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Process-oriented assessment and improvement of e-learning using e-learning Maturity Model (eMM) in higher education

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ABSTRACT

The growth of Information and Communication Technology (ICT) stimulates the use of internet in the education sector; thus it is important for educational institutions to start to prioritize and invest in the use of internet in Teaching-Learning process, such as e-learning. The implementation of e-learning in Telkom Bandung Vocational School aims to support the institution's vision in becoming the leader in ICT field. However, the institution has never conducted a measurement upon the implementation of e-learning so it is necessary to conduct an assessment that can measure the maturity level which reveals processes that have been running within the institution. The purpose of this research is to determine the maturity level of e-learning capability of the institution in achieving its vision using e-Learning Maturity Model (eMM), focusing on the area of the Learning process. Furthermore, it shows a roadmap of how the quality of e-learning activities at Telkom Bandung Vocational School can be improved.

Keywords— *E-learning, Maturity model, Capability, Quality, E-Learning Maturity Model (eMM)*

1. INTRODUCTION

Computerized information systems are becoming a necessity in the field of education, such as e-learning. E-learning is a concept where the learning process utilizes ICT, especially the internet, to improve the performance of the Teaching-Learning process [1]. Through e-learning, the Teaching-Learning system that was originally conventional or through face-to-face only becomes unlimited by distance and time. Teaching materials become more interesting and dynamic to motivate learners and improve the quality of learning.

Telkom Bandung Vocational School is an ICT-based vocational school which has implemented e-learning system. With a vision of becoming a superior in the field of ICT, it is certain that the institution needs to be supported by a leading and sustainable innovation. However, the institution has never measured the e-learning system used, despite the fact that the success of e-learning implementation depends on the development strategy and business goal institutionally. Therefore, a measurement method such as an assessment is needed to observe the existing e-learning implementation and its capability in achieving its objectives.

Assessment using e-Learning Maturity Model (eMM) can identify the strengths and weaknesses of the institution in implementing e-learning, so it can be discovered which sides can be improved for further development. This research applies the model within the institution, focusing on the area of the Learning process of eMM, then provides a roadmap for the further development plan. Learning process area has the core value for the whole process of e-learning and directly relates to pedagogy aspect of e-learning. Through a good development strategy plan, especially at the core of e-learning process, it's not just a short-term benefit that can be gained but it can actually achieve its long-term benefit such as the quality of the resulting learning.

2. E-LEARNING MATURITY MODEL (eMM)

The e-Learning Maturity Model (eMM) is an approach model developed to improve the quality of e-learning where institutions can assess and compare their ability to develop, utilize and support e-learning. eMM was developed by Stephen Marshall based on two complementary models of Capability Maturity Model (CMM) and Software Process Improvement and Capability Determination (SPICE). The eMM consists of process areas, processes, dimensions, practice statements and assessed using a pre-determined rating scale. The relationship between these components can be seen in Figure 1 below.

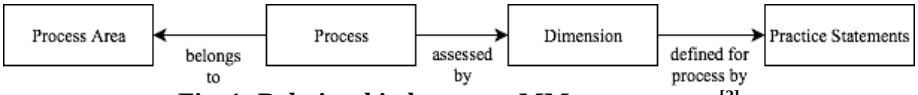

Fig. 1: Relationship between eMM components [2]

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The three major components of eMM are processes, capability dimensions, and capability assessments. There are 5 process areas which are broken down into a total of 35 processes. Each process is assessed within 5 capability dimensions using a rating scale based on the practice statements that are considered best practices according to eMM.

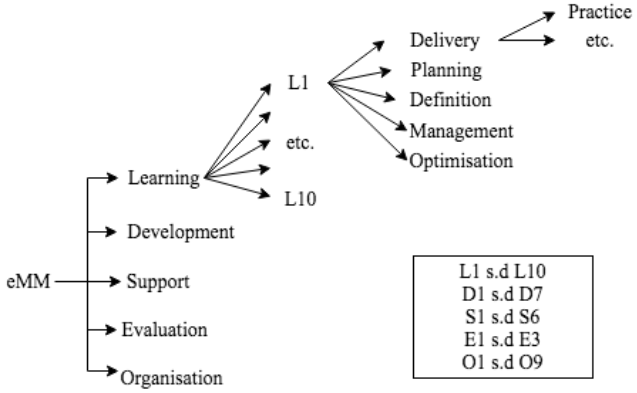

Fig. 2: eMM scheme [3]

2.1 eMM Processes

The eMM consists of five process areas; Learning, Development, Support Evaluation and Organisation. Each process area is broken down into a detailed process with a total of 35 processes.

Table 1: Process areas of eMM[4]

Process Category	Description
Learning	Processes that directly impact on pedagogical aspects of e-learning.
Development	Processes surrounding the creation and maintenance of e-learning resources
Support	Processes surrounding the oversight and management of e-learning
Evaluation	Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle.
Organisation	Processes associated with institutional planning and management.

The processes define the overall institutional aspects of the ability to provide good performance in the given process area. The processes used in this research are L1 through L10, which are the processes of learning process area.

Table 2: Processes of eMM[4]

Learning: Processes that directly impact on pedagogical aspects of e-learning.	
L1	Learning objectives guide the design and implementation of courses
L2	Students are provided with mechanisms for interaction with teaching staff and other students.
L3	Students are provided with e-learning skill development
L4	Students are provided with expected staff response times to student communications
L5	Students receive feedback on their performance within courses
L6	Students are provided with support in developing research and information literacy skills
L7	Learning designs and activities actively engage students
L8	Assessment is designed to progressively build student competence
L9	Student work is subject to specified timetables and deadlines
L10	Courses are designed to support diverse learning styles and learner capabilities

2.2 eMM Capability Dimensions

The main concept in using the eMM model lies in the problem of e-learning capability. The maturity level of capability in eMM is depicted through five dimensions. Each process in eMM is assessed based on these dimensions to ascertain the extent to which the development and utilization of e-learning within an institution.

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Table 3: Capability dimensions of eMM[4]

Dimension	Description
Dim 1 (Delivery)	This dimension is concerned with the creation and delivery of process outcomes. Assessments of this dimension are aimed at determining the extent to which the process is seen to operate within the institution.
Dim 2 (Planning)	This dimension assesses the use of predefined objectives and plans in conducting the work of the process. The use of predefined plans potentially makes process outcomes more able to be managed effectively and reproduced if successful.
Dim 3 (Definition)	This dimension covers the use of institutionally defined and documented standards, guidelines, templates and policies during the process implementation.
Dim 4 (Management)	This dimension is concerned with how the institution manages the process implementation and ensures the quality of the outcomes.
Dim 5 (Optimisation)	This dimension captures the extent an institution is using formal approaches to improve capability measured within the other dimensions of this process. The capability of this dimension reflects a culture of continuous improvement.

Those dimensions above, however, should not be mistaken as a ranking or hierarchical system but rather a holistic approach. An institution that has developed capability at higher dimensions but is not supported by capability at the lower dimensions will not deliver the desired outcomes and vice versa[4].

2.3 eMM Capability Assessments

The eMM has an assessment method using four capability scales. Each practice in each dimension is assessed using a scale of 1=not applied, 2 = partially adequate, 3 = largely adequate and 4 = fully adequate. Not adequate indicates that the practice is not done within the instution and fully adequate indicates that the practice is done formally and continuously. The rating scale is also color-coordinated to help with the assessment analysis.

Table 4: Capability assessments of eMM[4]

	Fully Adequate	The process outcomes are currently being clearly and sustainably addressed.
	Largely Adequate	The practice outcomes are evident.
	Partially Adequate	Major shortcomings or limitations in practice outcomes are evident.
	Not Adequate	There is currently no evidence of the practice occuring in the institutional context.
	Not Assessed	Cannot be assessed.

3. FINDINGS

The Learning area emphasizes on formal communications as well as documentation of learning objectives in institutional learning curriculum, although in some sections it also discusses scheduling, communication policies and students research and literacy skills. Figure 3 summarizes the results for the learning process area.

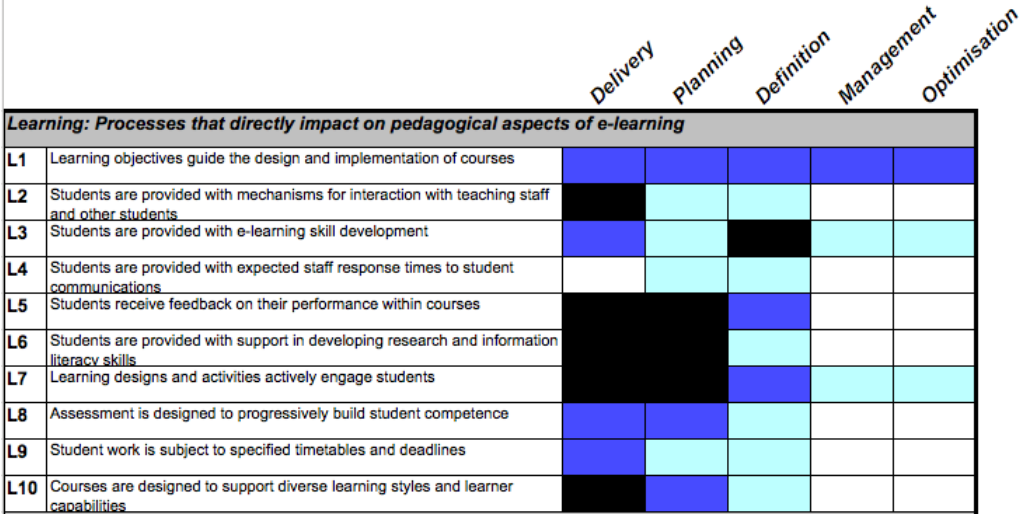

Fig. 3: Maturity matrix results of learning process area

Based on the result of the maturity matrix, the analysis is obtained as follows:

1. Most of the processes on Delivery dimensions are largely adequate or highly adequate, except for L4; processes regarding teachers and students communication. This indicates that processes directly impact on a pedagogical aspect of e-learning have been largely operated within the institution.

2. In planning dimension, there are six processes lie between largely adequate and fully adequate. The other four processes are only partially adequate, so in these processes, there is a lack of the use of objectives and planning established by the institution.
3. Most of the processes in Definition dimension are partially adequate, while the other four are either largely or fully adequate. This indicates that the four processes have been defined and supported by standard documents, guides, templates or policies within the institution. Moreover, in L3 the process of developing students' skills are sustainably achieved. Nevertheless, the L3 process needs to be controlled in order that the documents mentioned are not just a formality.
4. The processes in Management and Optimization dimensions require more attention from the institution because most of the processes are partially adequate, some even not adequate except for the L1 process.

4. CONCLUSIONS AND SUGGESTIONS

Based on findings of the assessment of e-learning maturity level, it can be concluded that the level of maturity of e-learning in Telkom Bandung Vocational School has reached level 2 of capability (partially adequate) in Definition dimension. This means that the institution already has provisions, guidelines, or templates on how the processes should be done. However, the documentation is still limited, not formal or inconsistent which causes that the Definition dimension is still not capable. The weakness in higher dimensions of Management and Optimization is the absence of evidence of required practices that reflect process control and continuous improvement.

The eMM enabled the identification of the weaknesses at Telkom Bandung Vocational School. Because of the low capability at the Definition process, it needs capability support from the lower dimensions in order for the capability to be able to go to the next level. Therefore, this research provides a roadmap containing proposed improvements to achieve process capability.

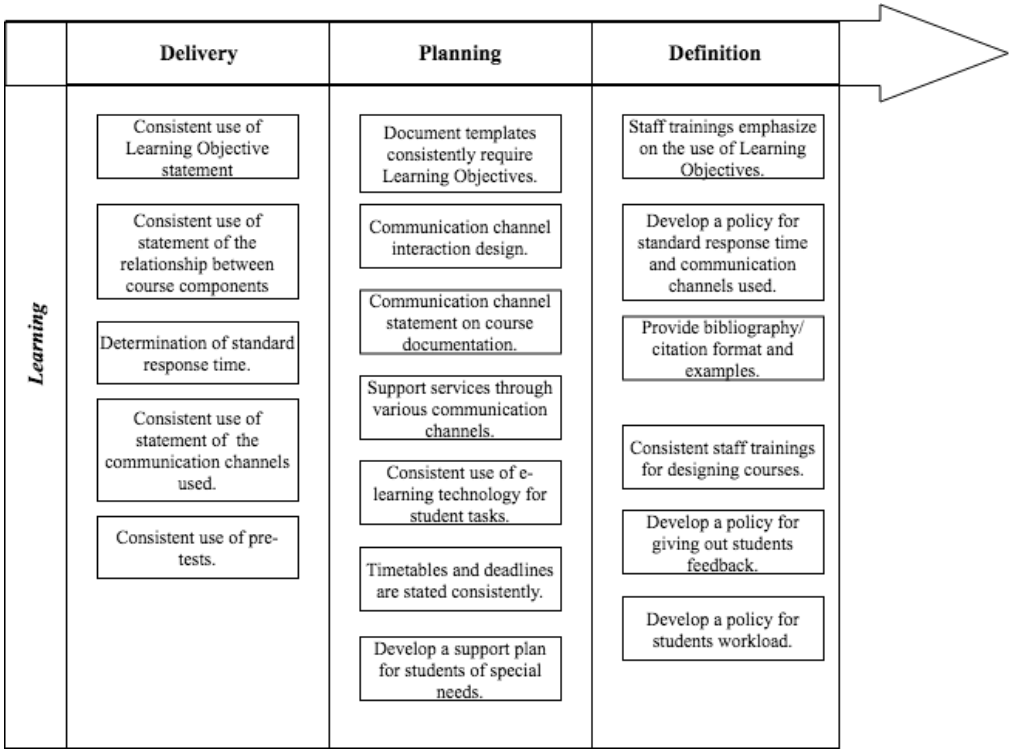

Fig. 4: Capability improvement roadmap

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