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A Conceptual Framework for Mechatronics Curriculum Using Stufflebeam CIPP Evaluation Model

Azman Hasan^a, Sharifah Nurulhuda Tuan Mohd Yasin^{a*} and Mohd Fauzi Mohd Yunus^b

^a*Universiti Tun Hussein Onn Malaysia, Faculty of Technical and Vocational Education (FTVE), Batu Pahat Johor, Malaysia.*

^b*Politeknik Ibrahim Sultan, Department of Mechanical Engineering, Pasir Gudang Johor Malaysia.*

Abstract

Evaluation means a study that has been established and implemented to help the observer to assess the value and merit of an object. This evaluation can be performed on any activities that have the aim. The model also visualize a conceptual representation of an activity about their relationship between the various elements that been involved in such activities. By using the model, assessment activities can be conducted completely and significant. The researcher choose Stufflebeam CIPP evaluation model because of its effectiveness to get results of formative and summative, to find the decision, and also problem solving ability. In this paper, the author is trying to define the stage dimensional and elements context, input, process and product in Mechatronics curriculum implementation. The method that been used are the analysis of documents, with reference of previous studies. Reviewing of literature can be used as a guide to researchers. As a results, the researchers will identify the aspects of the study based on the dimensions of context, input, process and product. Conceptual framework was intended to be used in the implementation of the evaluation study of Diploma in Mechatronic Engineering in polytechnic toward the needs of industry in Malaysia. In fact, this aspect of the study can be used to assess the Mechatronics program in terms of overall performance and significant. Stufflebeam CIPP evaluation model been used and designed not only to prove a decision but acts as a fixer where the information can be used as a guide for designing a program.

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* Corresponding author. Tel.: +06013-7776179;
E-mail address: shnurulhuda@gmail.com

1. Introduction

Economic transformation that led to the technology industry and services has opened up huge opportunities for the development of Technical and Vocational Education (TVE) in Malaysia. Recognizing these demands, the government has established technical and vocational education institutions formally by creating of 87 technique secondary schools and 27 polytechnics throughout Malaysia. The role of these institutions, especially in polytechnics is to produce semi-skilled workforce that will meet the energy needs of the country's industrial and services sectors(Abd Wahab, Zakaria, & Jasmi, 2010).

Ministry of Higher Education has initiated measures to upgrade polytechnic education system by giving Premier Polytechnic to 3 polytechnics in Malaysia. Those polytechnics are Politeknik Ungku Omar (PUO), Politeknik Ibrahim Sultan (PIS) and Politeknik Sultan Salahudin Abdul Aziz Shah (PSA). This reflects the government's determination to establish a system of technical and vocational education in a systematic, efficient and able to produce products that will cater the needs of the human capital needed in the present and future. It expected to produce polytechnic separatist proficient workforce that is competent and has a high merchantability. However, the government's efforts will be fruitful if the Department of Polytechnic able to explore and monitor the problems that related to these issues(Abd Wahab et al., 2010).

As according to the survey (TRACER STUDY) conducted by the Department of Polytechnic,(2011) only 49.5% of graduates are getting a job only after 6 months of graduation from polytechnics while 18.9% continue their studies and, while 23% do not work for some reason. 49.5% of graduates work in various areas and only 13.1% of graduates working in the same field as their study's field. The question is why these 36.4 percent of students did not work in their field of study. It is a waste that all the knowledge and skills they have acquired cannot be used and applied in their work, and they cannot give contributions to the country.

The main problems faced by institutions of technical education is the difficulty in meeting the needs of employers in accordance with technological developments(Shyr, 2012). Training given is inconsistent and not up to date with current developments in the rapidly changing technology. Hence skills issued are not equivalent to the requirements of industry and services. This is an issue that is still going on today in which students hard to find job because most employers do not see the relevance of the courses and skills that students have. This may be due to the slow improvement and the lack of latest facilities in training students.

The question that arises in this survey, why are there still so many graduates are still unemployed and looking for a right track? Are the teaching and learning in polytechnic education system is not effective enough so they do not get the job? Does the program offer polytechnic irrelevant and did not provide the skills they need in the employment's field and because of that they are not offered the job? This issue has to be explored and investigate next finding solution for this problem.

2. Literature Review

Study on how to track the performance of Mechatronics curriculum in Malaysia still not implemented by anyone. Therefore, the appropriate assessment should be carried out on the curriculum implementation in Mechatronics. Furthermore, the result of the evaluation is to make a choice whether to remain, review and upgrade of a curriculum or replace with a new curriculum (Ornstein & Hunkins, 2004). Oliva (2005) also states that the assessment is being conducted to determine what needs to be improved so that a program is effective. By selecting the CIPP model to a study made a thorough evaluation of the established curriculum.

Evaluation of the implementation of teaching and learning curriculum focuses on aspects of Mechatronics program to Diploma in Mechatronics Engineering students at the Polytechnic. Since it is still in the early stages of

implementation, it is very relevant to a valuation carried out to ensure the establishment of Mechatronics curriculum is really worthwhile and achieve goals and objectives. The results of the Mazudi's study (2007) states polytechnic graduates who obtained a CGPA score of 3.0 and above minuscule compared with graduates from other institutions. This statement is supported by Husain.H, Misran.N, Abdul Samad S., Hussain A. & Mokri S.S (2008) which explains most of polytechnic graduates who continue their studies at degree level is difficult to succeed in academics.

Therefore, one of the major changes implemented by the Ministry of Higher Education Malaysia Polytechnic is to implement the new curriculum outcome based approach that uses education (OBE). OBE approach was first introduced at the Polytechnic Ministry of Higher Education started in 2010 to meet the demands of the Malaysian Qualifications Framework (MQA). The curriculum changes are expected to be generated by the polytechnic graduates are on par with graduates from other institutions leavers whether it is private institutions or public institutions. By applying the concept of teaching and learning based on the results (OBE) in all higher education institutions (especially in engineering). In Malaysia today, it could provide an opportunity for the authorities to ensure that future graduates are produced in accordance with the requirements and needs of the country (Mohd Nor M.J.& Zaharim A.,2007).

Teaching and learning processes implemented at the Polytechnic Ministry of Higher Education Malaysia are using traditional methods. Through this teaching pattern, graduates are passive and only waiting for input from their trainers (spoon-feed). According to a study of Yaman et al., (2010), states that the traditional methods practiced by the lecturer will limit the ability of learning and students to gain a lot of knowledge. This study will improve the charging process and the implementation of Mechatronics curriculum. This is important so that it will be a curriculum that is relevant to current needs. To answer these questions, a review of the establishment and implementation of Mechatronics curriculum in the context of the establishment, provided input, the process and the products produced there from will be carried out based on the CIPP model.

3. Objective

The research is to define stage dimensional context, input, process and product of Mechatronics curriculum. Below are listed several objectives:

- a. Identifying the element of dimensional context, input, process and product in Mechatronics curriculum implementation.

4. Methodology

4.1. Research Goal

The aim of this study was to identify the extent and dimensions of the relationship between context, input, process and product use Stufflebeam model (CIPP). This study uses document analysis, with reference to previous studies. Review of the literature can be used as a guide to researchers. To achieve this objective, qualitative research methods, namely the study of documents, have been carried out with reference to some previous studies as a literature review. Several previous study reports, conference proceedings, and journals have been referred to as a literature review, and analysed with the data collected using a matrix table (Strauss and Corbin, 1994). This technique has been used, because it is a method of regular review and evaluates the paper documents and electronic resources. Based on Sallabas (2013), and Best and Kahn (1998), the document review method is the most appropriate tool to collect information in a qualitative study. Onwuegbuzie, Leech, and Collins (2012) believe that the variables relevant to the topic can be identified by conducting a quality review of the literature.

4.2. Analyses and Results

Conceptual framework refers to a set of concepts related to each other in a logical manner with respect to a

phenomenon studied Merican S. (2006). The conceptual framework used as a guide for conducting a research (Stufflebeam, 2000c). For example, to identify research questions. According to Marshall & Rossman (2006) research questions built in the conceptual framework. To carry out this study, the researcher has developed a conceptual framework based on the model evaluation studies Stufflebeam (2000a) as shown in Figure 1.

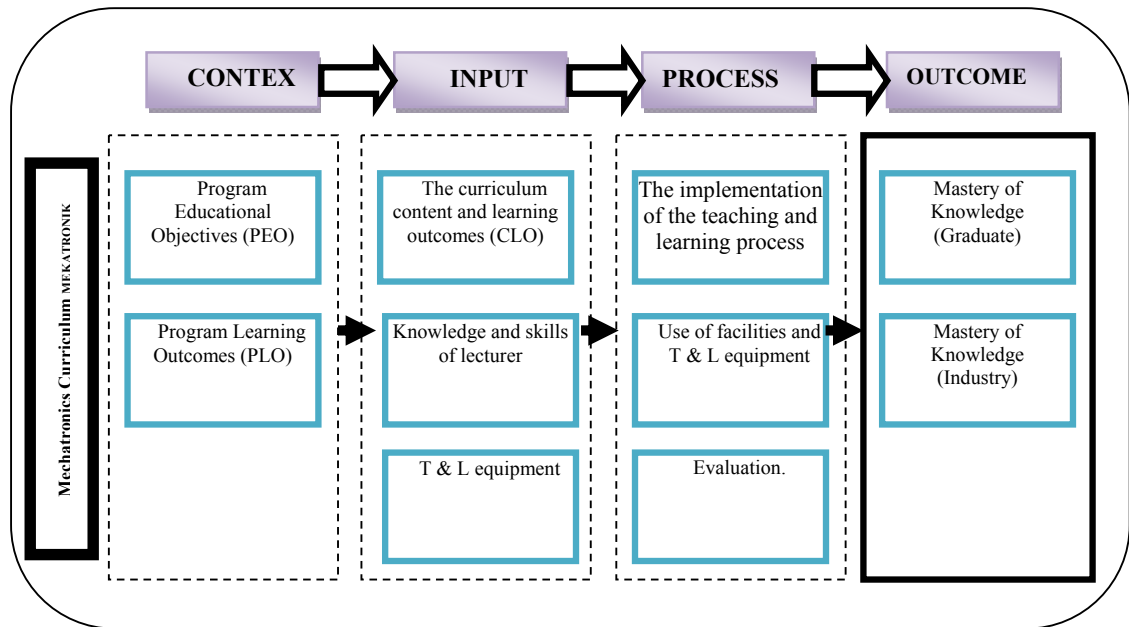


Fig. 1. Conceptual framework (Stufflebeam, 2000c).

According to Figure 1, there are four dimensions studied in the implementation of the curriculum focuses aspects of program educational objectives (PEO) and learning outcomes (PLO), the dimensions of context, input, process and outcome. Stufflebeam evaluation Model (2000a) involves the evaluation process in the form of context, input, process and product. Rating context refers to the needs, problems and opportunities as a basis for defining goals and priorities in determining whether a product is significant or not. Input evaluation involves a variety of approaches and program planning inputs needed to implement the program. Assessment process focuses on the implementation of activities that can help achieve target. Product evaluation is to identify results that have been achieved or not in order to track the effectiveness of the program.

Based on the evaluation model Stufflebeam (2000a), this study was undertaken to detect Mechatronics curriculum implementation program focused on educational objectives (PEO) and learning outcomes (PLO) for students Diploma in Mechatronics Engineering, Polytechnic Malaysia dimension of context, input, process and product. In dimensional context, the study was conducted to examine the level of knowledge of the context which includes Program Educational Objectives (PEO) and Program Learning Outcomes (PLO) of the program. Dimensional input is to see the extent to which the lecturer has made planning and preparation of information related to the components of the curriculum content and learning outcomes (CLO), knowledge and skills of lecturers and T & L equipment. Dimensional process is to assess the implementation of the teaching and learning process Polytechnic lecturer who teaches a course in Mechatronics, which includes teaching and learning strategies, use of inputs and teaching materials, use of facilities and P & P equipment as well as evaluation.

Evaluations was carried out in accordance with the dimensions of this process is the fact Oliva (2005), which explains that the evaluation includes an assessment of the teaching curriculum. Finally, the dimension of the product in this study is to examine the results of implementation of the curriculum for the Mechatronics program achieved by dimensional perspective of context, input and process. The overall implementation of the curriculum is through the evaluation process to see to what extent the implementation of a curriculum as in the model curriculum (Olivia, 2005) in Figure 2.

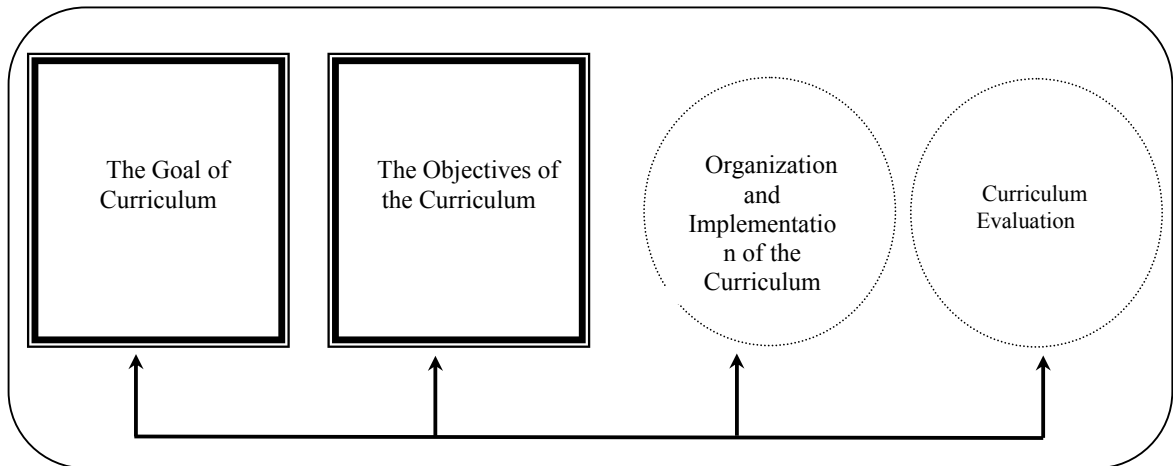


Fig. 2. The Curriculum Model (Oliva,2005).

According to Figure 2 above, in the curriculum model presented by Oliva, it comprised the goals and objectives of the curriculum. In addition, it is also accompanied by the organization and implementation of the curriculum. Curriculum implementation is one of the parts that should be evaluated to determine the extent of implementation. According to that, pursuant to the Model Curriculum submitted by Oliva, the evaluation should be done on aspects of the implementation of the curriculum. Therefore Mechatronics curriculum for the program educational objectives (PEO) and learning outcomes (PLO), which was conducted at the Polytechnic also need to be studied to see how far the effectiveness of the implementation. When a new curriculum was developed it based on several factors (Rohizani, 2005):

- (i) The development or discovery of new knowledge
- (ii) Changes to the requirements of society
- (iii) Development of Government Policy
- (iv) New ideas in the field of education and
- (v) The weaknesses found in the existing curriculum

5. Conclusion

Overall introduction to the study conducted by our research on the formation and implementation aspects of the curriculum Mechatronics based on the CIPP model in terms of the context of the curriculum, provided input, the process undertaken and products produced there from. From the analysis of documents obtained from several studies related to curriculum, available the following aspects are observed while researching the effectiveness of a programme in the field of Mechatronics. These aspects include Program Educational Objectives (PEO) and Program Learning Outcomes (PLO) for dimensional context. Dimension input refers to the curriculum content and learning outcomes (CLO), knowledge and skills of lecturers and T & L equipment. Dimensional process is to assess the

implementation of the teaching and learning process Polytechnic lecturer who teaches a course in Mechatronics, which includes teaching and learning strategies, use of inputs and teaching materials, use of facilities and P & P equipment as well as evaluation. Lastly, the dimension of the product in this study is to examine the results of implementation of the curriculum for the Mechatronics program. Evaluation models used to assess the effectiveness of CIPP implementation of life skills and are an important aspect in this study. Then decisions are made whether effective or not. If it's not effective programs should continue with some changes identified the cause of the weakness of the programme.

When compared to other assessment model, CIPP containing dimension of context, Input, process and product can be researched using four dimensions or use one of the combinations of the dimensions of CIPP. This depends on the requirements of the programme. Valuation model CIPP more emphasis to collect information with a view to facilitate making a decision. This information will also be used as a guide to further enhance a program either at the planning, structuring, implementation and production. As a result the future decision will be made whether to continue, modify, add or discontinue a program that (Hj Yahaya, Ramli, Hashim, & Yahaya, 2008).

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