

Curriculum Model of Capability Development through Transdisciplinary Courses System

Sulton, Eka Pramono Adi

Educational Technology Department, Faculty of Education
Universitas Negeri Malang
Malang, Indonesia
sulton.fip@um.ac.id, eka.pramono.fip@um.ac.id

Herawati Susilo

Department of Biology, Faculty of Mathematics and
Science
Universitas Negeri Malang
Malang, Indonesia

Abstract—The study was an in depth study on the method of developing the capabilities of learners through professional elements performed in the transdisciplinary system for each course in each study program at State University of Malang. The study was conducted in order to get the whole picture of the capabilities realization in life-based learning, based on the desired competence of each profession of science. The change of competence era into capability era is a fundamental change in the paradigm of learning goals. A common condition in every educational institution is the use of curriculum on the basis of competence. Based on the research focus, the approach used by the researchers was a qualitative approach. This research has concluded some descriptions which consist of curriculum development laying the foundation of capability as the learning achievement of graduates with the orientation of; creating independence in determining the acquired skills in accordance with the field of expertise; creating ability to apply and create the areas of expertise as a standard learning outcome; creating life-long learning skills to acquire and extend knowledge and apply it as a manifestation of the continuous improvement of life skills.

Keywords— *capability, transdisciplinary, life-based learning*

I. INTRODUCTION

The dynamics in the world of contemporary industry have been able to construct the estuaries of the graduates and the reshuffle of learning environment. The macro concept of industrial world as a part of economic activity which creates material goods with high degree of mechanization and automation has undergone a shift [1]–[3]. Since the beginning of industrialization, technological advances have led to a paradigm shift, in which today is called ex-post, as a revolution in the field of mechanization (the first industrial revolution), the intensive use of electrical energy (the second industrial revolution) and the comprehensive digitalization (the third industrial revolution). Started from the highly advanced digitalization within the factory areas, the convergence of internet and future technologies in the field of intelligent machines (machines and products) seems to lead to a shift in a new fundamental paradigm in industrial production. The vision on future production includes a modular and efficient manufacturing system and illustrates the scenarios in which the products control their own manufacturing processes.

The development of stage 4 industry should be understood as a project development. The issue of the stage 4 industrial world is an extraordinary need for demands which leads to a

substantial change in human resource needs. These needs result in social, economic and even political changes in general [4]–[6]. Several significant changes [7] are 1) Short development time: Development and innovation times will be shortened. For many companies, a high level of innovation is a factor of time-to-market success. 2) Individualization on demand: For decades, changes have occurred between sellers and buyers in the market. The buyer is in a position to determine the terms of exchange. This trend leads to an increased individualization of products and extreme individual products. 3) Flexibility: Due to the new general conditions; flexibility in product design and production. 4) Decentralization: In order to meet this condition, a faster decision-making process is required, thus organizational hierarchy is reduced. 5) Resource efficiency: The increased scarcity and consequent also increase resource costs and social change in the context of ecological aspects. Thus, some institutions have a stronger focus on sustainability in the industrial context, and the goal here is to improve the economic and ecological efficiency.

The development of digital era as a shift in the industrial world has begun to put pressure on educational and learning providers. The enormous technological pressure is still a bit responded by using a little technology in learning process. Nevertheless, the enormous technological pressures in industrial practice have even come to daily life. The old print technology as a part of everyday life has been shifted now. The key words are Web 2.0, mobile apps, smart phones, laptop computers, 3D printing in various contexts, especially in the industrial contexts [8]–[10]. The development of digital age is a technology in learning environment which corresponds to Z generation [11], [12].

The change of competence era into capability era on graduates is a fundamental change in the paradigm of learning goals. A common condition in every educational institution is the use of curriculum on the basis of competence [13], [14]. The current condition is still dominated by the need for reliable workers with various competence. However, the development of future resources needs to be more directed to human beings who are able to adjust to the needs of contemporary life. Jobs and professions will experience "open and close" all the time [15], [16]. Life-based learning model which is used by State University of Malang focuses on the learning framework of the capability development of learners. Learning is not limited to work and professional problems alone, and is not limited by

time. Life-based learning recognizes that life environment becomes a source of learning, which opens opportunities to develop the graduate's skills and capabilities.

Life-based learning has different focus than life-long learning. The difference is about the source of learning. The former one recognizes the contribution of one's learning and recognizes the different ways of solving problems [17]. For all this time, learning has been focused only on individuals. Life-based learning enables everyone to be present and engaged in learning and work, and affects individual capabilities. Life-based learning also recognizes that the individual's experience in learning both within and outside their learning environment has an important role in helping their lives. Moreover, the individual's knowledge's, skills and abilities which are not always visible have the potential to be recognized in a group or organization. All of the potential in the form of capability can significantly contribute to the life of learners.

The field of scientific education as the dominant science at State University of Malang has a pedagogical foundation to facilitate learning and improve the performance of learners. Study in the field of education is a practical study and an ethical practice of facilitating learning and improving performance by creating, using, and managing the technological processes and resources. As an example, study in the field of education has an effort and attitude of understanding on the field of education. Besides education field, other courses also have a learning taxonomy consisted of cognitive, affective and psychomotor [18], [19]. Thus, all fields of science at State University of Malang require the construction of continuous knowledge and improvement through researches and reflective practices within a certain period, i.e., capability development activities which refer to the collection of information and analysis beyond the professional conception of every science. Capability development in the realm of education and learning evolves from competence to capability.

The capability development model of every science requires the foundation of the competence of various professions as a practical foothold. Practical foothold competence is generally a learning practice which is supported by the ethic code of scientific profession respectively. The Association of Ethics Committees of each science have been active in defining field ethical standards and providing the examples of cases which address and understand the implications of various life practices (for example "Association for Educational Communication & Technology,") [20]. In general, the foundation of the development of capabilities which support the life of learners is a form of life capability rooted in 1) Commitment to individuals and fellow individuals, 2) Commitment to society, 3) Commitment to profession to be undertaken by learners.

Curriculum changes at State University of Malang using life-based learning as a curriculum base need to be done in-depth qualitative study. Curriculum changes at State University of Malang will change the construction of how to build learning achievement which is a professional perspective of each field of science. The study of curriculum development method is a strategic step in responding curriculum changes in

the institution of State University of Malang. Based on educational knowledge in the background, it is necessary to study the action of each course to strengthen transdisciplinary by providing a larger portion of content / learning object which supports the capabilities of learners in their respective professions of science life-based learning.

This study was an in-depth study on the method of developing the capabilities of learners through the elements of profession performed in transdisciplinary system for each course in each study program at State University of Malang. Thus, this research shall get a complete picture of the capabilities realization in life-based learning, based on the desired competence of each profession of science.

The in-depth study on capability development through life-based learning in various study programs at State University of Malang is needed to provide the professional graduates' strengthening. This condition is a must in the current era of knowledge development. The environment has evolved in the incorporation of work and learning in a system of education and skills training. The learning model is also a response to the changing context of scientific profession. Some development models have identified the needs for:

- Capacity building approaches rather than compliance approaches within the group of experts.
- The fulfillment of the changing nature and needs of the working world (real life).
- The birth of a new pedagogical approach to learning, teaching and innovation.
- The fulfillment of strategies which shall break many barriers for learners, and.
- Improved integration between work and learning.

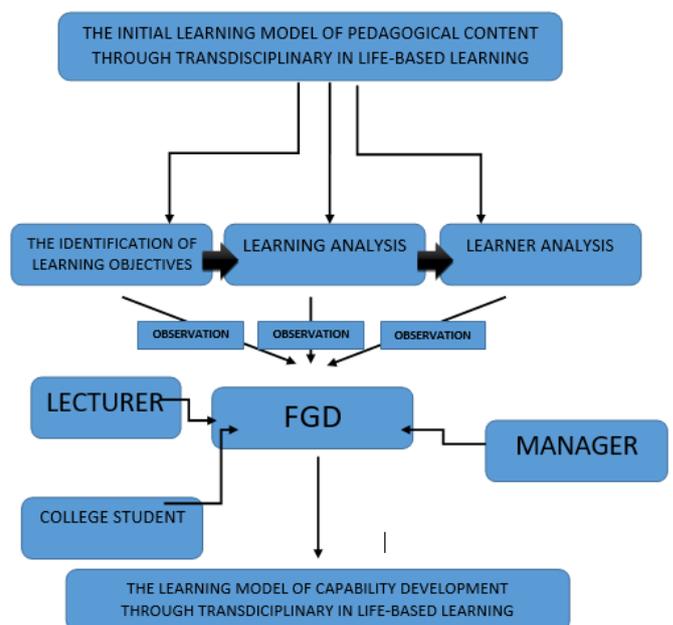


Fig. 1. Model Development Chart

II. RESEARCH METHOD

The development of life-based learning model in the formation of student capability is shown in Fig. 2. The approach used to analyze and develop the model was a qualitative approach. Padgett [21], concluded that qualitative research is a study to understand the phenomenon of the course's experience such as behavior, perception, motivation, action, and so forth holistically, through description in the form of words and language, in a special context which is natural and by utilizing various scientific methods. The researchers chose a qualitative approach because they would examine matters related to the development activities of the learner's capabilities. In this case the researchers would examine whether the capabilities of learners were strengthened or not through understanding the scientific profession of each study program.

This qualitative approach used the case study research. According to Merriam [22], case studies are a series of inquiry activities to describe and analyze intensively and in detail a particular symptom or social unit, such as individuals, groups, communities or institutions. By using the case study approach, the researchers wanted to know deeply about the students of State University of Malang with respect to the comprehension and the initiative of knowing it in getting the information and to be able to compare the various professions in the presentation of each course. The research activity is a simultaneous activity towards the development of the early concept of life-based learning model. The concepts of learning are a form of transdisciplinary review in various studies for learners [23], which are reinforced by the strengthening of self-regulated learning [24] for some of the lessons in college. Capability can not be separated by student characteristics [25] and student learning styles [26]. Thus, the initial model of learning is as follows:

A. Identifying Learning Objectives

Learning objectives describe the knowledge, skills, and attitudes (MCC) which are expected to be mastered, acquired, or achieved after the participants learn to follow the learning process. The formulation of learning objectives can be derived from a list of objectives (competence in curriculum), e.g., the analysis of performances, the analysis of needs, the practical experience of learning difficulties by learners, the analysis of the person doing the job, or the requirements for the new lesson.

B. Conducting Learning Analysis

Learning analysis identifies what abilities should be mastered by participants to perform a particular task (in this case, achieving the defined learning objectives). The results of learning analysis are a list of skills, knowledge, and attitudes (as entry behaviors) which need to be learned by participants to follow the learning process. The lists are organized on a diagram illustrating the relationships between all of the identified skills.

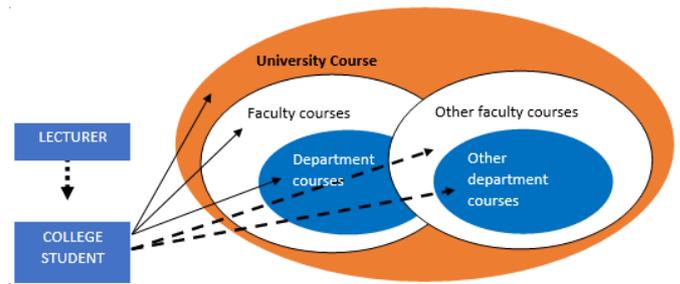


Fig. 2. Initial reference model of learning Transdisciplinary in Life-based Learning at State University of Malang

C. Analyzing Learners and Context

This step identifies the general characteristics of the targeted learning participants, the contexts (conditions) associated with the skills to be learned, the contexts in which the learners use learning process and acquired skills, including; identifying initial skills, e.g., early experiences, preferences, attitudes, and demographic backgrounds; identifying characteristics which are directly related to the skills taught; and doing performance analysis and learning situations. The results of this analysis are useful for the next steps, especially for determining learning strategies.

In qualitative research, the researchers become the main research instrument. They act as an instrument as well as data collector. Researchers as an instrument can be interpreted as a whole in the process of research conducted by the researchers themselves. The whole process includes: planning, data collection, analysis, data interpretation, and ultimately the reporting of research results.

State University of Malang is the location of this research. It is also the workplace of the researchers in observing the facts which occur. The selection of this research location allowed the researchers to dig deeper information and knowledge about the learning objects.

The primary data source were the main data in this study. The primary data used were the results of observation and interview. The conducted interviews on lecturers, students and learning managers were divided into several fields [27]: 1) science, 2) vocational / professional, 3) humanities and social affairs and 4) education.

The observation data were obtained during the learning process, while the interview data were obtained from the research subjects: 1) students, 2) lecturers, and 3) managers were used as the basis for conducting studies in making changes and fundamental arrangements on the initial reference model.

III. RESULT AND DISCUSSION

A. General Learning Conditions

According to Fig. 3, capability in student conception is not really creating new capabilities, but rather optimizing the potential of individuals in transdisciplinary community thinking. In a meeting with some students as respondents, they

described the capability of innovation, which raised the idea of how to learn from one's mistakes in professional world is quite easy to be understood and implemented. However, the students found difficulties in realizing a sustainable idea and even more applying it to tasks, such as building a joint construction to fit new customer needs or facing a new competitor. The individual learning patterns within an organization called class are not the same as the classroom learning patterns seen as an organization. Learning which has been done is the learning in organizations in the form of classes or groups, which just supply anything to be learned individually. In this condition, the professional view in the world of work is the thinking view of each individual. It cannot be denied that in learning in organizations, whether in tangible groups or classes which occurs through individuals, it would be a mistake to conclude that learning through an organizational framework is nothing but the cumulative result of the learning of its members or individuals [28]. Capability is built in line with individual, in which each student develops a personality, personal habit, and self-trust together with the view and ideology of the organization. The capability development will be meaningful and undergo a color change when there is a change on member and leadership, nevertheless potential professional memories are formed from the way organizations think will retain some of the behaviors, mental maps, norms, and values that each individual believes.

Students at State University of Malang do not have a comprehensive understanding of transdisciplinary thinking capabilities yet. The view of learning in professional organizations actually has some similarities with the aspects of good bureaucratic development, that is in the creation of systems and procedures which are strong enough to overcome professional thinking of each individual [29]. As an early activity, the lecturers need the scope to build professional world and serve as a manager who is functioning to build a learning organization which focuses on individual learning and organizational learning. Learning various observations have not led to construct the capabilities of individuals within organization as they acquire new competencies through education, experience, or experiment personally. In Fig. 4, the active thinking of profession is not based on systems and culture to transfer it to other individuals who have differences.

Professional excavation is not based on the concept of profession, but is approached by the emergence of the desire to have a very common profession through the perspective of ideals. Professional excavation is the foundation to focus on the development of the student's capability of State University of Malang. Acquired capability is a requirement for students to face life, for example by seeking scholarship from within and beyond their discipline nowadays. Students chronologically explain the changes in constructing their ideals based on their thinking timeline. However it can not be denied that ideals do not always appear when children have already been flexible or open toward changes.

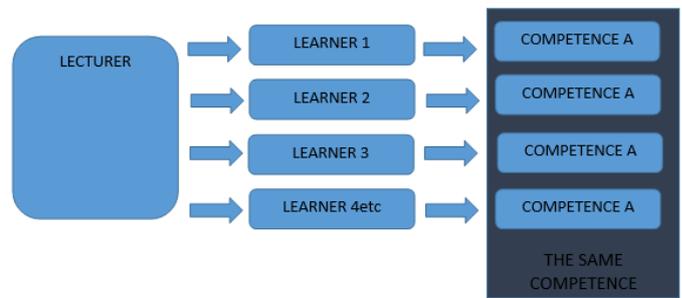


Fig. 3. Lecturer's efforts on learning to build the same competencies

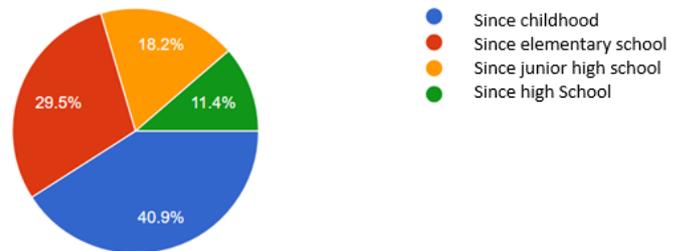


Fig. 4. The awareness of profession in terms of the emergence of ideals

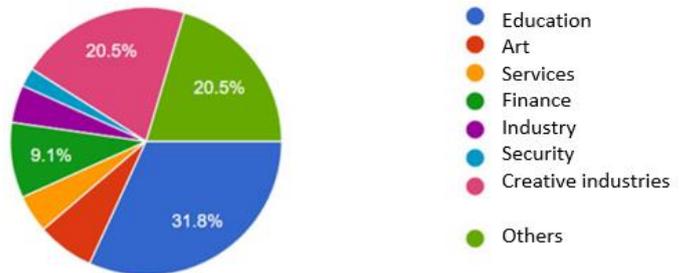


Fig. 5. Student professional construction results through capability

Difficulties which a rose were the way lecturers and students looked at profession. The development of ideals is actually the development of an individual mindset which influences learning in an organization. Organizations can be classes, family, friends, and so forth. Fig. 5 shows how complicated learning capabilities are to get management within the organization. In reality, one individual does not have only one organizational learning.

Organizational learning in a community need to have a leader / manager who is able to design culture and system in which students are constantly challenged to help the realization of the organization's future through different scientific perspectives. The regular organizational learning is the capacity of organization to gain insight from their own experience, the experience of others, and to modify the method in accordance with such insights [30].

B. Development of the 21st Century Capability Curriculum

State University of Malang constructs a learning model which enables students and their environment to construct ability to face up all changes, one of them is professional

world. Therefore a learning system is needed in order not to be limited only to the competence of the field, but also to build modern thinking by establishing scientific connections in learning ecology. The developed ecological system of learning should make all learnings interrelated in order not to separate learning in the competence of field from other knowledges like adults in learning. Students are given the opportunity to explore the learning objects of professional competence and learning beyond the competence in their field such as from open online courses which can influence work practice and the students' thinking. The learning orientation is based on the learners' ability to learn comprehensively for the growth and development of the individual and the organizational individual.

The learning model which is currently being developed for capability is life-based learning. Life-based learning is a modern learning model for skills development in the vocational and technical education. Life-based learning proposes that learning for work is not only limited to studying. According to life-based learning, all learnings are interrelated so that it is not easy to separate learning with other trainings such as the behavior of adult learners in their lives. It is because learning for adults is a multi-dimensional experience.

C. Serving learners with Transdisciplinary Curriculum

A transdisciplinary approach refers to learning which is authentic and relevant to the real world. Learning is not only by the learners or teachers in the midwife but also supported and enriched by anyone who can be involved in the learning system. Each transdisciplinary theme includes an extensive plot of universal understanding to all humanity and is open enough to embrace various areas of content.

IV. CONCLUSION

The curriculum model development activity is a series of in-depth study on the method of developing the capability of learners through professional elements in the transdisciplinary system for each subject in each study program at State University of Malang. It is done in order to get the whole picture of capabilities for the realization in life-based learning, based on the desired competence of each professional science. The change of competence era into capability era is a fundamental change in the paradigm of learning goals. A common condition in every educational institution is the use of curriculum on the basis of competence. Based on the research focus, the approach used by the researchers was a qualitative approach.



Fig. 6. Curriculum services form to build capabilities

Curriculum development lays the foundation of capability as a learning achievement of graduates with the orientation of

- 1) Selecting occupation according to the needs or interest of students. (In the formulation of the graduate's profile and SCPL which illustrate the context of expertise area which become the foundation of individuals in learning, working, and creativity to meet the needs of life accordingly with their choice).
- 2) Creating the independence to determine the acquired skills in accordance with the field of expertise. (In the presentation of the core courses and the courses of choice and the provision of opportunities for students to make their choices both inside and outside the study program).
- 3) Creating the ability to apply and create the areas of expertise as a standard learning outcome. (This is illustrated in the SCP formula).
- 4) Creating life-long learning skills to acquire and extend knowledge and apply it, as a manifestation of the continuous improvement of life skills.

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