



STRENGTHENING VOCATIONAL CHARACTER FOR POLYTECHNIC EDUCATION WHICH HAS NON-PRODUCTION-BASED CURRICULUM

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Abstract

The vocational character of polytechnic education has declined in the last ten years, especially for polytechnic which has non-production-based curriculum. This research aims to reveal factors which have contribution in the devotionalization of polytechnic education, and to find out the alternative solution to revocalize by considering the current condition and the future demand. This study applied qualitative approach supported by quantitative data that involved three polytechnics in Bandung and Malang, three industries in Bandung, one industry in Yogyakarta, and an expert as representative from the Department of Industrial and Cooperation Yogyakarta. Interpretational inductive analysis was used to analyze qualitative data. This study revealed: (1) environmental factors are very influential factor in shaping the character of polytechnic education and recognition; (2) the greatest gaining vocational character acquired through apprenticeship in industry or workplace; and (3) gaining vocational character needs to be managed by maintain and strengthen cooperation between polytechnic and industries, and competent institution which can develop education system.

Keywords: *vocational character, polytechnic education, professional, apprenticeship, recognition*

Introduction

Polytechnic, in Government Regulation Number 17 of 2010 on the Implementation and Management of Education chapter 1 verse 18, is a higher education institution that conducts vocational education in few specific fields. Vocational education in the historical record has been developed since several centuries ago in Egypt in the form of apprenticeships over the years to become an expert in the field of job. (Finch & Crunkilton, 1999, p. 4). Apprenticeship is a non-formal education at that time attempted to achieve competencies needed to do a specific job. Until now, vocational education implementation is often related to supplying skilled workers and the economic growth of the country. Supplying skilled workers is conducted through apprenticeship in various models. Apprenticeship at some centuries ago until the late 18th century was conducted in individual and non-formal training form to achieve professional competencies. The increasing of skilled workers requirement since World War-I has been driven vocational education to move from non-formal education to formal education as stated in Smith-Huges Act (1917) in the United State of America. Later on, the vocational education has been developing. Throughout its history, vocational education in various countries has always been associated with the supply of skilled workers through various training models, economic growth, and product development: goods or services.

Character according to the dictionary is the quality of something different from the others; or trait (Bull, 2008, p. 68). Vocational is everything associated with vocation. Vocation is something associated with work or way of life (Bull, 2008, p. 495). Thus, it can be interpreted as a vocational character traits or characteristic associated with job. Vocational education is any education that provides experiences, visual stimuli, affective awareness, cognitive information, or psychomotor skills; and that enhances the vocational development

process of exploring, establishing, and maintaining oneself in the world of work (Thompson, 1973, p. 216). Vocational education can be differentiated from academic education through competence definition in the same area, as mentioned by Barnett and shows in Table 1. Barnett differentiate operational competence for vocational, and academic competence for academic, including cognitive competence, attitudes, or personal competence, value or behavior that reflected professional action.

Several vocational education characters are: the implementation of education often related to technology and economic development, and it supplies skilled workers who have specific competencies for doing a certain job. The curriculum was planned and developed according to the existing products; learning model was often related to job. Ideally, these learning activities should be equipped with the industrial equipment that would be used in the workplace. The implementation of this vocational education model is costly. Schools have to update their equipment if there is any change in the industrial equipment. The application of technology, especially information technology, in many sectors has affected in the change of using industrial equipment. This change requires workers with different qualification than before. Another impact is the emergence of new profession that has never been imagined before. These changes are very fast, so that the competencies of education result have been obsolete (Cheng, 2005, p. 19). These conditions encourage vocational education in each country to change its curriculum planning and strategic implementation to maintain its existence and can contribute to the economic development of the country. Some research data show that vocational education has become a great developer of innovative product that encourages the economic growth of the country, such as South Korea, Singapore and China (Yoo Jeung Joy Nam, 2009). The direction of vocational education is influenced by the role of this education in the economic

development framework of a country. The contribution of this education to each country's economic development was given in a different form.

The history has shown that this education have been established and developed under social condition. The primary objective of vocational education should be focused on individual development. The role and the contribution of vocational education that provided economic improvement is not just viewed for individual level but also for the country. Education effectiveness has been measured based-on their contribution in the economic performance. Every vocational institution has their own way to give their contribution. Principally, vocational education can be characterized by two things, they are: (1) education is focused on operational or technical competences development and training associated with the work in certain profession in order to produce graduate who have 'professional experiences at the beginning

level'; (2) the existence of vocational education is determined by its contribution into economic performance in the different forms, methods and level.

Based on these main characteristics, all levels of vocational education need work environment. Professional competence as a product of vocational education could be developed through apprenticeship (Nicholls, 2001, p. 43). Therefore, apprenticeship for polytechnic students should be viewed as a part of practical learning process intergrated into education to improve technical competence in the field. Why devocationalization phenomena appear in polytechnic? What factors influence the vocational character of polytechnic education? How should polytechnic develop their students' competences? What kind of competence need to be developed as the basic of professional competence? How apprenticeship can be utilized by polytechnic to increase its contribution to economic performance?

Table 1. Two Rival Barnett's Competence

No	Term	Operational Competence	Academic Compeence
1	Epistemology	know how	know what
2	Situations	define pragmatically	define by intellectual field
3	Focus	outcomes	proposition
4	Transferabilty	Metaoperation	metacognition
5	Learning	experiential	propositional
6	Communication	strategic	disciplinary
7	Evaluation	economic	truthfulness
8	Value orientation	economic survival	disciplinary strength
9	Bondary conditions	organizational norms	norms of intellectual field
10	Critique	for better practical effectiveness	for better cognitive understanding

Source: Nicholls (2001, p. 28)

Method

Type of research

This research mainly used qualitative approach for generated devocationalization phenomenon of polytechnic education generally in Indonesia. This research was also supported by quantitative data to reinforce the interpretation data in the field, and for data, model and conceptual model.

Data validation

One of the weaknesses of qualitative approach is bias that comes from the researchers as the main instrument in this research. This bias can be eliminated by validation data through triangulation approach and data check and recheck to the sources of data using the same tools for other source of data, or by using different tools to check the same source of data.

Time and location of this research

This study was conducted from April until October 2012. The research involved three state polytechnics in Bandung and Malang which were considered to represent a model of polytechnic education in Indonesia, three industries in Bandung, one industry in Yogyakarta, and an entrepreneurial expert from the Ministry of Industry and Cooperative of Yogyakarta Special Region or also known as *Daerah Istimewa Yogyakarta* (DIY) who was considered to be very concerned about vocational education development, particularly polytechnic.

Research procedure

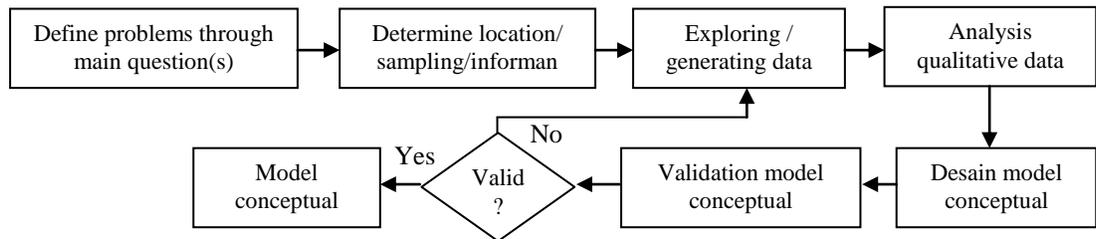


Figure 1. Research Procedure

This research was started with observation in four state of polytechnics: Bandung State Polytechnic (Polban), Malang State Polytechnic (Polinema), and Jakarta State Polytechnic (PNJ). Collected data which had been used to formulate the problem were related to the main issue or phenomenon which should be observed. The next step was field study, in which the researchers determined the location or plan of this study, sampling and informant. Polytechnic selected as the samples were State Polytechnic of Bandung or *Politeknik Negeri Bandung* (Polban), State Polytechnic of Malang or *Politeknik Negeri Malang* (Polinema), and Manufacture Polytechnic of Bandung or *Politeknik Manufaktur Bandung* (Polman). The informen consisted of senior lecturers who have taught more than 15 years, 6th semester students from four study programs, including: electrical, electronic, sipil, and electromotif. Intensive

Technique and tools to collect data

Document exploration, interview, observation and questionnaire were used to explore and generate data. Tools that had been used to collect data were: digital camera, voice digital recorder, stationery, and questionnaire. Sampling had been chosen based-on purposeful sampling.

Sampling and respondent

This research involved three polytechnics, 12 lecturers, 20 students, 4 industries, and 8 polytechnic managements. Purposeful sampling were used in this research.

data collection was conducted from three polytechnics. The collected data were analyzed and resulting conceptual model as an alternative solution of the main problem of devocalization of polytechnic education. This conceptual model has been socialized to the sample polytechnics by using Delphi technique. This technique was selected to collect opinion data without discussion to each other in the first step. These opinions were then analyzed and used as a reference to improve model. Improved model was resent to the same respondent and other respondent from State Polytechnic of Jakarta, State Polytechnic of Padang, and State Electronic Polytechnics of Surabaya.

Analysis Technique

Triangulation technique was employed to ensure the validity of the collected data. Interpretational inductive analysis was used to

analyze qualitative data. Analysis was conducted through cyclical process, which was started from collecting data, transcription process and data reduction, interpretational process, and revealing conceptual model as an alternative solution for main phenomenon, that is, a character vocational polytechnic education.

Findings and Discussion

Factors which Influence Polytechnic Education Characters

The first step of this research reveal information about the history of polytechnic development which influence the establishment of polytechnic education characters in Indonesia. These characters are influenced by many factors. These factors mainly can be categorized into two categories, namely: internal and external factors. The internal factors are related to the history of establishing polytechnics in Indonesia. The first six polytechnics were built during 1980's by the collaboration between Indonesian and Switzerland Governments. It was an expansion of Polytechnic Mechanic Swiss pilot project that was successful. This development was covered by the World Bank and organized by Swiss-Contact. These polytechnics were attached to universities or institutes which had successfully delivered academic education. Fresh graduate prospective lecturers from universities or institutes with minimum industrial experience had been trained in Polytechnic Education and Development Center (PEDC) Bandung. Laboratory and workshop equipment had been built at a very sophisticated condition in PEDC and polytechnics accordance to the equipment used in industries. Polytechnics had graduated skilled workers in accordance with the needs of workforce. Ten years later, polytechnics became independent from host university or institute. PEDC institution was then discontinued following the regulation that independent polytechnics should develop their own academic implementation.

The polytechnic development was successful followed by spring up in a number of polytechnics in Indonesia, especially delivered by private sectors. The need of faculties has increased significantly. The recruitment of prospective lecturers was not followed by special training for them as before. The new lecturers were mainly fresh graduates from universities or institutes which have no industrial experience.

The vocational character of polytechnic was starting to degrade. In other words, polytechnics were starting to de-vocationalize. Research and evaluation on polytechnic education implementation were too late to be conducted, even until now, the evaluation has not been done comprehensively. Quality and relevance between polytechnic competence and industry problems have started to emerge. This situation was worsened by external factors that had a direct impact on polytechnics. External factors that have contributed on polytechnic education characters are economics, social, culture, politics, and technology application, especially information technology. The application of technology in industrial equipment has changed work patterns and the type of works and they need workforce qualification which is quite new and different than before. These changes are very fast so that graduate competencies have rapidly obsolete. The same condition also occurs in other vocational education in other regions in the world (Cheng, 2005; UNESCO, 1992). This condition has been responded differently by each country.

Strategy for Coping with Environmental Change

Some countries have chosen a strategy by equipping their students with generic competences in addition to specific technical competences. The same strategy has also been taken by many polytechnics in Indonesia. Strong vocational education still delivered in many countries which have manufacture-based industries. Some countries in Asia

choose to strengthen their manufacturing industries by involving vocational education like polytechnics in their production process. The countries which have decided to choose this strategy are Germany, Singapore, South Korea, and Taiwan (UNESCO, 1992). Thus, students are prepared to be an expert on particular job.

Indonesia has other types of industries. It tends to have trading or services industries rather than manufacturing. This condition will continue until at least the upcoming five years. This was revealed in the discussion of Economic Forum West Java, on Saturday (8 June 2013) in Bandung (Kompas, Monday, 10 June 2013 p. 17). The discussion concluded that Indonesian government does not have strong policies in the areas of manufacturing industries, trading and investment to face ASEAN Economic Community 2015. This condition needs planning and polytechnic's educational curriculum implementation, including different learning model to vocational curriculum which is used in Germany, Singapore, or South Korea that have a strong 'manufacturing industries culture'. Competencies which are needed in manufacturing industries are different to competencies which are needed in trading and or services industries. The types of job in Indonesian industries are mostly in service industry. The service types of job in the engineering area are mostly maintenance and repair industrial equipments or machines. The strengthening of vocational education character could be focused on preparing workforce who has the ability to do this job and solve field work problems at this area. Educational and training curriculum needs to be planned strategically to achieve an effective and efficient results.

Polytechnic Development Strategy

Applied technology in various equipments in industries have changed the work pattern and create new profession which need new qualification competences which are

different to the previous ones. Fast changing causes the polytechnic graduate competences become obsolete quickly (Cheng, 2005, p. 19). These conditions encourage vocational education in each country to change its curriculum planning and strategic implementation in order to maintain its existence and contribute to the country's economic development. Some research data show that vocational education has become a great developer of innovative product that encourages the country's economic growth, such as South Korea, Singapore and China (Yoo Jeung Joy Nam, 2009). Curriculum has been developed by aligning with the economic development framework. Some countries have a strategy to implement its vocational education by equipping their students with generic competencies that are more flexible and still maintain their specific competencies as a character of its vocational.

The two kinds of competencies have different role in the work. These competencies are needed for different working contexts. Each competency plays its own role, especially in the transition time from education to the working life. The generic competencies have influenced positively at out of work field, while technical or specific competencies have influenced positively in the internal of work field (Heijke, Meng & Ris, 2003). In the recent years, polytechnic will be faced with a situation in which the characteristics of work organizations across the board change under the influence of the increasing importance of knowledge. It has been created three trend demands e.g. (1) the increasing emphasis which has been placed in education and training as an important factor affecting economic growth (World Bank, 2002); (2) the change of labor market process which has emerged the concept of the transition labor market to indicate how in modern society, the demarcation lines between work, leisure time, education, and care have been blurred, leading to increased mobility and flexibility patterns, and to overall focus on employability; (3) the

needs of internationalization and globalization of product markets, labor markets, and their impact for higher education (Dicken & Arlett, 2009; Marginson & van der Wende, 2006; Van Dame, 2001; Jim Allen Rolf van der Velden (ed), 2009, p. 3). These signals indicate that polytechnic development should be directed to meet these demands and trends.

The Strategy of Strengthening Vocational Character

The two main characters of vocational education are mentioned above, e.g. focused on professional competence development and its contribution into economic performance will be used as a guidance to design vocational curriculum. Curriculum is a key element in an educational process (Finch & Crunkilton, 1999, p. 3). Therefore, the strengthening of polytechnic education character can be started from the strategic planning and developing curriculum. Field data showed that, generally, state polytechnics delivered their education by package system. Provision of the curriculum is set by Ministry Regulation Number 232 year 2000 about the Guideline of Structuring Higher Education Curriculum and the Appraisal of Students Learning Outcomes which is stated in Credit Unit Semester (sks). Learning load for D3 Program is 110-120 sks, and learning load for D4 Program is 144-160 sks. This load equals to 30-40 hours/week. Polytechnic curriculum which is non-production-based has theory composition about 50%-60% of the total hours. The remaining hours (40%-50%) are allocated for practical training.

Polytechnic curriculum during that time has been developed by polytechnic itself. Industry involvement was minimal. The content of the curriculum was still focused on knowledge strengthening. Practical activities in the laboratory and workshop that occupy 50%

of total learning hours have not been directed to building attitude and basic professional ability, but just at the level achievement of knowledge experience. It is the time that polytechnic curriculum development now should involve industries more than before. The form of engagement can be upgraded from participation to collaboration. The examples of real form of these activities are defining the collaboration vision between polytechnic and industry, identifying competencies which are needed in industry, holding general lectures with key note speakers from industries, and participating in the graduate competence examination team. This strategy is adopted for shortening the gap between polytechnic and industry, and for improving their communication which have been less effective.

The basic concept of polytechnic curriculum development which is proposed in this study is shown in Figure 2. Curriculum development has to be derived from ideal vision which has been built together with industries. Although far reaching and long term, the polytechnic vision needs to be built as realistic as possible in order to be easily derived to become program activities at major level and operational activities in teaching and learning which should be developed by faculty member. Curriculum development needs to be planned strategically, based on ideal vision (Kaufman, Herman & Watters, 2009, p. 71). This strategy is needed to assure that polytechnic is going in the right direction (relevant). The second step is deriving the strategic planning into program planning or program development at the tactical level. This step includes the planning of all resources and facilities needed to achieve this vision.

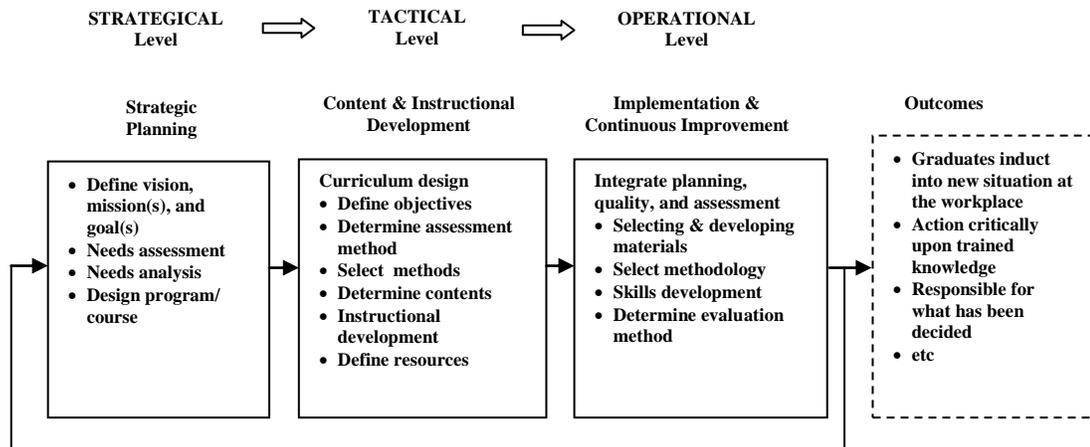


Figure 2. The Basic Concept of Polytechnic Curriculum Development

Efficiency program can be measured based on vision achievement (professional skills achievement and polytechnic contributions into economic development). The third step is implementing, continuously improving and determining what should be done to achieve vision through the planning of

learning and teaching including selecting and developing materials, selecting the appropriate method, and assessing the learning achievement. Programs need to be evaluated for improvement. The more detail strategic planning and curriculum development is presented in Figure 3.

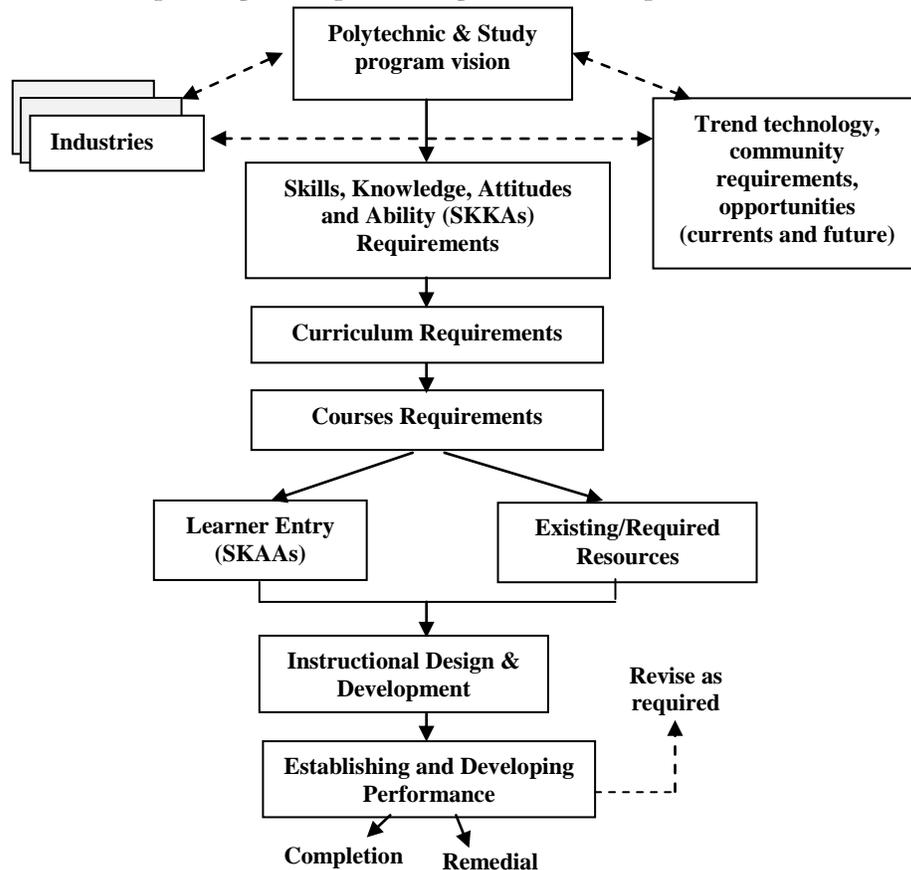


Figure 3. Strategic Planning and Polytechnic Curriculum Development

After the vision of polytechnic and study program is determined, polytechnics need to do need analysis including identification of skills, knowledge, attitudes, and ability needed in industries and by considering the students' development. The result of this analysis will be used as consideration to plan or develop curriculum. Course structure is derived from curriculum which has been determined. Resources are designed in accordance with the result of evaluation of the existing condition and consideration for future requirement. The next step is designing and developing instructional method needed in the process of learning and teaching. Building and developing student performance are done through learning and teaching process. The content of curriculum is designed in accordance to the need of individual, industrial and polytechnic including learning outcomes standard.

Practical Paradigm in Curriculum Planning

There are two kinds of curriculum planning perspective according to Kaufman theory, namely: inside-out planning perspective and outside-in planning perspective. The difference between the two planning perspectives is lied on how one views the world. Conventionally, curriculum is designed in organization's (school) viewpoint as a client. It usually carries assumptions that complicate major changes, such as altering a system's major mission or identifying opprtunities and problems which currently do not exist. It is a reactive planning. Mission(s), goals, objectives and activities are defined as reaction to the changes. There are very high activities in implementaion phase, but the contribution of this change is not significant. More detailed explanation on this difference is presented in Figure 4.

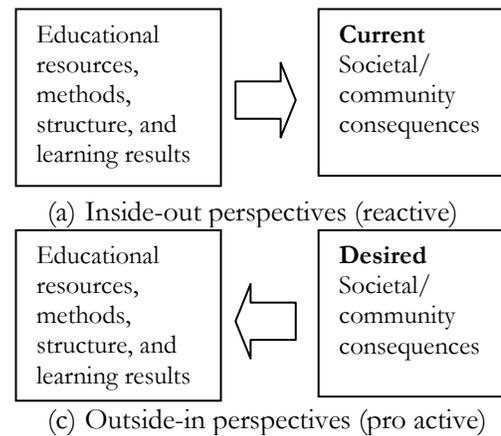


Figure 4. Inside-out and Outside-in Planning Perspectives (Kaufman, 2002, p. 33)

The outside-in planning views society as the primary client. Planning in this way is as if one were looking into the organization, its results, and effort. It is proactive planning. Mission(s), goals, and objectives are determined by what we want to accomplish in the future. All activities aim to achieving the target changes. In this perspective schools is actively contributing to the change. Based-on this theory, designing polytechnic curriculum should be planned in the proactive perspective in order to increase its contribution to the change in the future.

Tactical Planning Curriculum

Tactical planning is needed as a bridge between strategic planning and operational activities. This stage requires a system analysis. It needs identify the key aspects related to the learning and teaching process. There are at least four key aspects which need to be considered in the curriculum planning, e.g. context, curriculum design, skills development and assessment (Dickens & Arlett, 2009). The context aspect of learning and teaching in the engineering area including setting standard, identifying learning outcomes which is contain in terms of knowledge and understanding, intellectual abilities, practical skills, transferable skills, to address the needs of employability, entrepreneur, and internationalization skills.

Kaufman theory about inside-out and outside-in planning needs to be considered in planning the curriculum. If polytechnic wants to increase its contribution to economic development in the future, it is necessary to apply the proactive curriculum planning by involving industries to define vision, mission(s), and learning outcomes which are needed to industries or world of work. The big problem now is the poor communication between polytechnic and industries. It has been broken information flows between them. Polytechnic will lose informations which are needed to develop their curriculum and students competences, and the worse case, polytechnic will be isolated from industries. This conditions mean disaster for polytechnic. Establishing and strengthening collaboration and cooperation between polytechnic and industries are not avoided. This collaboration and cooperation should be conducted at "B-to-B" level (institution level).

Skills development aspect should consider the most effective way of providing opprtunities for students to develop their professional compeencies by attach them within a modul. This approach not just help students to fit them into new material and condition, but it also help the student to learn within a relevant context. Competencies should be developed are professional competencies which have core component consist of knowledge or cognitive competence, functional competence, value or etical competence, and personal or behavioural competence (Nicholls, 2001, p. 124). Knowledge competence is ability to put appropriate work-related knowledge in effective use. All courses have to ensure students develop their skills and knowledge which will enable them to think and act critically and effectively. Functional competence is ability to perform a range of work-based task effectively to produce specific outcomes. Time management skill is the most important skills to perform work-based task effectively. Value or ethical competence is the possession of apprpriate personal and

professional value and ability to make judgment based-on these in work-related situations. It can be enhanced by case studies which support the learning and teaching of ethic.

Personal or behaviour competence is the ability to adopt appropriate behaviours in work-related situations. Personal competencies, including interpersonal skills and intrapersonal skills, are competences needed to support professionals work. Intrepersonal skills are abilities to relate with other people, member of team work or other team member, for example: motivation skills, leadership skills, negotiation skills, communication skills, relationship building, publick speaking skills, self developing, etc. Intrapersonal skills are the abilities to perform self control and or self direction, e.g. time management, stress management, change management, transforming belief, creative thinking process, self learning, etc.

These profesional competencies components should be developed. The question is how to develop and when it should be developed? The key word of professional competencies is an expertise. The power and satus of professional workers depend to a significant extend on their claim to unique forms of expertise, which are not shared with other occupational groups, and the value which is placed on that expertise (Eraut, 1994, p. 14). The development of professional competencies at all levels need work environment. Professional development is essentially a learning process. Learning is defined as changes in knowledge, understanding, skills and atitudes brought about by experience and reflection upon that experience, whether that experience is structured or not (Nicholls, 2001, p. 54). Based-on these theory, vocationalization character could be formed by cyclical process of learning. Individual, groups, and organization should have learning experiences as descibed in Figure 5.

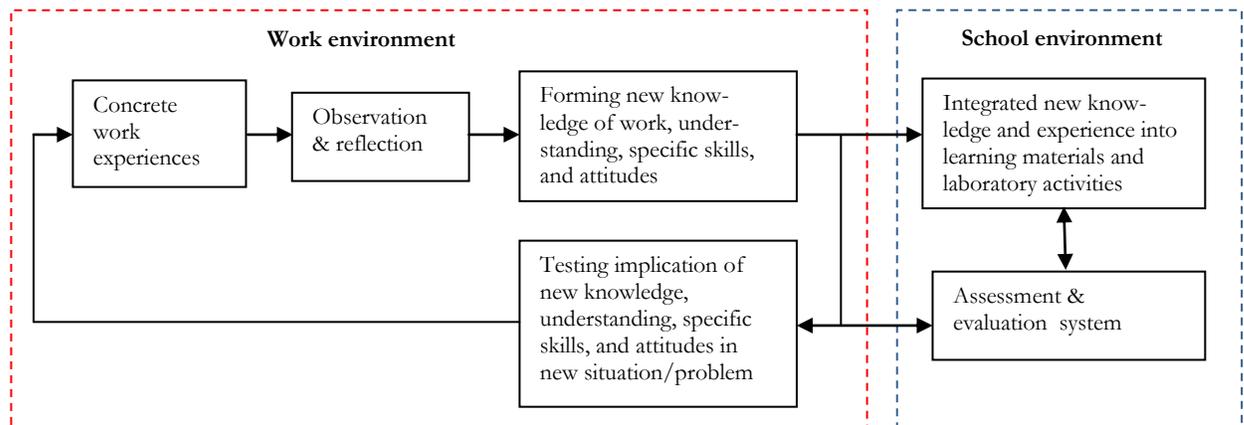


Figure 5. The Vocationalization Process in Polytechnic Education

Assessment is a broad term which is defined as a process for obtaining information that is used for making decisions about students; curricula, programs, and schools, and educational policy (Nitko & Brookhart, 2011, p. 3). Assessment needs to be integral part of the development process and focuses on learning. Assessment in this case is a process for obtaining information about how much the professional skills have been achieved, students performance have been improved, and polytechnics productivity has been increased. Professional skills consist of knowledge skills, thinking skills, personal skills, personal attributes, and practical skills. Skill is ability to use one's knowledge effectively and readily in execution or performance (Eraut, 1994, p. 72). Skills could be differentiated into two categories: hard skills and soft skills. Hard skills are easier to describe and recognize because they are more likely about how to follow procedure for certain work, for example use computer to collect, analyze, and display information from these data. Soft skills harder to observe except their absence, such as being nice, listening, taking the initiative, problem solving. Soft skills fall into three categories: (1) reasoning or logic skills; (2) interpersonal and communications skills; and (3) leadership, management, and entrepreneurial skills. These skills need to be assessed formatively and sumatively. Formative assessment of student's

achievement is judging the quality of student's achievement while the student is still in the process of learning. Information which is gathered from formative assessment may be used to guide next learning steps. Summative assessment of student's achievement may be used to judging the quality of student's achievement after the instructional process is completed. These information may be used to evaluate student's achievements, curriculum, and programs.

The change of students' performance reflects the result of education or training program. Students' performance should be assessed in four levels: (1) students response (satisfaction), (2) students learning, (3) behavior changes, and (4) results. This approach referred to Kirkpatrick's theory about evaluation training program (Kirkpatrick D. L & Kirkpatrick J. D, 2006, p. 21). The most important thing is getting positive reaction, because the future of a program depends on positive reaction. If participants do not have a positive reaction, they probably will not be motivated to learn. Positive reaction may not ensure learning, but negative reaction almost certainly reduces the possibility of its occurrence. Learning can be defined as the extent to which participants change attitudes, improve knowledge, and/or increase skills as a result of attending the program. Students' performance has been used as a measure the

success of education or training program. Polytechnic contribution on economic may be measured by its contribution in supplying semi-skilled and skilled workers, the number of patents which has been obtained by faculties or institution, the number of innovative products which have economic values and are recognized by community(ies).

Assessment is also needed for curriculum and program. The effectiveness of curriculum could be measured based-on the objectives achievement. It needs standards proficiency which consists of content and performance. Content standards describe the subject matter, facts, concepts, principles and so on that students are expected to learn. Performance standards describe the thing students can perform or do once the content standards are learned.

Evaluation term is defined as a process of making value judgement about the worth of a student's product or performance. Evaluation may or may not be based-on measurements or test results, or may be based-on counting things, using checklists, or using rating scales. Evaluation of student's product or performance is based-on the achievement indicators which are agreed by both polytechnic and industries. The evaluations tend to summarize the strengths and weakness, and describe whether a properly implemented program or procedure has attained its stated goals and objectives. Assessment within professional development needs to reflect the specific process of learning. Assessment should reflect what students can apply, analyze, and critically reflect what they have learnt.

Based-on the afore-mentioned theory, the strengthening vocational character of polytechnic education can be done through four approaches which are described in Figure

6. The approaches are as follows: (1) lecturing approach; (2) laboratory practice; (3) apprenticeship in industry or in the workplace; and (4) evaluation system.

Curriculum Delivery to Strengthening Vocational Character

The afore-mentioned vocational character strengthening can be done at least by four ways. Figure 6 shows the process of strengthening polytechnic education which can be done by polytechnic which has non-production-based curriculum. Character strengthening in the learning and teaching activities can be conducted through many methods, such as giving students more opportunity to learn actively, being more active in discussion, and self-learning actively about theory and science in practice. Enquiry-based learning method can be used to give students opportunity to learn something deeply, for instance, project-based learning, problem-based learning or investigation study. The teaching evaluation methods can be selected e.g. tests or quizzes which can motivate students to be more active.

Strengthening vocational character can also be given through practical activities in the laboratory. These activities can provide many learning outcomes, such as gaining practical skills, having experiences using fine instrument, designing a test program, linking theory and practice, collecting data, gaining analysis skills, making judgment, establishing team work ability, improving interpersonal ability, and so on. All practical activities need to be focused on formation professional competencies. Professional is a social recognition about expertise in doing the job (Eraut, 1994, p. 100). It is also associated with the evaluation system and the variable which are assessed.

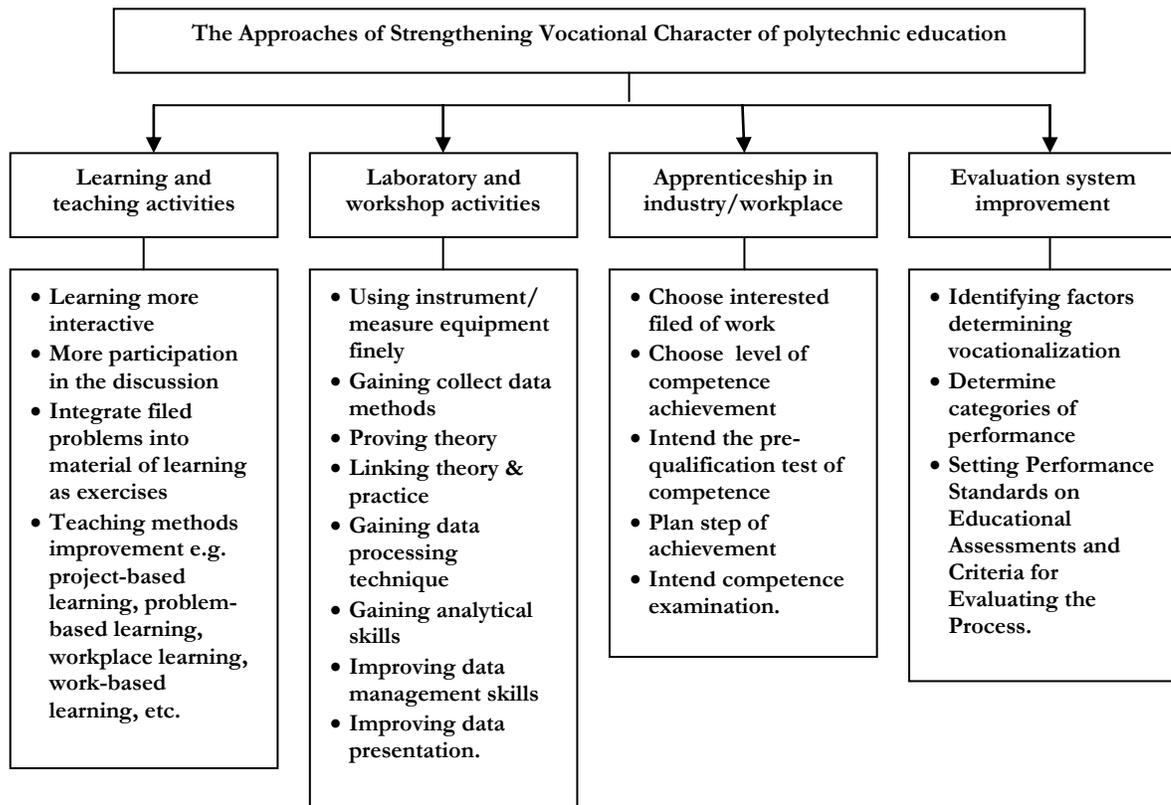


Figure 6. The Strengthening Polytechnic Education Character Approach

The professional skills are vocational character that has to be reinforced. Students can reinforce their professional skills in the workplace at a certain profession/occupation. Assessment system can be utilized to improve vocational character. Aspects to be assessed should include: (1) personality aspects, especially ethics which consists of: honesty, including academic honesty by not doing plagiarism, falsification, respectful, sense of responsibility; (2) gaining or developing skills, knowledge, attitudes and ability (SKKAs) aspects, including implemented K3 consistently, and discipline in action; (3) developing students creativity aspect; (4) recognition of learning outcomes which is delivered through learning outcomes evaluation system.

The consequences of implementation of this teaching and learning concept are the need of changing teaching and learning method, and evaluation system. Polytechnics also need to

develop instruments and learning outcomes standard to improve their evaluation system.

The third approach that can be used to strengthen vocational character is apprenticeship in industry or workplace. Students will gain the real experience directly from first-hand (Fry, Ketteridge & Marshall, 2009, p. 14). Good experience (success) or bad experience can be used as a learning source. Apprenticeship should be focused on technical competencies certificate achievement, which can be used to access the world of work. The technical competencies could be used as foundation of career development of students in the future. The role of apprenticeship in the polytechnic education is very important, because it is the only event for students to gain their specific competencies which could not be acquired on the campus. The Competence Certificate which is obtained from apprenticeship is expected to have an added value for students which are recognized by the

world of work. This certificate can be used as Diploma Supplement (DS). The fourth approach is improving evaluation system. Educational evaluation is one of the ways to determine effectiveness educational program (Worthen & Sanders, 1981, p. 1; Kirkpatrick D. L. & Kirkpatrick J. D., 2006, p. 3). Evaluating is defined as the process of making a value judgment about the worth of a student's performance (Nitko & Brookhart, 2011, p. 6). Determining this judgment value needs standards as the quality assurance of educational and training outcomes. The lack of learning outcomes standard for assessment will provide various learning outcomes quality

which are happening now in several study programs in polytechnics. Therefore polytechnics need to develop evaluation standards as a real action to perform educational quality assurance.

Based on Kolb's experimental learning cycle and the strengthening approach which is described in Figure 6, the strengthening process of vocational character in polytechnic education can be described in Figure 7. Reflection and learning are key elements of any professional development program, and yet increasing these particular elements being assessed.

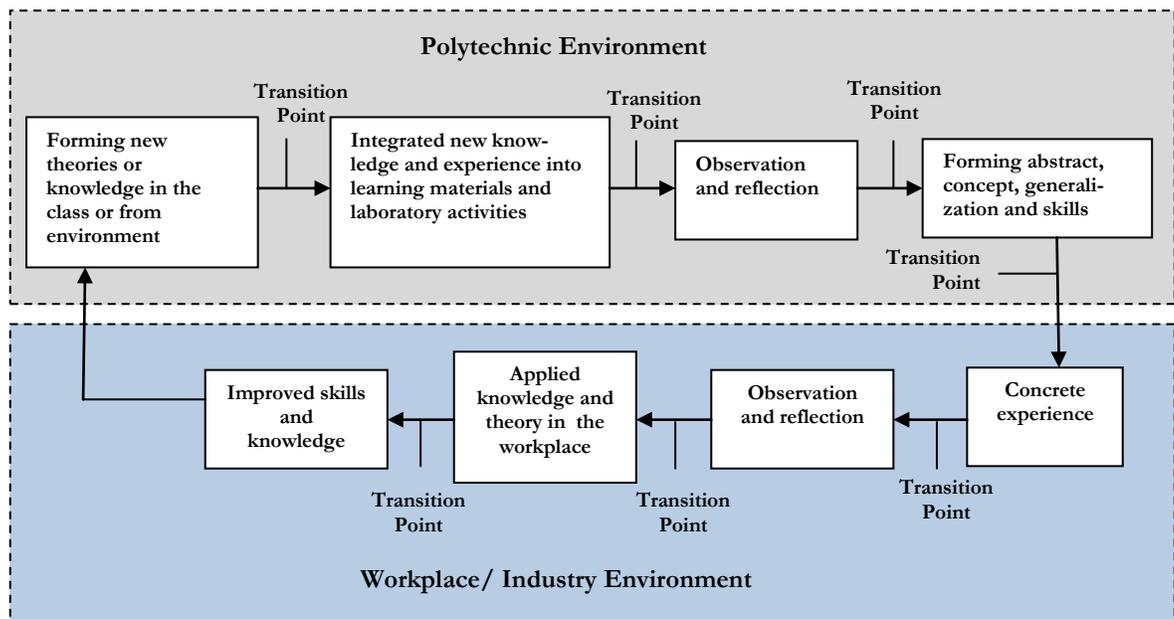


Figure 7. The Individual Strengthening Process of Vocational Characters

Polytechnic should develop monitoring system to reveal the progression of professional skills development. There are critical points should be monitored are transition points between school to work and between stage to next stage. These points are crucial because advisor, faculties member, and community makes judgment and assessments about individual often requiring new thing before transfer to the next stage in endorsed.

Based-on these theories and all descriptions as mentioned above, the hypothetic model of strengthening vocational character for polytechnic education can be described at Figure 8. This model has been socialized and provided positive response, and made polytechnic management has an optimistic feeling to gain their polytechnic education character in the future. Most respondents proposed that detail guidelines are

needed to implement this model, because it needs a big change in the habit of teaching and learning implementation in polytechnic. A lack of financial support to provide all necessary resources, including materials development and training for the faculty members needed to

achieve this mission may be the major obstacle to implement this model. Based on the current data of faculty members and participants suggestions, it needs a step by step training for faculty members and education personnel to deliver the model.

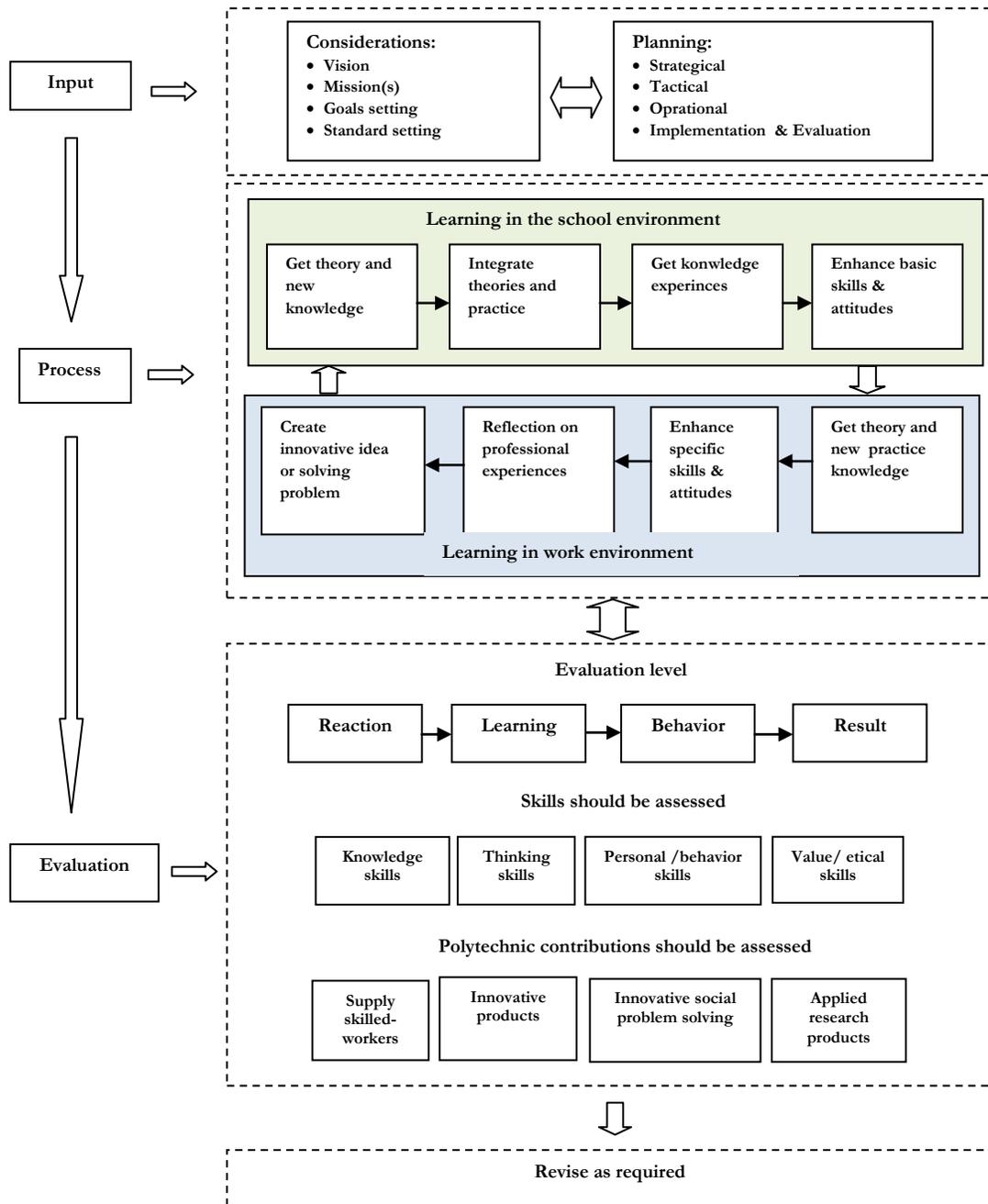


Figure 8. The Hypothetic Model of Strengthening Vocational Character of Polytechnic Education

Conclusion

Based on the research findings, there are some points that can be noticed as conclusions: (1) Environmental factors are very influential factor in shaping the character of polytechnic education and recognition; (2) The greatest gaining vocational character acquired through apprenticeship in industry or workplace and supports by evaluation system; (3) Gaining vocational character has to be done cyclical and it needs to be managed by maintaining and strengthening cooperation between polytechnic and industries, and competent institution which can develop education system.

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