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EXAMINING THE USE OF WHEELER-MODEL BASED CURRICULUM DEVELOPMENT IN A LEARNING MANAGEMENT SYSTEM FOR VOCATIONAL STUDY PROGRAM

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ABSTRACT

This research is a survey of vocational higher education curriculum based on Learning Management System (LMS) adapted to government policy of "independent learning - independent campus" (ILIC). Previous researches have advocated that educational curriculum must conform to any changes in education policy, scientific development, educational models, and labor needs. During the pandemic, Indonesia applied the new policy of online learning and implementing using an LMS. In this context, the objectives of this study were (1) to know the perceptions of lecturers and students towards LMS-based online learning, (2) to ensure conformity of Wheeler-Model based curriculum in producing graduates who meet the needs of workforce, and (3) to ensure conformity of government policies in vocational higher education programs. The sample constituted 16 lecturers and 61 students of Mechanical Engineering Vocational Study Program. The data was obtained using questionnaire instruments over the google form. The findings suggest that LMS is not carried out properly and facing issues of communication, variations in IT, network limitations and control of learning outcomes. An analysis of Wheeler-Model based curriculum development indicators showed that its objectives were fulfilled and the curriculum could still be used to produce graduates with good competencies required to meet the needs of the workforce. It also became evident that ILIC program were significant and relevant. This study recommends implementation of LMS needs to be improved and trained by lecturers and priority should be given to the relevant ILIC programs for vocational higher education (VHE) students in Indonesia.

Contribution/Originality: The main contribution of this research shows that the application of LMS in vocational higher education (VHE) is relevant, as evident in the implementation of LMS-based learning during the pandemic. It also endeavors that Wheeler-model based curriculum within the ILIC policy contributes significantly and relevantly to VHE.

1. INTRODUCTION

The development of computers and digital applications has affected all aspects of human life including the world of Industry and education. Educational institutions that have been the backbone of the development of industry, precisely at this time there is not much role in the development of industry. The industrial world has been so rapidly growing, and now it has entered the era of Industry 4.0, causing educational institutions to lag behind to adjust in preparing the human resources needed by the industry. Educational institutions must redesign in all aspects of the educational process to suit the industry today. This is the gap in the world of education that needs to

be resolved through an in-depth analysis of the educational process by utilizing information technology to produce the graduates needed by the industry.

Jantjies and Joy (2016) suggest that the use of computer technology has become an important aspect of teaching and learning process around the world. Research at educational institutions today shows that digital technology is becoming important in improving authentic teaching and academic achievement of students (Burris, 2019; Kamau, Mwania, & Njue, 2018; Milla, Kurt, & Mataruna-Dos-Santos, 2019; Yunus, Sakinah, & Ashairi, 2019). This means that e-learning and digital systems are a necessity for teaching and learning, and one of the models that have been developed to meet this need is a learning management system (LMS).

This study aimed to examine the extent of student readiness in learning by implementing LMS, and the readiness of lecturers as well in teaching with LMS in the framework of Indonesian education policy called "independent learning - independent campus" (ILIC) program (Directorate General of Higher Education, 2020). The current use of the curriculum was reviewed for compliance with LMS-based e-learning with wheeler-model concept. The Covid-19 pandemic event has massively triggered the use of e-learning. Hence, the learning process is going to have a larger meaning for the future of the Indonesian nation, especially at the vocational higher education level.

2. BACKGROUND

Higher education policy in Indonesia is currently known as ILIC which states that "This is the initial stage to remove the shackles to make it easier to move. There will be several matrices that will be used to help higher education achieve its targets" (Directorate General of Higher Education, 2020). There are four things that form the main program of universities in Indonesia related to ILIC, namely (1) autonomy of the opening of new study programs; (2) re-accreditation process to be conducted automatically and voluntarily; (3) simplification of requirements to become state universities with legal entities; and (4) granting right to study three semesters outside the study program and changes in semester credit unit (SCU) system.

The fourth point relates to curriculum development which is directly related to the overall learning process of a study program. In this context, it is specified that "Students are given the freedom to take or not SCUs outside their campus as many as two semesters or the equivalent of 40 SCUs. In addition, students can also take SCUs in other courses on campus as many as one semester of the total semester to be taken. However, this does not apply to health study programs" (Directorate General of Higher Education, 2020). Each SCU is defined as an 'activity hour', not a 'learning hour'. Activities here can mean studying in class, internships or work practices in industries or organizations, student exchange, community service, entrepreneurship, research, independent studies, or teaching activities in remote areas. The list of activities that can be taken by students can be selected from the program determined under the guidance of lecturers.

With the Covid-19 pandemic since the beginning of 2020, there has been a change in the teaching and learning process (TLP) at all levels of education in Indonesia. The regulation set by the government states TLP is to be implemented online and face-to-face in schools must be abolished until the time that allows face-to-face again. LMS has also been programmed to suit higher education requirements and has become very helpful in pandemic. LMS is one of the e-learning systems that have been widely used to improve the student learning experience and the construction of learning materials understanding on certain topics. Turnbull, Ritesh, and Jo (2019) observed that LMS is utilized in teaching and learning process in education by utilizing programs such as Moodle, A-Tutor, Blackboard and Success Factors. The characteristics of the LMS are flexibility, ease of use, accessible and user friendliness.

The LMS-based ILIC education policy certainly affects the curriculum design. Therefore, in this study, the LMS-based ILIC program was verified against the implementation of the curriculum using the Wheeler-Model

which is considered suitable to meet the requirements to adapt to the development of science and technology in vocational higher education.

3. THEORETICAL FRAMEWORK

3.1. Learning Management System (LMS)

LMS is a software application for online activities, through e-learning programs, and content training (Bersin, Howard, O'Leonard, & Mallon, 2009; Morrison, 2003). LMS represents the following: using self-service and self-guided services; collecting and delivering learning content quickly; consolidating training initiatives on scalable web-based platforms; supporting portability and standards; and personalizing the content and enabling the reuse of knowledge.

LMS is a system that can be used in education by customizing the software to distribute learning programs and learning materials over the internet online. LMS facilitates self-service for students by implementing workflows, providing online learning, online assessment, ongoing professional education management, collaborative learning, and resource management training. LMS is also used by educational institutions to improve and support classroom teaching programs and offer courses for a larger population (Wichadee, 2015).

Kattoua, Al-Lozi, and Alrowwad (2016) suggest that internet is recognized as the main tool for education, especially in higher education, where web-based applications are preferred in terms of educational activities, communication channels and systems for accessing knowledge. Many educators introduced their electronic education models in the early 20th century, but they did not have adequate tools for effective implementation. LMS was therefore seen as the starting point of any we-based learning program which acts a useful platform for providing a conducive learning environment (Ellis, 2009).

Benefits that can be implemented by developing lecture learning materials by utilizing LMS are shown below in Figure 1.

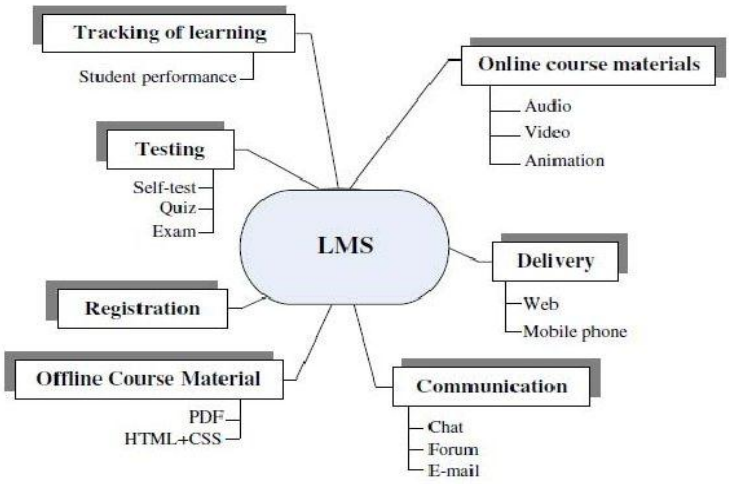

Figure-1. Structure of learning management system (LMS).
Source: Cápay and Miroslava (2011).

Based on this LMS structure model of Martin Cápay (Cápay & Miroslava, 2011) a grid of instruments was created to get feedback from students on the LMS model concept with the following description: A. Online course materials, with three descriptions, namely (1) At the time of online lectures, the audio is clear. (2) At the time of online lectures, the video is clear. (3) the online lectures are more interesting than face-to-face. B. Delivery, with three descriptions, namely (4) Lectures can be accessed using the internet network with a full computer. (5) Lectures can be accessed using android with a mobile phone completely. (6) Learning can be accessed using a computer and/or mobile phone. C. Communication, with six descriptions, namely: (7) Communication with

lecturers in the study of theory through a chat platform. (8) Communication with lecturers in real time in the study of theory through online. (9) Communication with lecturers using email in the study of theory. (10) Communication with lecturers in practical learning through a chat platform. (11) Communication with lecturers in real time in practical learning through online. (12) Communication with lecturers using email in practical learning. D. Offline course material, with two descriptions, namely (13) Lecture materials delivered using PDF or power points or the like and accessed offline. (14) Theoretical lecture materials are delivered offline by providing accessible HTML. E. Registration, with one description, namely (15) Lectures are limited to students enrolled in the study plan card. F. Testing, with three descriptions, namely (16) Written evaluation is carried out at a predetermined time and can be accessed online. (17) Oral evaluation during online lectures. (18) Evaluation in the form of assignment and the results are collected by email or WhatsApp. G. Tracking of learning, with three descriptions, namely (19) Online lectures improving performance and learning outcomes. (20) Online lectures are not different from face-to-face learning. (21) Online lectures make it difficult to improve my performance and learning outcomes.

3.2. Independent Learning - Independent Campus (ILIC)

The explanation of freedom of learning is given in the Q & A column published by the Ministry of Education and Culture, about the concept of ILIC (Directorate General of Higher Education, 2020). Independent Learning in autonomous universities follow the principle of a paradigm change in education in order to become more autonomous with an innovative learning culture. This aims to create an innovative learning culture, and not to curb it, and in accordance with the needs of each college. It also follows the flow of change and the need for linking and matching with industry so that universities become adaptive (Magnusson & Zackariasson, 2019).

Permenristekdikti Number 44 (2015) state that SCU is a measure of learning activities based on the learning process and recognition of the success of students' efforts in participating in curricular activities. Though, so far SCU is limited to face-to-face learning in a classroom but the student learning process should not be limited only to classroom activities. In the new scheme, students are given the right to carry out activities voluntarily outside the study program, or even outside the tertiary institutions that recognize the SCU. Hopefully, students can have the freedom to determine their learning series, thus creating a culture of independent learning, in order to gain a cross-disciplinary and valuable knowledge and experience. The process of calculating the SCU should be released to each college. Universities should be obliged to give to their students the right to voluntarily take a SCU outside their course of study or outside of college.

Students are the main beneficiaries of these four change initiatives. Students will get a choice of more up-to-date courses and according to the needs of knowledge and skills, as well as the freedom to choose courses that suit their capacity building. In addition, students will obtain more quality materials and learning processes with reduced administrative burden on lecturers.

The results of research from Iwan (2020) stated that universities should be open for collaboration and interaction with fellow education providers and third parties (business world, industry, non-profit organizations) in order to expand learning content. Based on the model of freedom of learning with off-campus activities, a matrix was prepared to find out how far off-campus activities programs responded in its implementation in an independent campus. This matrix followed the guidelines issued by the Directorate General of Higher Education (Directorate General of Higher Education, 2020) for off-campus program of activities, namely internships/industrial practices; projects in villages; student exchange programs; research and entrepreneurship; independent studies/projects; humanitarian projects; teaching in schools and like.

3.3. Wheeler-Model Curriculum

In the opinion of Sukmadinata (1999) curriculum is a tool to achieve educational goals, as well as a guideline in carrying out education. Curriculum reflects the philosophy of a nation's life, which provides the direction how the

life is determined by the curriculum for the nation. The curriculum can plan the expected educational or teaching outcomes because it can show what to do and what activities students should experience. Curriculum must be able to adjust to the development of times that are constantly likely to change.

The development of the current curriculum in Indonesia, as stated by Palupi (2018), is a process that runs through different stages and is carried out after each period is determined by the institution concerned. Curriculum development with integrative approach further balances cognitive abilities namely understanding concepts and theories as well as attitudes and psychomotor competences, obtained from co-curricular or extracurricular activities normally not obtained in a classroom but through practice. Various strategies are used to improve students' soft skills and hard skills (MKDP Development Team, 2017).

Curriculum development aims to improve students' ability to learn and socialize. Curriculum changes are expected to increase learning opportunities. The lesson materials in the integrated curriculum are planned according to the development and needs of the community and students as whole in order to be functionally useful and able to improve students' ability to learn (Hadijaya, 2015). Moreover, to implement an integrative curriculum, lecturers must have the ability to implement varied teaching and learning strategies. Finally, curriculum evaluation as one of the components in decision making is very useful to develop educational programs (Hadijaya, 2015). The achievements that lecturers want to produce in this curriculum is the realm of cognitive, affective, and psychomotor which certainly cannot be separated from each other to improve the soft and hard skills of students. One of the curriculum development models discussed in this study is the Wheeler Model (Bhuttah, Chen, Hakim, & Saima, 2019).

The Wheeler model in Vocational Education is found appropriate because curriculum users, in this case lecturers, will see technological advances used in the practical learning process, so that the technology used is the same as the technology suggested in the curriculum. However, the technology used in educational institutions is not necessarily relevant to cutting-edge technology.

A good learning model is one that is easy to understand a process fundamentally and thoroughly (Henson, 1995). The benefits of the model are a) it can explain several aspects of human behavior and interaction; b) it can integrate all knowledge of observation and research results; c) it can simplify a complex process; and d) it can be used as a guideline for performing activities.

The model for curriculum development in this study is the Wheeler Model (Print, 1993) described as follows in Figure 2.

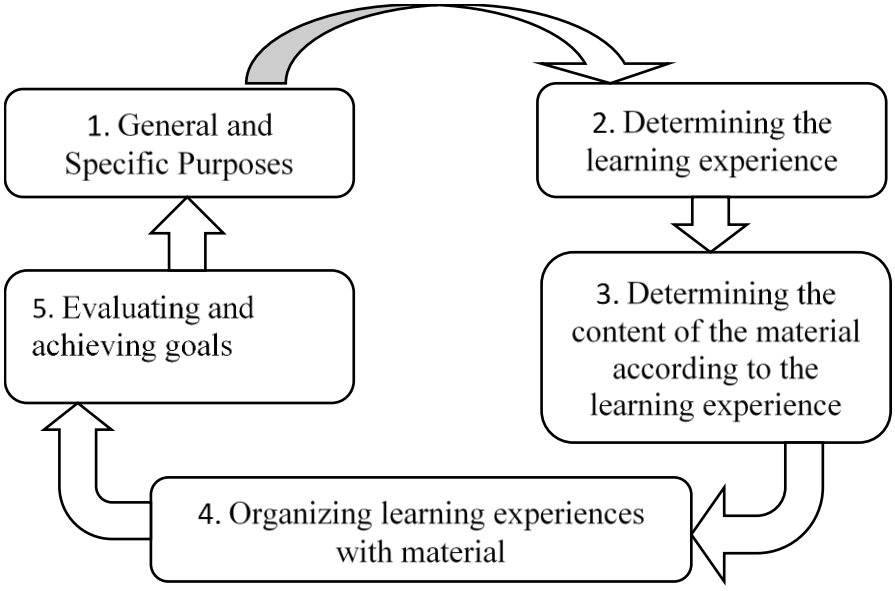

Figure-2. Wheeler Model curriculum development.

Source: Print (1993)

a. General and Special Purposes

Formulating goals is the main function in educational goals, consisting of general and special objectives. General objectives are normative which contain philosophical goals (aims) or practical learning objectives (goals). Specific objectives are specific and observable (goals), namely a learning goal that is easily measured for its achievement.

In the context of curriculum development, according to Wheeler model, goal determination must be done at the initial stage because the goal gives the direction to determine educational objectives. The method of information networking through focus group discussion (FGD), is commonly used to determine goals, work experience, learning materials, organizing learning materials, and evaluation of goal achievement.

b. Determining the Learning Experience

The learning experience in question surrounds all student activities in interacting with the environment. Some principles in determining the student learning experience include (1) they must be in accordance with the objectives to be achieved; (2) each learning experience must satisfy the student, (3) each design should ensure the involvement or participation of students, (4) each principle must aim at achieving a different goal. Organizing a clear learning experience will provide direction in the implementation of the learning process into a real experience for students.

c. Determining the Content of The Material According to the Learning Experience

The third stage of curriculum development, according to Wheeler model, is the determination of content and subject matter. The determination of content and subject matter is based on the learning experience of students and used as a reference in the preparation of teaching material. Moreover, clear organization of learning material will provide direction for the implementation of the learning process so that it becomes a real learning experience for students.

d. Organizing Learning Experiences with Materials

There are two types of organizing learning experience (Sanjaya, 2008) namely (1) Vertically organizing the learning experience, namely connecting learning experiences together in the same study at different levels so that students have a wider learning experience. (2) Organizing the learning experience horizontally, namely connecting the learning experience between fields at the same level so that students can differentiate between learning experiences and attain reinforcement.

e. Evaluating and Achieving Goals.

Evaluation is a process of collecting, processing and presenting data for the determination of a curriculum. However, this evaluation process needs to be updated according to the effectiveness and efficiency of the curriculum and goals to be achieved. Curriculum evaluation also needs to be carried out to adjust to latest policies, developments in science, technology and changing labor market needs. There are two aspects that need to be considered in evaluation (Sanjaya, 2008) namely (1) Evaluation should assess whether there has been a change in students' behavior in accordance with the educational objectives that have been formulated. (2) Evaluation should use more than one assessment tool at a certain time.

While developing Wheeler Model curriculum it appears that there are multiple cycles and each stage in a cycle has interconnected components. The Wheeler-model based curriculum development is described as follows: (A) Determining general and specific purposes with five descriptions for the lecturer, namely (1) I create a course plan every semester before the lecture begins. (2) I arrange the general purpose of the lecture by referring to the competence of graduates of the study program. (3) I arrange a specific purpose based on the general purpose of the course for the achievement of graduate competence in accordance with the substance of the field of courses. (4) I

compile a specific purpose based on textbooks relevant to the course. (5) I arrange a specific purpose by adding the required competencies of industry and employment in accordance with the formation of graduate positions. (B) Determining the learning experience, with five descriptions, namely (6) I prepare a lecture plan in accordance with the provisions of the SCU. (7) I design the course gradually to achieve the competence of the course. (8) I design the lecture time to be more than 12 meetings (theory or practice). (9) I design student center learning-based lectures (10) I use case study methods and/or project-based and/or inquiry. (C) Determining the content of the material in accordance with the learning experience, with five descriptions, namely (11) I compile the lecture materials according to the learning program plan. (12) I compile lecture materials based on textbooks. (13) I prepare lecture materials for enrichment based on the latest technological and industrial developments. (14) I follow and/or study the development of science and technology. (15) I apply the discussion method in the lecture. (D) Organizing the learning experience with materials with five descriptions, namely (16) Lecture materials are delivered at the beginning of the lecture. (17) Material can be accessed by students openly (open access) (18) Students are given the flexibility to access materials from various sources. (19) Lectures are conducted online and offline. (20) Lectures must be attended by more than 80% of students. (E) Evaluating and achieving goals with five descriptions, namely (21) One competency unit is evaluated in every-learning lesson. (22) The final evaluation is carried out to measure the achievement of learning objectives. (23) The specific purpose of the lecture program plan shall be achieved in the lecture process. (24) 70% of students should graduate with a grade of more than B (grade A - E). (25) The course plan is revised for the next semester of lectures.

4. METHODOLOGY

This study used survey method of data collection through two survey instruments, namely a questionnaire for students that included seven indicators namely, online course materials, delivery, communication, off-line course material, registration, testing, and tracking of learning, with a total of 21 questions items. The questionnaire for lecturers consisted of five indicators, namely, determining general objectives and specific objectives, determining the learning experience, determining the content of the material in accordance with the learning experience, organizing the learning experience with the material, and evaluating and achieving objectives, with questions as many as 25 items. The analysis of research data is a process of measuring the fundamental relationship between empirical observation and quantitative mathematical expression (Creswell, 2014). The survey method is used in large and small populations, but the data studied is data from samples taken from that population, so that relative events, distribution, and relationships between variables (Kerlinger & Lee, 2000). The findings of the study were interpreted by descriptive and explanative methods. The descriptive research method enabled to understand the condition of each research variable, while the explanative method explained the causal relationship between variables.

4.1. Participants, Sampling and Setting

This research was conducted in the Vocational Study Program of Mechanical Engineering, Faculty of Engineering, State University of Jakarta, with a research population of two groups, namely, lecturer groups and student groups. The sample was determined by using accidental or opportunity sampling technique that involves taking a population sample which is close at hand rather than carefully determining and obtaining it (Sekaran & Bougie, 2010) with 16 lecturer and 61 student respondents. Each respondent was required to fill in the questionnaire according to the respondent's status through an online google form.

4.2. Procedures and Data Collection

The data instruments used the Likert scale. The answers were arranged in an interval from 1 to 5 with following categories: 5 - strongly agree; 4 – agree; 3 – undecided; 2 – disagree; 1 - strongly disagree. The

Questionnaire instruments were created in Google Form. According to Bond and Fox (2015); Turnbull., Chugh, and Luck (2021) the selection of alternative answers should have following objectives(1) to get universal data, (2) to include all 'undecided' responses in the "neutral" category and not to include in the analysis unless the respondents give the reason, and (3) to avoid the category "do not know" as a response.

4.3. Data Analysis

The question items in the data collection tools were tested for validity and reliability. Validity test was done by calculating moment coefficient through Karl Pearson method. Reliability test was carried out by using Cronbach's Alpha formula. The data analysis techniques used in this study included descriptive statistical analysis, which is a statistical technique in the form of frequency distribution tables, graphs, and averages. The test results of validity and reliability of instruments are as follows (1) The data of 15 respondents for each group was used to test the instrument. (2) The validity test tool that used Karl Pearson's moment coefficient measured a significant level of 5% as its critical value. If the value of correlation 'r' count is greater than the correlation value based on table 'r' where $\alpha = 5\%$ and sample 'n' of 30 known 'r' table = 0.361, then the question is valid (Sekaran & Bougie, 2010) (3) The Reliability test tool found the Cronbach test R value above 0.8, hence it can be interpreted that the relationship between variables and the whole question is sufficiently reliable. The test result of the instrument for validity (Table 1) with known magnitude of correlation count (below the column corrected item- total correlation) is entirely above the correlation table, which is 0.361. This indicates that all question items are valid in measuring the indicator and valid as well in measuring the description of the research indicator.

Table-1. The wheeler model indicator validity test.

Indicator	t count	Explanation
Defining general goals and specific goals	6.51	Valid
Determining the learning experience	8.54	Valid
Determining the content of the material according to the learning experience	9.29	Valid
Organizing learning experiences with material	10.32	Valid
Evaluating and achieving goals	10.25	Valid

Likewise, the LMS Indicator test result revealed the magnitude of the correlation count. It measured entirely above the table correlation (Table 2), which was 0.361. This indicates that all question items are valid in measuring their indicators.

Table-2. Correlation value of learning management system items.

Indicator	t count	Description
Online course materials	6.78	Valid
Delivery	8.54	Valid
Communication	9.25	Valid
Offline course material	9.71	Valid
Registration	5.73	Valid
Testing	4.10	Valid
Tracking of learning	5.61	Valid

The instrument test results for Reliability (Table 3) measured the values above 0.6; hence all indicators of both instruments were declared reliable.

Table-3. Reliability test.

Variable	Cronbach Alpha	Description
Wheeler Model	0.870	Reliable
Learning Management System	0.667	Reliable

5. FINDINGS AND DISCUSSION

The results of both instruments and description of indicators of implementation of the development of the Wheeler model curriculum are analyzed as follows:

5.1. Learning Management System (LMS)

a. Analysis per Indicator Description

This section contains the results of respondents' assessment of all descriptions of LMS indicators. The overall response to each indicator description showed the following results: 4.7% responded, "strongly disagree"; 23.8% responded, "undecided"; 38.1% responded, "agree"; 33.4% responded, "disagree"; and none of the respondents opted for "strongly agree". It can be interpreted that the overall implementation of LMS has not been carried out to the maximum and it also depends upon the ability of students in various things that must be improved, including communication, variations in information technology (IT) accessibility, network limitations and control of learning outcomes. What is very concerning is that there are no significant differences with non LMS based learning. This can be due to limited mastery of IT facilities and less optimal use of IT for learning.

b. Analysis per Indicator

The following table (Table 4) is the result of respondents against all LMS indicators. The table illustrates that all indicators rated an average score of 3.1 "Undecided", although in the indicator "tracking of learning" the response is "Disagree", while there are 3 indicators with the response of "Undecided". This indicates that the implementation of LMS still has constraints on online course materials and communication indicators. Teaching materials become the main source of online learning needs, which must be prepared, developed and re-evaluated. This would also result in overcoming the communication barriers by developing teaching materials that are more appropriate and meaningful for students. Moreover, control of learning processes and learning outcomes also need to be developed in the LMS. A measurable evaluation system and appropriate learning objectives need to be developed too, so that learning outcomes can be evaluated appropriately. Figure 3 restates these findings graphically.

Table-4. Learning management system (LMS) indicator value.

No.	Indicator	Average	Explanation
1	Online course materials	2.9	Undecided
2	Delivery	3.5	Agree
3	Communication	2.7	Undecided
4	Offline course material	3.5	Agree
5	Registration	3.6	Agree
6	Testing	3.4	Agree
7	Tracking of learning	2.4	Disagree
	Average LMS Implementation	3.1	Undecided

5.2. Implementation of Wheeler Model

a. Analysis per Indicator Description

This section provides results from respondents to all indicator descriptions of wheeler-model based curriculum development. Respondents stated 24 indicator descriptions as "strongly agree" (96%); only one description received the average response "agree" (4%). Thus, it can be said that the overall description of curriculum development with Wheeler Model is fulfilled, and the current curriculum can still be used.

b. Analysis per Indicator

Table 5 provides the results by respondents to all indicators of wheeler-model based curriculum development. All indicators are seen with an average score of 4.3 which means >3.9. This indicates that indicators of wheeler-

model based curriculum development are appropriately implemented and that the current curriculum is still in accordance with the existing situation both online and offline. Figure 4 is a graphical restatement of these findings.

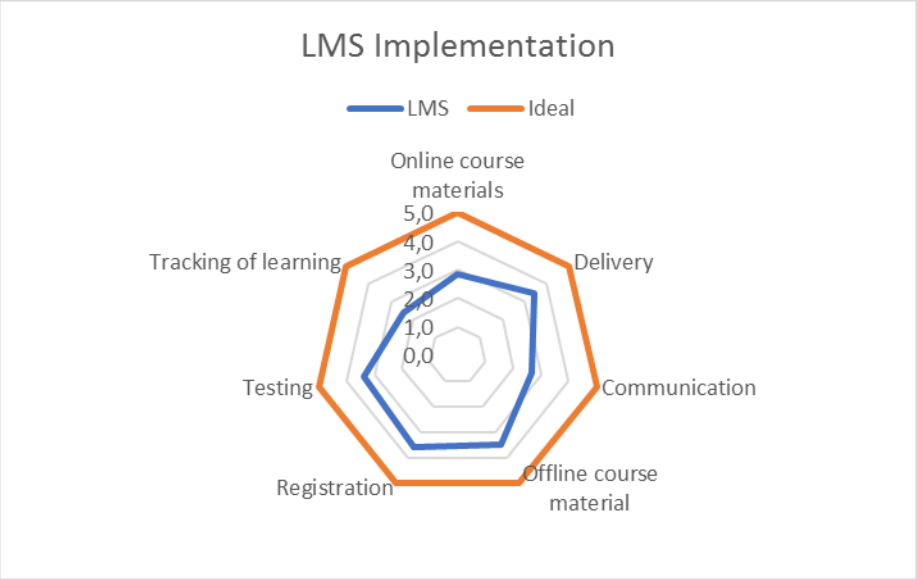

Figure-3. LMS implementation response.

Table-5. Wheeler Model based curriculum development indicator values.

No.	Indicator	Average	Description
1	Defining general goals and specific objectives	4.5	Strongly Agree
2	Determining the learning experience	4.4	Strongly Agree
3	Determining the content of the material in accordance with the learning experience	4.3	Strongly Agree
4	Organizing the learning experience with material	4.3	Strongly Agree
5	Evaluating and achieving goals	4.1	Strongly Agree
	Average Curriculum Development based on Wheeler Model	**4.3**	Strongly Agree

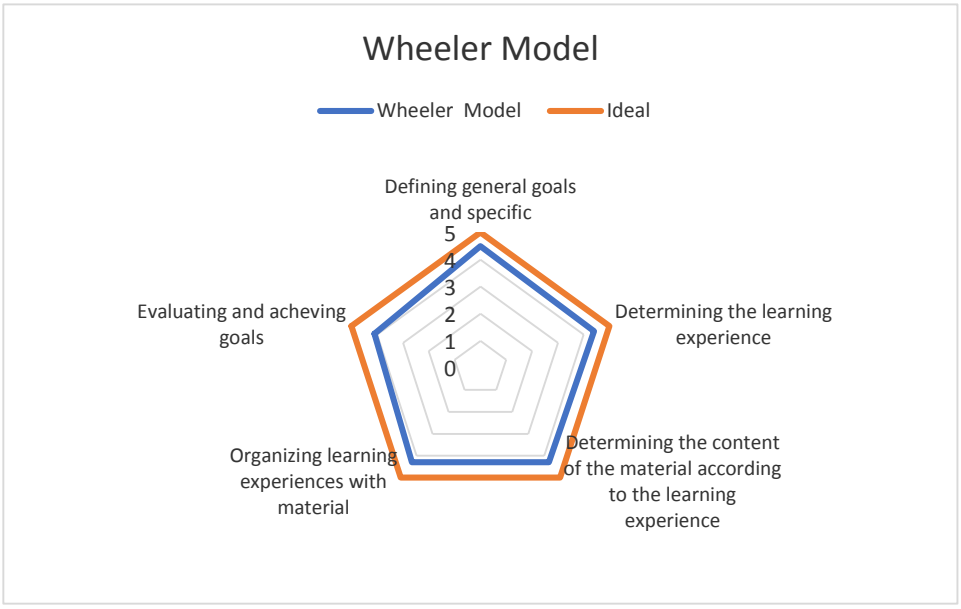

Figure-4. Implementation of wheeler model-based curriculum development.

5.3. Implementation of Off-Campus Activities

a. Value Analysis per Activity

Respondents' assessment of all off-campus activities showed that there were 5 activities (62.5%) rated "strongly agree" because the average score was ≥ 3.9; while there were 3 activities (37.5%) with a score of 3.3, less than the average score. This means that off-campus activities in independent learning programs such the Vocational Study Program of Mechanical Engineering within independent campuses are appropriate to be implemented and developed.

b. Ranking of Priority Activities

Table 6 exhibits the results of respondents' assessment of the priority ranking of off-campus activities. This assessment states that there is a need to set the priority ranking of these activities in the order of average score.

Table-6. Priority activities off-campus activities.

No	Activities	Average	Priority Ranking
6	Independent Studies / Projects	4.9	1
1	Internships / Industrial Practice	4.5	2
2	Project in the Village	4.2	3
3	Student exchange	4.1	4
7	Humanitarian Project	3.9	5
4	Research	3.3	6
5	Entrepreneurship	3.1	7
8	Teaching in schools	2.9	8

Looking at the results of respondents for priority to off-campus activities, it can be concluded that independent studies / projects have the highest priorities. They can be developed and interpreted as most appropriate for student activity programs in the Mechanical Engineering Vocational Study Program. The second and third priorities are such programs like Internships / Industrial Practice and Project in the Village that are found relevant to this course. Thus, it can be concluded that off-campus learning activities can be used as an independent learning program by prioritizing three out of eight activities proclaimed in this study. Figure 5 restates these findings graphically.

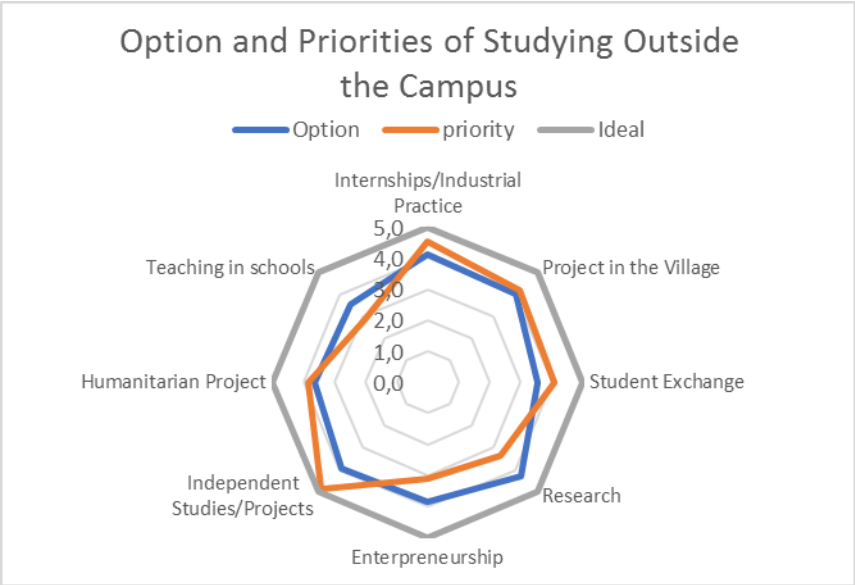

Figure-5. Options and priorities of off campus learning in the implementation of ILIC program.

6. CONCLUSION

There are at least three conclusions of this study which illustrate that vocational higher education institutions in Indonesia have a high flexibility in anticipating the development of the industry today, although there is still an improvement in its implementation. These conclusions are: (1) The implementation of LMS shows that its overall implementation has not been maximized, especially related to communication, variations in IT accessibility, network limitations and control of learning outcomes. This research has proven that the overall implementation of LMS indicators is considered as "undecided", to mean that the implementation of LMS is still a constraint for the online course materials and communication indicators. Hence, teaching materials become the main source of online learning needs to be prepared, developed, and re-evaluated, so that communication barriers can also be overcome. Eventually, for the implementation of LMS, there is a need to develop important teaching materials. (2) The analysis of Wheeler-Model based curriculum reveals that the development measures for the curriculum based on the Wheeler Model are fulfilled, and that the current curriculum can still continue to be used. This study further concludes that all indicators of wheeler model-based curriculum development are appropriately implemented in the existing online and offline modes of instruction. It can thus be recommended that curriculum development based on Wheeler Model could be appropriately used in curriculum development for vocational education environments. (3) Finally, in the context of the ILIC program running eight off-campus activities, it may be concluded that off-campus activities in the vocational studies program are appropriate to be implemented and developed. The priority ranking of off-campus activities shows "independent studies/projects" as first, "internship/industrial practice" as second, and "project in the village," as the third priority, which is significant and relevant to this study program. It is also concluded that ILIC program can be developed and implemented as a mandatory program in vocational higher education environment in Indonesia.

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REFERENCES

Bersin, J., Howard, C., O'Leonard, K., & Mallon, D. (2009). *Learning management systems 2009: Fact, practical analysis, trends and provider profiles.* Oakland, CA: Bersin & Associates.

Bhuttah, T. M., Chen, X., Hakim, U., & Saima, J. (2019). Analysis of curriculum development stages from the perspective of Tyler, Taba and wheeler. *European Journal of Social Sciences, 58*(1), 14-22.

Bond, T. G., & Fox, C. M. (2015). *Applying the rasch model; fundamental measurement in the human sciences* (3rd ed.): Routledge.

Burris, J. (2019). Syncing with families: Using technology in early childhood programs. *American Journal of Education and Learning, 4*(2), 302-313. Available at: https://doi.org/10.20448/804.4.2.302.313.

Cápay, M., & Miroslava, M. (2011). *Analysis of students' behaviour in e-learning system.* Paper presented at the Conference: EAEEIE Annual Conference 2011. Nitra: University of Constantinus the Philosopher in Nitra - Constantine the Philosopher University in Nitra.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.

Directorate General of Higher Education. (2020). *Guide book of independent learning - independent campus* (1st ed.). Jakarta: Directorate General of Higher Education, Ministry of Education and Culture.

Ellis, R. K. (2009). A field guide to learning management systems (LMS), how can organizations make smart purchasing decisions about LMS's? (L. Circuits, Ed.) Retrieved from: https://slideplayer.com/slide/12361995/#.YLcwkSHkb4A.whatsapp.

Hadijaya, Y. S. M. (2015). *Student organizations and student managerial competencies (student organization and student managerial competency)* (1st ed.). Medan: Perdana Publishing Mulya Sarana Publisher Group.

Henson, K. T. (1995). *Curriculum development for education reform.* New York: Longman.

Iwan, M. A. (2020). Analysis of online models in the independent campus. *Perspective: Journal of Administrative Sciences*, *2*(2), 83-79. Available at: https://doi.org/10.33592/perspektif.v2i2.628.

Jantjies, M., & Joy, M. (2016). Lessons learnt from teachers' perspectives on mobile learning in South Africa with cultural and linguistic constraints. *South African Journal of Education*, *36*(3), 1-10. Available at: https://doi.org/10.15700/saje.v36n3a1274.

Kamau, L. M., Mwania, J., & Njue, A. K. (2018). Technology resources for teaching secondary mathematics: Lessons from early and late adopters of technology in Kenya. *Asian Journal of Contemporary Education*, *2*(1), 43-52. Available at: 10.18488/journal.137.2018.21.43.52.

Kattoua, T., Al-Lozi, M., & Alrowwad, A. a. (2016). A review of literature on E-learning systems in higher education. *International Journal of Business Management & Economic Research*, *7*(5), 754-762.

Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Florida: Harcourt Inc.

Magnusson, J., & Zackariasson, M. (2019). Student independence in undergraduate projects: Different understandings in different academic contexts. *Journal of Further and Higher Education*, *43*(10), 1404-1419. Available at: https://doi.org/10.1080/0309877X.2018.1490949

Milla, A. C., Kurt, O., & Mataruna-Dos-Santos, L. J. (2019). User perceptions of technology integration in schools: Evidence from Turkey's fatih project. *International Journal of Education and Practice*, *7*(4), 430-437. Available at: https://doi.org/10.18488/journal.61.2019.74.430.437.

MKDP Development Team. (2017). *Curriculum & learning* (3rd ed.). Depok: Rajawali Press.

Morrison, D. (2003). *E-learning strategies*. Chichester: Wiley & Sons.

Palupi, D. (2018). What type of curriculum development models do we follow? An Indonesia's 2013 curriculum case. *Indonesian Journal of Curriculum and Educational Technology Studies*, *6*(2), 98-105. Available at: https://doi.org/10.15294/ijcets.v6i2.26954.

Permenristekdikti Number 44. (2015). *National standards of higher education*. Indonesia: Ministry of Research, Technology and Higher Education.

Print, M. (1993). *Curriculum development and design* (2nd ed.). St. Leonards, N.S.W: Allen & Unwin.

Sanjaya, W. (2008). *Learning strategy oriented to educational process standards*. Jakarta: Prenada Media.

Sekaran, U., & Bougie, R. (2010). *Research method for business: A skill building approach* (5th ed.). New York: John Wiley @ Sons.

Sukmadinata, N. S. (1999). *Development of theoretical and practical curricula*. Bandung: PT. Rosdakarya Youth.

Turnbull, D., Ritesh, C., & Jo, L. (2019). *Learning management systems: An overview. Encyclopedia of Education and Information Technologies, edited by A. Tatnall*. Cham: Springer Nature.

Turnbull., D., Chugh, R., & Luck, J. (2021). Learning management systems: A review of the research methodology literature in Australia and China. *International Journal of Research & Method in Education*, *44*(2), 164-178. Available at: https://doi.org/10.1080/1743727X.2020.1737002.

Wichadee, S. (2015). Factors related to faculty members' attitude and adoption of a learning management. *Turkish Online Journal of Educational Technology*, *14*(4), 53-61.

Yunus, M. M., Sakinah, Z., & Ashairi, S. (2019). The potential use of social media on Malaysian primary students to improve writing. *International Journal of Education and Practice*, *7*(4), 450-458. Available at: http://doi.org/10.18488/journal.61.2019.74.450.458.