Implementation of Life Based Learning Models in Mechatronics Course

Puteri Ardista Nursisda Mawangi[1], Djoko Kustono[2], Widiyanti[2]
[1] *Vocational Education Study Program, Postgraduate Universitas Negeri Malang, Malang, Indonesia*
[2] *Mechanical Engineering Study Program, Universitas Negeri Malang, Malang, Indonesia*

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Abstract: Problem Based Learning (PBL) and Work Based Learning (WBL) implemented before Life Based Learning. PBL and WBL succeed if the integration of students, colleges and industry. LBL appear as enhancements to the needs of the development of vocational education and industry. LBL has been applied to the Vocational and Technical Education (VTE) in Australia and proved capable of changing the Human Resources (HR) become more competent. A Mechatronics course in vocational education has the potential to apply LBL in a small scope, because mechatronics has been recognized (required) by the industry since 1986 in Europe and until now. Mechatronics has developed theories, models, concepts, and new instruments. So, the aim of the paper is to explain the implementation of LBL models in mechatronics course. Implementation of LBL on mechatronics courses focus on students' rights to regulate the amount of practical learning percentage according to their willingness and ability. The difference which clearly visible on the LBL models is practical learning can be done internally or externally. This shows that the LBL models recognize the learning process in the outside of college or in real life. When viewed from its benefits, LBL learning models in mechatronic course should be implemented to follow the development of education in the 21st century.

1 INTRODUCTION

Vocational education has evolved long before the method of Life Based Learning (LBL) is presented. We also are familiar with Problem Based Learning (PBL) and Work Based Learning (WBL). This method comes as the demands of the industrial world that is constantly changing with the times. (Ismail *et al.*, 2015) released an article entitled "A Comparison of the Work Based Learning Models and Implementation in Training Institutions" which describes the ratio of the application of WBL in vocational education from various countries. They stated that to ensure the success of WBL, cooperation of third parties, students, colleges and industries, is very important.

The learning methods in vocational education are constantly evolves to find the most appropriate method. Growing demands of the industry cause the appearance the LBL method. The application of LBL itself has been tested on vocational education in some countries such as Australia and Germany. That country was able to prove that the application of LBL is able to transform the human resources (HR) to become more competent. LBL application research in Australia begins by (Staron, Jasinski and Weatherley, 2006). The report's results of this study are designed for managers because of their support in developing new labour capability guidance for Vocational and Technical Education (VTE). Also, for individuals and groups who want to implement a new strategy and approach to the development of capabilities in VTE (Staron, Jasinski and Weatherley, 2006).

Mechatronics is one of the courses that have the potential for LBL application in a small scope. It aims to give freedom to the students in developing the appropriate capabilities according to their willingness and ability. This effort also aims to prepare the evolution of education in the 21st century. LBL learning model in the mechatronics course is one form of learning model innovation that can be adapted to suit the needs of students based on their intellectual development. This is in line with the opinion of (Liliana and Florina, 2015) which states that the smart growth that is represented by the development of an economy based on knowledge and innovation require the integration of new technology infrastructure with the process of research,

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development and innovation, as well as education, directly contribute to development of intellectual capital which considered as main source of community today. From the above explanation we can conclude that the aim of the paper is to explain about the implementation of LBL models in mechatronics course.

2 URGENCY OF MECHATRONIC

Mechatronics is a design process that includes a combination of mechanical engineering, electrical engineering, telecommunications engineering, control engineering, and computer engineering. Mechatronics is a system composed of mechanical and electronic parts. With advances in technology, these systems are being developed. The development can be either software or hardware such as programmable logic controllers (PLC), sensors or actuators human machine interface (Gullu, Aki and Kuscu, 2015).

Currently, the process to renew education and research has arrived to the mechatronic problems as environmental education in a knowledge-based society in designing integrated fabrication environment. Mechatronics is accepted as a new discipline in Europe in March 1986 when the Advisory Committee for Industrial Development and Research of the European Communities has acknowledged that mechatronics is a major requirement in the European research and education programs (Liliana and Florina, 2015). Mechatronics is greatly recognized as a reality in permanent development in the educational environment. Mechatronics also offers efficient solutions to promote interdisciplinary and has been a supporter of the measures taken to stimulate the initiative and creativity. In response to the needs of the new changes that result from the interaction of multiple courses, mechatronics has been developing theories, models, concepts, and new instruments. It is associated with the concept of creativity-interdisciplinary-mechatronics and applied as a teaching and learning method.

3 LIFE BASED LEARNING MODELS

LBL is a model developed by March Staron who works as a teacher, consultant at TAFE NSW International Center for Vocational Education and Training (VET) as well as a director of TAFE NSW Labor Development. The focus of LBL Models is developing capabilities (ability and willingness) in an era that increasingly demands a mastery of science to contribute to the welfare and happiness of society. According to (Sudira, 2014) knowledge capability is measured by the benefits of science developed in building the prosperity and happiness of life together. Studies that benefit to the welfare and happiness of all mankind should develop in the field of science. While the science that does not benefit to the welfare and happiness certainly obsolete. Useful knowledge is the knowledge that can be practiced, knowledge that builds habits to become useful for others. The existence of Life Based Learning models also can not be separated from the idea that (Slaughter, 2005) which contains about reviewing and comparing various paradigms that can be used and developed which relevant in the world of education. Derived from the published article as well as their outlook could be described as the following five: Environmental, Neo-Humanist/multicultural / de-colonising, Spiritual, Futures, and Integral (Slaughter, 2005).

(Staron, 2011) states, "Life-based learning proposes that learning for work is not restricted to learning at work". This Staron's statement is not enough for the conditions in Indonesia. Because for Indonesian people, learning for work is a part of the necessities of life. There are still many other needs that must be met such as the need to socialize, worship according to religion, preserve the environment, and keeping the tradition of local knowledge. Everything needs a learning experience. The formulation of the learning patterns of LBL in VTE to carry the future of vocational education is very important discussion (Sudira, 2014). This means that learning for work is not limited to learning in the workplace. So existence of that model, if it is associated with the education to gain knowledge or learning experience, students can get the knowledge anywhere, especially in their surrounding environment which is not limited to their college. LBL is a process of gaining knowledge and skills to understand the essence of life, skilled at solving the problems of life, living the balanced and harmonious life. LBL explores the concept that learning of life is the true learning (Fawait, 2017).

3.1 Life Based Learning Models - Integrated and Holistic

No matter why, where, how, when, how, or with whom to learn, the impact of the learning is not linear,

isolated or limited to discrete contexts such as work or do not work. Challenges and goals for development is the ability to identify what activates the motivation or desire to learn. Activation of this energy will require a variety of strategies (Sudira, 2015). As depicted in figure 1 and figure 2, the shift comes from the perspective of where the work is traditionally seen in isolation from the comfort, family and personal life to a place that more realistic, they combine and allow a more integrated or a more holistic approach which admits the reality of adult learning.

What makes LBL explicit is that individuals have the knowledge, skills and attributes that may not always be seen or recognized by the organization, they significantly contribute to organizational achievement and organizational relationships. LBL recognizes the importance of personal values and the basic truths and profound effect on the employment and culture. LBL Models have a number of key characteristics. Deliberate focus on the characteristics rather than strategy that recognized individuals, groups and organizations will make their own decisions, and decisions on how to continue to embed new ways of working, learning and knowing in their organization (Staron, Jasinski and Weatherley, 2006b).

The main characteristics of LBL models according to Peddle (Staron, 2011) are: (a) emphasizing development capabilities, (b) promoting strength-based learning orientation, (c) recognizing many learning resources, (d) the balance of integrity and utility, (e) shifting responsibility for learning to the individual, (f) shifting the role of the organization to enabler, (g) recognizing that the contradiction is strength, (h) invest in developing the whole person, (i) recognize the disposition of human beings as being critical, and (j) rewarding the changes are qualitatively different . While 10 of these characteristics are described in the form of a list, it should be emphasized that their true strength in their true strength relationship as an interconnected whole and not as a discrete unit. For clearer description seen in Figure 2.

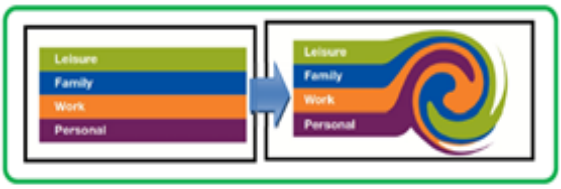

Figure 1: Life based learning: learning as an integrated ecology and mutual connect. (Source: Staron et al., 2006).

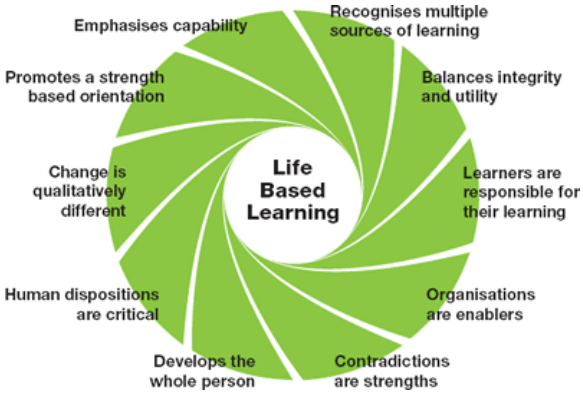

Figure 2: Holistic and interconnected key characteristics of life-based learning. (Source: Staron, 2011).

4 RESULT AND DISCUSSION

Various studies and methods that are presented can be applied in engineering education, such as project-based learning and practical learning, to achieve success in the field of engineering and integrate it to engineer candidates in real life (Kapusuz and Can, 2014). LBL models give the option to be applied in engineering education in the mechatronics course. Some things to note is the implementation of a LBL models in Mechatronics course focuses on practical matter, whereas for theory offerings every student gets the same percentage. The distribution of the percentage of theory and practical learning offerings on the curriculum of mechatronics course in accordance with mechanical engineering in college can be seen at Table 1.

The main characteristics of LBL in Figure 2 are reflected in the types of practice offerings, for more details see Table 1. Because that, the implementation LBL on mechatronics courses focused on practice learning offerings. If calculated then the offerings represent the percentage of practical learning by 56% and the percentage of theoretical learning by 44%. In practical learning offerings, students are given the right to regulate the amount of grain appropriate practice learning willingness and ability. In practice learning offerings, there are several options to meet the percentage of 56%. Selection practices can be seen in Table 1.

Table 1: Description of the competence of mechatronics course.

No. Description Of Competence	The Type Of Offerings	Weight
Describe the concepts and mechatronic applications.	Theory	11%
Identify the main robotic devices and their functions.	Theory	11%
Explain the working principle, characteristics, and application of various types of sensors (linear and rotation, acceleration, force, torque, flow, temperature, distance, light, vision, integrated micro sensor).	Theory	11%
Demonstrating the working principles, characteristics, and application of various types of sensors (linear and rotation, acceleration, force, torque, flow, temperature, distance, light, vision, integrated micro sensor).	Practice	Max. 20%
Explaining the functions and working principle of actuators (electric motors, hydraulic, pneumatic, and electromechanical).	Theory	11%
Demonstrating the working principles, characteristics, and application of various types of sensors (linear and rotation, acceleration, force, torque, flow, temperature, distance, light, vision, integrated micro sensor).	Practice	Max. 20%
Conditioning the mechatronics signal.	Practice	Max. 20%
Designing mechatronic systems.	Practice	Max. 20%
Applying mechatronics system	Practice	Max. 20%

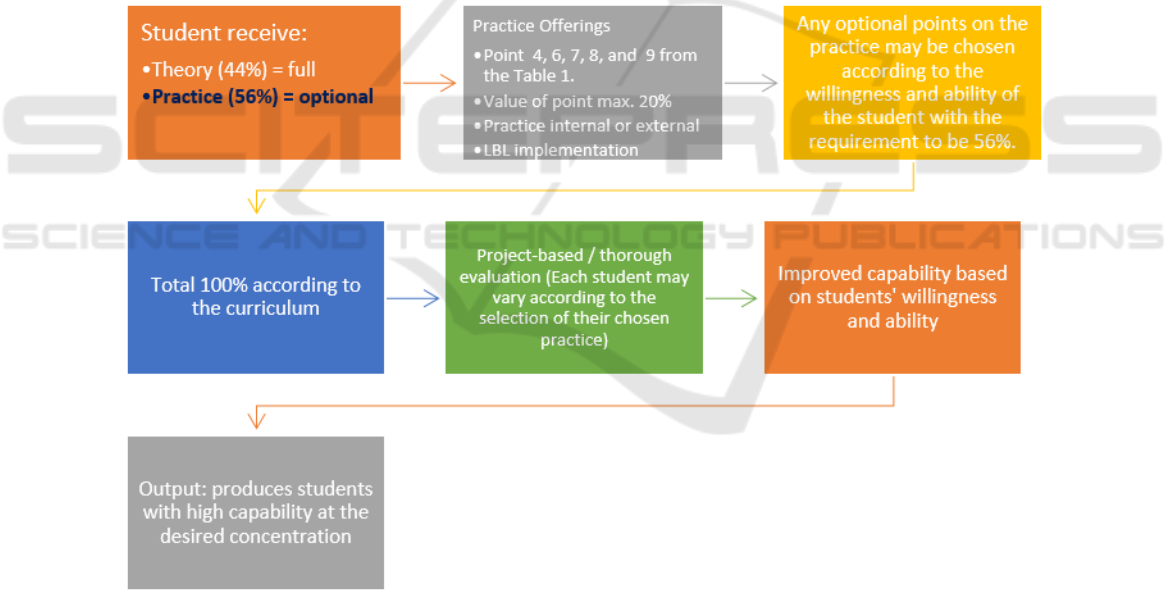

Figure 3: Process of implementation LBL models on mechatronics course.

From the figure 3 it can be discerned that in the offerings of practical lesson student does not have to follow every practical lesson as long as the accumulation amount to 56%. The differences that are clearly visible on the LBL models is that their practice offerings can be performed in internal or/and external space. Internal practice is a practice that took place internally within the college and use college's facilities, while the external practices could occur in workshops, school or industrial institutions. This shows that the LBL model recognizes the learning process outside the college or in real life environment. For example, if a student has done industrial practice and has mastered particular competences that are recognized by his mentor, he should also be recognized in the courses that he took in his college, because the student have proved their competence in the real world. Moreover, The benefits by applying the LBL models on mechatronics courses are can see at Table 2.

Table 2: The benefits of implementing LBL models on mechatronics course.

No	recipient	the benefits
1	Industry or external institution	Indirectly increase industry or external institution cooperation with the college
2	Student	Facilitate the teaching and learning activities, because students actively seek knowledge in their lecture
		Grow the individual responsibility, and open the student's self-potential through achieving targets in the LBL models
3	College	Utilizing real life as learning materials and be recognized by college
		College can make the students to become qualified human resources in accordance with their willingness and ability

5 CONCLUSION

The implementation of LBL has not been utilized properly in Indonesia. LBL has 10 characteristics that can improve students' capabilities when applied in the learning process. The explanation above reveals an example of the implementation concept of LBL that is carried out in a small scope, namely at the level of courses in college. The freedom of students in arranging competencies according to their will and ability to produce graduates who have different specific skills according to the chosen concentration. When viewed from the benefits above, in theory LBL the LBL learning model in the mechatronics course should be implemented to keep up with the development of education in the XXI century. However, the writer needs more research to assist the actual implementation of the LBL model in mechatronics courses.

SUGGESTIONS

Colleges in Indonesia are expected to implement LBL in a small scope, for example in the mechatronics course. However, it would be better if it is implemented in a broader scope not only in the level of courses but also in the level of study program in college.

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