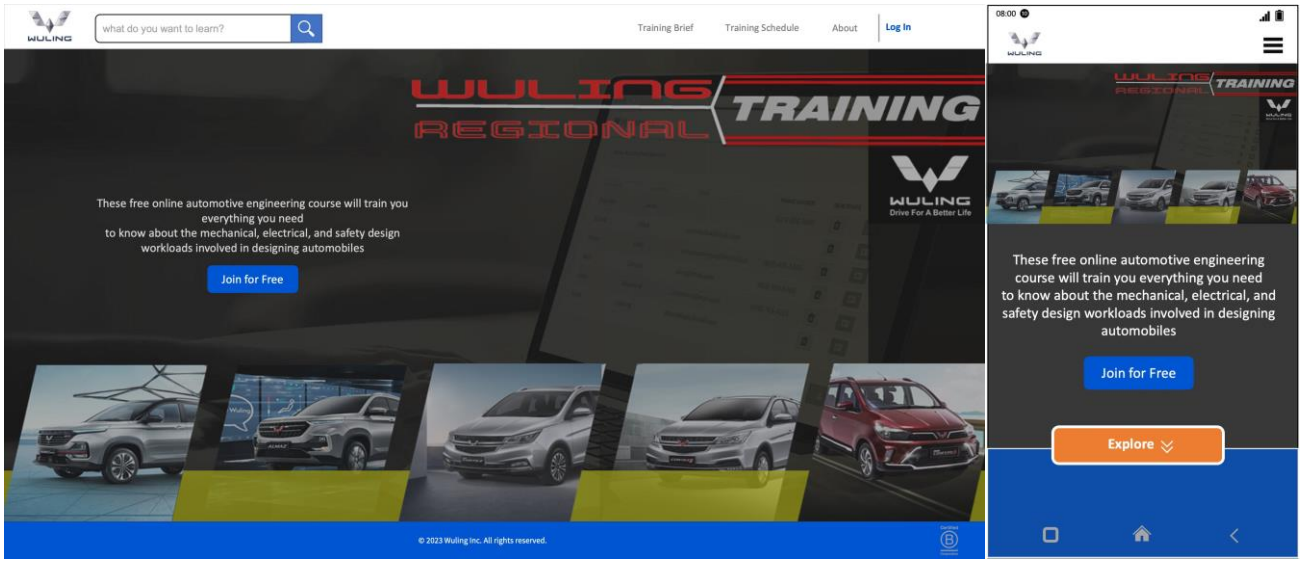

Fig. 3. The landing page of online training (*left-desktop version and right-mobile version*).

After the product has been successfully developed, an expert evaluates the feasibility of the LMS from several aspects of product feasibility. Product results that have been declared feasible by experts are then used by users. After using it, users provide an assessment of the product for several aspects of the benefits obtained.

1) Feasibility of learning management system for employee training activities online

The results of the developed LMS feasibility assessment can be seen in Table III.

TABLE III: THE RESULTS OF THE DEVELOPED LMS FEASIBILITY ASSESSMENT

Aspects	Score	Category
Convenience	3.41	Very feasible
Display	3.35	Feasible
Content settings	3.58	Very feasible
Interaction	3.30	Feasible
Ease of monitoring	3.73	Very feasible
Facilitate self-study participants	3.52	Very feasible

Based on the feasibility assessment of the developed LMS, the developed LMS meets the criteria for feasibility, so it can be used to support the implementation of online training for automotive industry employees.

2) Employee perceptions of online training with the developed LMS

Employee perceptions are obtained from closed questionnaires given to training managers, trainers/training instructors, and participants. Several questions were asked regarding the experience of attending the training. Employee perceptions can then be seen from several aspects, including the suitability of training for job needs, the suitability of training for career development, and the use of work training. Respondents' responses can be seen in Fig. 4.

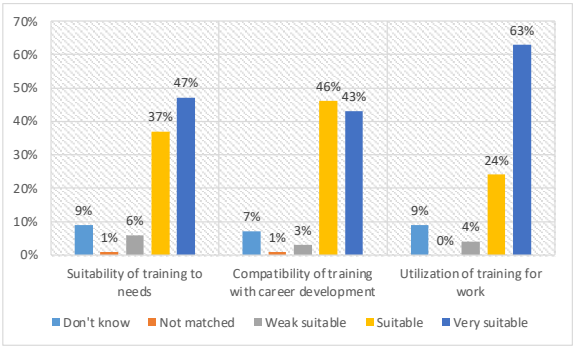

Fig. 4. Appropriateness of training materials for employees.

Based on the results of the appropriateness of the training responses above, most employees stated that the training materials provided so far were in the suitable (37%) and very suitable (47%) categories. Training for employees is expected to benefit job requirements and encourage career development in employee positions. The research results show that training materials for employees can support their careers. 46% of employees stated that it was appropriate, and 43% stated that they felt the benefits of training for career development. The following important aspect related to the training carried out so far is utilizing the training results on the job. The results of the data analysis show that, so far, the training materials provided have been widely used by employees. 24% of employees often use it, and 63% say they almost always use it, although 4% of employees said they rarely use the results of the training.

Apart from the suitability of the training for the perceived benefits of employees, employee experience is also related to the lack of training implemented so far. Based on the results of the data analysis, some of the deficiencies in the training that has been carried out so far can be seen in Fig. 5.

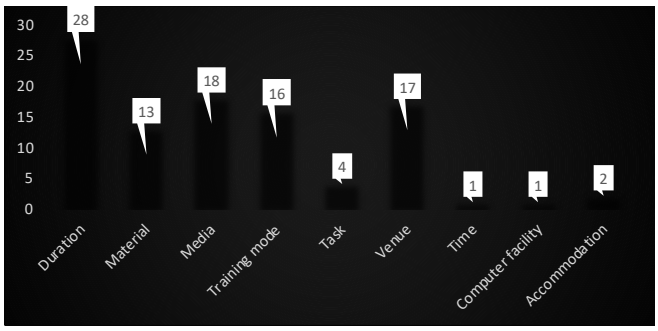

Fig. 5. Lack of aspects of training perceived by employees

The figure above shows that employees feel some deficiencies in the training they have attended. Many employees view training duration, materials, media, modes, and venues as deficiencies in employee training.

D. Disseminate LMS for Online Employee Training

The results of the LMS that have been developed and confirmed for its feasibility are then disseminated to LMS users, namely to employees, through the automotive company training department. Users rate the quality of the LMS used as part of a product's summative evaluation. In addition, product distribution was carried out to automotive training managers and supervisors. To evaluate the quality of the LMS used, employees provide a perceptional assessment of aspects of the LMS that have been used, including convenience, appearance, flexibility, language, instructional materials, motivation, benefits, and consistency. The data is taken from employees who have used the LMS. LMS assessments by employees can be seen in Table IV.

TABLE IV: LMS QUALITY

Aspects	$\bar{x}$	StD	Max	Min	Category
Convenience	4.24	0.68			Good
Display	4.19	0.66			Good
Flexibility	4.22	0.60			Good
Language	4.09	0.73			Good
Material	4.13	0.63	5	2	Good
Instruction	4.18	0.58			Good
Motivation	4.00	0.97			Good
Benefits	4.21	0.59			Good
Consistency	4.13	0.55			Good

Most employees state that the LMS has been good enough so far based on employee perceptions of the LMS that has been used. Thus, LMS can support employee competency development through online distance training.

IV. DISCUSSION

So far, retraining industrial employees is a mandatory agenda item for industrial training institutions. Various modes of training have been carried out. However, with the need for training efficiency, online learning has become a new alternative to vocational education. Even in the industry, online training methods are recognized to increase training efficiency. Employees can attend training at their respective workplaces. Online training platforms such as the LMS must be used to support online training for these employees.

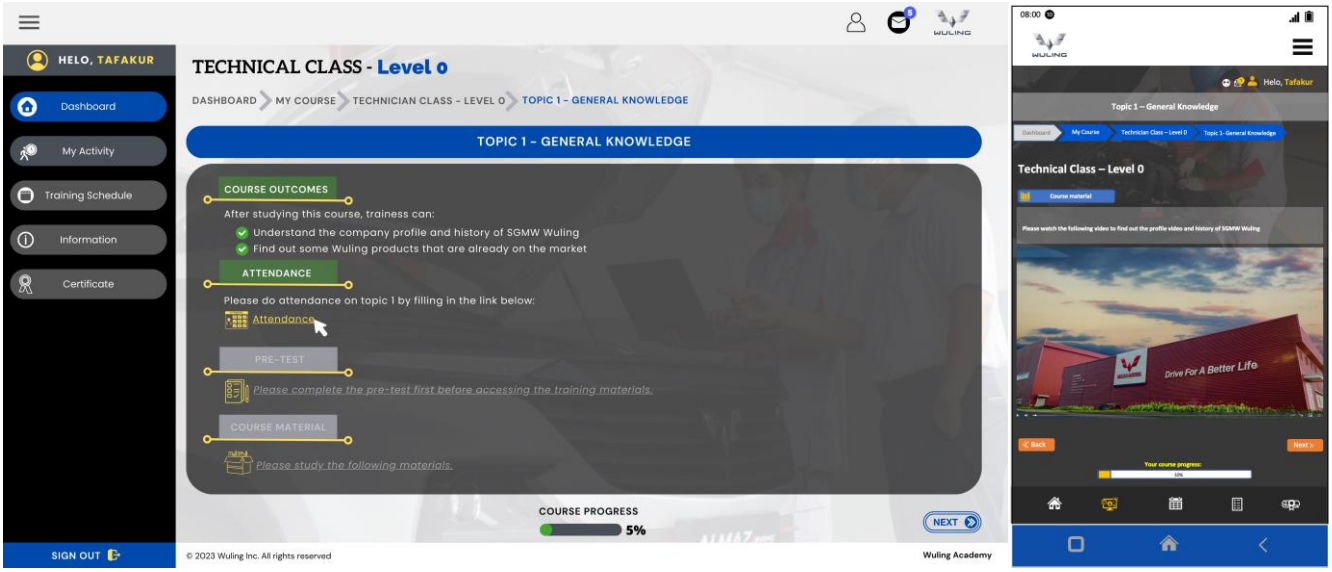

Fig. 6. Display of online training classes.

Based on an analysis of employee responses, some of the LMS features that most employees expect are downloadable material files, engaging learning media, and chat features. While others expect grouping/training classes, LMS login features, user profiles, quizzes, web meetings, assignment submissions, certificates, and notifications. With these features, it is believed that it will more effectively support distance training communication, where the communication system in distance education must have several functions: 1) presentation activities by students and educators; 2) practical activities with feedback such as question and answer, discussion activities, and structured group activities; and 3) accessing learning resources [13]. In line with this finding, Meylani *et al.* [9] confirm that an ideal online learning environment can create positive attitudes in participants and support various learning experiences, aiding participant reflection and providing scaffolding for online learning.

Judging from the appearance of the LMS desired by the participants, the expected appearance of the LMS is that it has an attractive, simple, elegant, complete appearance, a neat and structured menu, a material menu for download, uses an updated logo, provides notifications, task submission status, separates material and questions, provides clear pictures, and provides animation. The appearance of the developed LMS must be attractive and accessible and motivate the trainees to participate effectively. With a good appearance, an effective multimedia-based LMS will be intuitive and easy for students to navigate and find what they need [16]. Judging from the need for training media, employees expect learning media in the form of video tutorials, pictures, animations, and text materials. Meanwhile, the media in the form of sound recordings and graphic forms is more accessible to the small number of employees who expect it. These results support the idea that teachers can combine various types of learning media; even animation and video learning media need to be emphasized for online learning [19]. With this interactive LMS design, it will support an enterprise learning management system that enhances social networks, thereby creating a good social learning environment for students [20].

The development of the LMS platform is based on a needs analysis conducted by previous researchers. The LMS developed for online training is based on the adminLTE platform as the basic template for web pages. To meet the needs of training users, web features are modified to meet user needs. Based on this, the LMS was developed without using platforms like Moodle and Microsoft Teams. Even though these platforms have their advantages, to achieve the aspects needed by a trainee, using an LMS such as Moodle does not meet the criteria trainees want. As stated by Al Naddabi [21], there are five problems and concerns in using platforms such as Moodle, such as: (1) registering students on a large scale is a difficult task for several existing platforms; (2) students tend to be passive because the assessment activities are not thoroughly carried out; (3) lack of efficiency due to the skills of students and teachers when using platforms such as Moodle; (4) the forum provided is not following the learning target; and (5) the sharing forum is not used optimally to share information with other students. These problems are found mainly by instructors who do not understand the various features provided and lack IT skills. Even research conducted by Moloney and Gutierrez [22] regarding using Moodle in the Science and Engineering program at Ritsumeikan University also reported that several platforms, such as Moodle, are positive and valuable for distance education and are available for everyone to use. Still, only a few lecturers have discovered how Moodle can be applied in the classroom. These limitations make researchers consider using a modified platform to develop a training LMS for industrial employees. As a result, an LMS developed without using an available platform is included in the "feasible" category.

Subsequent results also support the theory that training is recognized as increasing productivity levels on an ongoing basis, improving performance due to increased knowledge, skills, and competence, and even increasing self-confidence, job satisfaction, and pride [6]. In addition, the quality of the LMS was generally good, although some respondents stated that there were still some deficiencies in the LMS, such as materials, media, and training modes. This evaluation becomes important information in the further development of the LMS. With these results, this distance employee training LMS can support employee training. This follows Ghilay's [23] claim that LMS can document, track, report, automate, and deliver educational, training, or learning and development programs, which start directly from the concept of e-learning. LMS is widely recognized as a convenient medium for delivering and managing training and easily sharing it with students remotely. LMS adoption is often done to improve the quality of learning, expand access, and reduce implementation costs [24].

V. Conclusion

This research seeks to develop an LMS to support online training activities for employees in the automotive after-sales industry. To do this, researchers conduct research and development by following the 4D model (define, design, develop, and disseminate). The researcher conducted a needs analysis for LMS development, designed the LMS, developed the LMS, tested the feasibility of the developed LMS results, and studied industry employees' perceptions of the developed LMS results for online training for them.

Based on the analysis of research data and discussion of the development of an LMS for online distance training that has been carried out, it can be concluded that there are four key results from the development of this LMS. First, the need for an online LMS for automotive industry employees to help the training process become more effective and efficient includes having an attractive appearance, a menu that is simple, elegant, complete, neat, and structured, a downloadable material menu, using a logo, the provision of notifications, the status of assignments, the separation of material and questions, clear pictures, and the provision of animations, as well as the provision of various learning media in the form of video tutorials, images, animations, and text material. Second, the results of developing the learning management system for online employee training activities are a training information system packaged in desktop and mobile versions with various features tailored to the needs of industrial employees and instructors. Third, the learning management system for online employee training activities is feasible by fulfilling aspects of convenience, display, content

management, interaction, ease of monitoring, and facilitating independent learning participants. Lastly, most employees consider that the LMS developed follows their needs, career development, and utilization in the workplace.

With the development of a suitable LMS to support remote training for employees in the automotive industry, it is suggested to conduct further research to examine the effectiveness of using LMS to support remote training for employees and the factors that influence it. This research was conducted in the context of the after-sales service industry in the automotive sector, so it is necessary to conduct studies for other industries and agencies.

ETHICS STATEMENT

This study is not an experimental study involving human or animal subjects. Before data collection, all research subjects had received information that filling out the instrument was done voluntarily. Respondents were also informed that personal identity data would be kept confidential and secure. They were also informed that this research would not risk their careers or families. All respondents agreed to participate in the study and responded to the instrument.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Tafakur conducted the research and wrote the paper; Ayu Sandra Dewi analyzed the data and wrote the paper; and Moch Solikin supervised the research and reviewed the paper. All authors had approved the final version.

ACKNOWLEDGMENT

On this occasion, we would like to thank Yogyakarta State University for funding this research. In addition, we also thank the employees of PT SGMW Sales Indonesia so that this research can be completed properly.

REFERENCES

[1] T. K. Shih and J. C. Hung, *Future Directions in Distance Learning and Communication Technologies*, 2006. doi: 10.4018/978-1-59904-376-0.

[2] I. R. Mathew and E. J. Iloanya, "Open and distance learning: Benefits and challenges of technology usage for online teaching and learning in Africa," *Pan-Commonwealth Forum 8 (PCF8)*, vol. 22, 2016.

[3] I. Kusmaryono, J. Jupriyanto, and W. Kusumaningsih, "A systematic literature review on the effectiveness of distance learning: Problems, opportunities, challenges, and predictions," *International Journal of Education*, vol. 14, no. 1, 2021, doi: 10.17509/ije.v14i1.29191.

[4] H. C. Liu and J. R. Yen, "Effects of distance learning on learning effectiveness," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 10, no. 6, 2014, doi: 10.12973/eurasia.2014.1218a.

[5] G. Grigorov, "The trend of distance education: problems and prospects for implementation," *Grani*, vol. 24, no. 3, 2021, doi: 10.15421/172131.

[6] P. Chhetri, V. Gekara, A. Manzoni, and A. Montague, "Productivity benefits of employer-sponsored training: A study of the Australia transport and logistics industry," *Education and Training*, vol. 60, no. 9, 2018, doi: 10.1108/ET-02-2017-0029.

[7] L. I. Vanek, J. Simpson, D. Johnston, and J. Petty, *IDEAL Distance Education and Blended Learning Handbook*, IDEAL Consortium 2018, 2019.

[8] D. B. Erice, F. Questier, D. P. Luján, and C. Zhu, "Linking e-learning tools with experiential knowledge production in higher education teaching-learning processes: The case of open source LMS," *International Journal of Information and Education Technology*, vol. 2, no. 4, p. 327, 2012.

[9] R. Meylani, G. Bitter, and J. Legacy, "Desirable characteristics of an ideal online learning environment," *Journal of Educational and Social Research*, 2015, doi: 10.5901/jesr.2015.v5n1p203.

[10] K. Safford and J. Stinton, "Barriers to blended digital distance vocational learning for non-traditional students," *British Journal of Educational Technology*, vol. 47, no. 1, 2016, doi: 10.1111/bjet.12222.

[11] N. I. Mohamad, A. Ismail, N. Nisak Ahmad, N. M. Mohamad, and N. S. Ibrahim, "Role of online training content in enhancing job motivation," *International Journal on Emerging Technologies*, vol. 11, no. 3, 2020.

[12] D. J. Keegan, "On defining distance education," *Distance Education*, 1980, doi: 10.1080/0158791800010102.

[13] J. D. R. S. E. Smaldino and D. L. Lowther, *Instructional Technology and Media for Learning*, London: Pearson New International Edition. Pearson Higher Ed., 2014.

[14] G. R. L Moran, *Vocational Education and Training through Open and Distance Learning: World Review of Distance Education and Open Learning*, London: RoutledgeFalmer, 2004.

[15] B. Saptono, H. Herwin, and F. Firmansyah, "Web-based evaluation for teacher professional program: Design and development studies," *World Journal on Educational Technology: Current Issues*, vol. 13, no. 4, pp. 672–683, 2021, doi: 10.18844/wjet.v13i4.6253.

[16] G. Woodill, *The Ideal Learning Management System for Multimedia Learning*, 2011.

[17] F. Firmansyah, B. Saptono, and Tafakur, "Using the service quality instrument to assess the quality of the professional certification programme," *Cypriot Journal of Educational Sciences*, vol. 17, no. 5, pp. 1812–1824, May 2022, doi: 10.18844/cjes.v17i5.7356.

[18] A. Suharsimi, "Prosedur penelitian suatu pendekatan praktik," *Jakarta: Rineka Cipta*, 2012.

[19] T. Tafakur, M. Solikin, and A. S. Dewi, "Student's perception on online instructional media effectiveness in automotive field," *VANOS Journal of Mechanical Engineering Education*, vol. 6, no. 2, 2021.

[20] O. E. Llantos and M. R. J. E. Estuar, "My.Eskwela: Designing an enterprise learning management system to increase social network and reduce cognitive load," *Procedia Computer Science*, vol. 138, 2018.

[21] Z. Al Naddabi, "A moodle course: Design and implementation in english for academic purposes instruction," in *Proc. the World Conference on ELearning in Corporate Government Healthcare and Higher Education*, 2007.

[22] B. Moloney and T. Gutierrez, "An enquiry into Moodle usage and knowledge in a Japanese ESP program," *PacCALL Journal*, vol. 2, no. 1, 2006.

[23] Y. Ghilay, "Effectiveness of learning management systems in higher education: Views of lecturers with different levels of activity in LMSs," *Journal of Online Higher Education*, vol. 3, no. 2, 2019.

[24] K. T. Habeeb, "E-learning platform/learning management system in education," *International Journal of Reflective Researching Social Sciences*, vol. 2, no. 1, 2019.