

Challenges of Design Education in Malaysia: Implementation Teaching and Learning

^{*1}Norliza Ahmad, ²Khairul Aidil Azlin Abd Rahman and ³Roslina Sharif

Abstract--- The Malaysian Education Development Plan (MEB) 2013-2025 has recently reported nine indicators of teaching and learning approaches that teachers can use in various fields including in design education. The teaching and learning approaches in the curriculum report are self- learning, collaborative, project-based, inquiry based, problem-based, mastery learning, constructivism, exploration, observation and science, technology, engineering and mathematic (STEM). This studied aims to identified teaching and learning implementation among design teachers in Johor, Malaysia based on the newly introduced curriculum in Malaysia. In addition, this studied aims to addressed the problems faced by design teachers and in implementing project based learning. The total number of respondents involved is 17 teachers who are teaching the Design subjects in 2017 and 221 Form Four (Age 16) students. Data collection was conducted through questionnaire and interview. Furthermore, the data were analysed by descriptive statistical techniques. Meanwhile, the finding of the problems obtained from the interviews among teachers and students were translated into appropriate group indicators. Then, the indicator is used as the starting point for organizing the instrument items in the form of a statement tables. The finding shows that the teaching and learning strategy of the Form Four (age 16) used by the teachers is Project-Based Learning (PBL). The implementation in Form Four teaching and learning also shows that the process of creating and designing various ideas was the most difficult process by referring to the problems of creativity in creating a product in a project-based learning (PBL) conducted in secondary schools.

Keywords--- Design Education, Teaching and Learning, Project-Based Learning.

I. INTRODUCTION

The Invention subject is one of the Design Education subjects offered to the upper secondary schools in Malaysia (16 until 17 years old). After completing the Form Three studies (13 until 15 years old), those who take the Design Technology subject can continue their learning in the Design Education field by taking the Invention subject to enhance their knowledge in the area of product design. The Invention subject aims to make students capable of critical and inventive thinking by embracing the use of technology to develop countries (Abdullah, 2004).

The third objective in the curriculum of the Invention subject is students should produce creative and commercial products characterised by green technology. Mohd Ridzwan (2016) stated that the Prime Minister of Malaysia mentioned the creativity in his speech, 'To be a developed nation', Malaysia must use science and technology powers, as dynamic entrepreneurship, innovation and creativity to boost performance in the public and private

sectors'. The revised policies as well as educational reforms are aimed at strengthening the teaching and learning process at schools (Iberahim et al., 2017).

The Creativity is one of the key skills needed for the development of a sustainable nation, especially in an increasingly complex social environment (Omar, 2014). The curriculum transformation provided in the Invention subjects is expected to identify a phenomenon of student achievement problems in creativity and innovative product design among students. Obstacles to the achievement of creative and innovation among students need to be resolved, otherwise it can stave off efforts in pursuing innovation economics in national development (Nor Fadila & Mohd Fairul, 2002). A preliminary study found that there were problems faced by students and teachers in implementing the teaching and learning process in The Invention subject in 2017. Table 1 shows the timing of the implementation assessment of course work for the Malaysian Education Examination.

Table 1: Timing of the implementation assessment of course work for the Malaysian Education Examination

Design Process On Teaching And Learning	Month	4				5				6				7				8				9				10					
	Week	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Problem Identification And Analysis (Form 4)																															
Research Design Existing (Form 4)																															
Create and Design Various Ideas (Form 4)																															
Application Of New Design (Form 4)																															
2 and 3 dimensional drawing (Form 4)																															

Based on the observations in the classroom, it is found that students have taken a long time, up to four months to create and design various ideas. This resulted in a time-shift for the next process while the teachers did not have enough time based on the date set by the Malaysian Examinations Board. It requires a very high creativity through high-level thinking skills. Among the activities implemented were two and three dimensional drawing, improving the design of a product and solving project-based learning. Therefore, this paper sets out some of the objectives in finding the source of problems faced by teachers and student in T&L in the Invention Subjects of Secondary Schools in Malaysia.

II. METHODOLOGY

This research study is a descriptive study that uses quantitative and qualitative data. Data collection was conducted through questionnaire and interview. The data were analysed by descriptive statistical techniques. Meanwhile, the finding of the problems obtained from the interviews among teachers and students were translated into appropriate group indicators. Then, the indicator is used as the starting point for organizing the instrument items in the form of a statement tables. This study intends to:

1. To identify teaching and learning strategies among teachers of Form Four (*Age 16*) in the Invention subject of secondary schools in Malaysia.
2. To analyse the problems faced by students and teachers during teaching and learning among students of Form Four (*Age 16*) in the Invention subject of secondary schools in Malaysia

1) Sample

The total sample consists of 17 teachers who are teaching the Design subjects in 2017 and 221 Form Four (Age 16) students in Johor, Malaysia. The Sample is selected as a whole involving in The Invention subject.

2) Tool

To understand the problems identified in the implementation of teaching and learning, observations were made at several design classes in Johor, Malaysia. These observations are analyzed over time in the form of a table. From the table, interviews were conducted to identify the problem. Performance is assessed through teacher observation through the process. In addition, the choice of answer through the interview questions refers to the assessment of teachers and students through a number of indicators such as infrastructure, attitude, experience, skills and time management. Students and teachers are free to offer their opinions on the problems they face while implementing teaching and learning. The sum of each student's and teacher's scores is created in descriptive statistics to see the distribution of problems.

III. RESULTS AND ANALYSIS

Figure 1 shows the findings of the T&L strategy used by the teachers in the Form Four (Age 16) secondary schools in Malaysia.

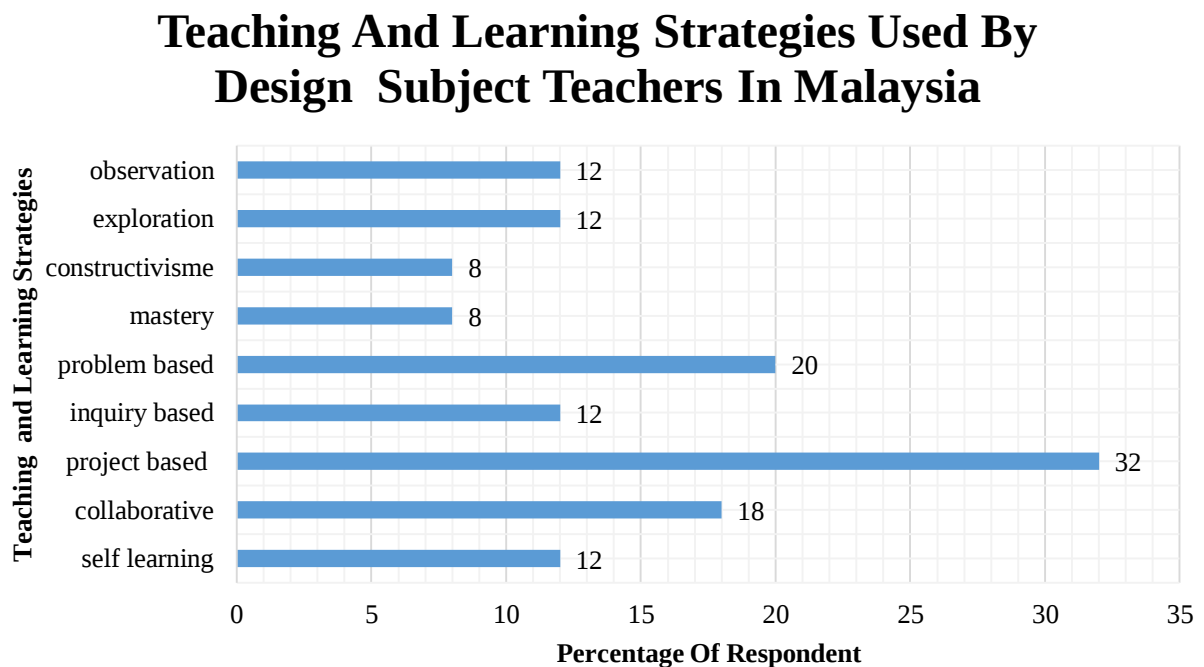


Figure 1: Teaching and Learning Strategies Used by the Invention Subject Teachers

The findings in Figure 1 show that 17 teachers mostly have chosen the Project Based Learning (PBL) and problem based learning strategy to implement teaching and learning in their classrooms. However, students take too long in the idea-making phase of the design process. This statement can be references in Table 1 in the preceding

paragraph. PBL is an activity model in a classroom that differs from the habit of which it involves a long period of time in the invention process.(Azaki & Nasir, 2014) Besides, Table 2 and 3 show the findings of the open questionnaire on problems faced by teachers and students. Some indicators have been selected based on the frequency of the findings.

Table 2: Indicators statement types of problem by teachers in teaching and learning

Indicator	Types of Problems by Teachers in T&L
Infrastructures	Limited computer usage, easily breaks down on lack of manageable spending
Student's Attitudes	Absent form school, less preparation in terms of basic knowledge, less interest in subject, less creativity and insufficient effort
Experience	Low confidence among teachers, lack of knowledge in the design field, poor understanding of the concept, weakness on the skills in Computer-Aid Design (CAD), weakness on skills in using machines and equipment's
Teachers Skill	Weakness on sketching and rendering,
Time	Workload among teachers in time management, syllabus requirement

Table 3: Indicators statement types of problem by student in teaching and learning

Indicator	Types of Problems by Students in T&L
Skills	Lack of general knowledge, difficulty in creativity isometric drawing, weakness in making 3 dimensional visual, difficulty in sketching and rendering
Creative Thinking	Difficulties in generating ideas, Lack of ideas, limited resources and preventing creative thinking, take a long time to synthesis ideas.
Time	Not enough time for CAD application drawing, need to share the computers
Teacher's attitudes	Very helpful, proper in delivering instruction, strict in teaching

IV. DISCUSSION

1) Teaching and Learning (T&L) Of Design Subject in Secondary Schools

Based on the findings of this study, teaching and learning process used among teachers is project-based learning (PBL). However, students have taken too long to solve the project problems faced by Table 1 which include the implementation of the teaching and learning process in the design education classroom. The PBL is suitable for the Designs subject curriculum because it involves various disciplines and technical skills to complete certain projects (Herpiana & Rosidin, 2018). PBL is also used in engineering where many studies are described by researchers in the world using this method. (Dym et al., 2005). It is also a comprehensive approach in which it is a lesson that involves students in a way that is organised in the form of cooperation to investigate and solve certain problems (Musa et al., 2011). This study also shows that collaborative learning, STEM and self-learning are used by teachers of the Invention subjects. According to Rasul dan Nur Farhana (2015), creativity can be defined as an ability of thinking and acting that is not based on ordinary logic because of the nature of judgement. All the learning methods chosen by teachers have a great impact to create creativity among students for the Invention subject.

2) Teachers

This study found that teachers faced difficulties in implementing T&L based on several indicators such as infrastructure constraints, student's attitudes, lack of experience and skills in designing and constraints in time management due to the workload of clerical work. The role of teachers in using the simulation to deliver the content

of the lesson is very important in project-based learning. The statement is based on interviews by researchers with Teacher A on the role of a teacher in helping students in the classroom:

'To realise the creativity of a student, teachers should play their parts with the help of creative simulations individually or collaboratively, if not expecting to produce certain students will be stunted'

Interview Teachers' A

Problems in T&L occur when teaching practices are limited because no simulation and effective teaching aids can help students think creatively in their PBL. Teachers need to be creative in producing formulas for effective teaching techniques that can give a big impact on weakness of students. (Norizan, 2014).

3) Students

An early study of 47 students found that students could not draw a three-dimensional (3D) shape well. Students were also weak in making innovation and addition to existing products because of the lack of effective simulation. The early stages of two-dimensional and 3-dimensional drawing are one of the initial processes in design learning. This study also found that the visual skills of the space are very weak and the process of generating ideas is repeated and takes a long time in the design process. Effective simulants can help students in generating ideas more quickly and develop creativity thinking among students.

V. CONCLUSION

The data obtained shows that the PBL strategy was the main approach among teachers of Form Four (Age 16) students in Invention subject of Secondary School in Malaysia. Other collaborative approaches are the supportive T&L approach that helps students to develop creative thinking in the process of creating their own products. In addition, in assisting to generate the ideas of the design process, the use of simulation is indispensable in forming a critical idea. The problem solving project according to the implemented theme takes a short time, so the thinking simulation is PBL strategy approach which is a long-term approach that requires the commitment of all parties to achieve the objectives of the Invention subject by addressing some of the identified problems. The problems need to be addressed urgently so that the implementation is expected to have a tremendous impact in producing a sustainable national economy as a result of the individual creativity (Norhafezah et al., 2011). This study is expected to provide an early exposure to students and teachers particularly in moulding and shaping a brilliant generation of creative and innovative secondary schools.

REFERENCES

1. Abdullah. (2004). Majlis Perasmian Konvensyen MPP IPTA 2004. <http://www.pmo.gov.my/ucapan/?m=p&p=paklah&id=2832>.
2. Azaki, M., & Nasir, Z. (2014). Pembelajaran Berkonsepkan “Flipped” Menerusi Aktiviti Pembelajaran Berasaskan Projek. International Education Postgraduate Seminar, pp. 1-13.
3. Curriculum Development Section. (2016). Panduan Pelaksanaan Pentaksiran Sekolah. Putrajaya: Kementerian Pendidikan Malaysia.

4. Dym, C., Agogino, A., Eris, O., & Frey, D. (2006). Engineering design thinking, teaching, and learning. *IEEE Engineering Management Review*, 34(1), 65-65.
5. Herpiana, R., & Rosidin, U. (2018). Development of instrument for assessing students' critical and creative thinking ability. *Journal of Physics: Conference Series*, 948(1), pp. 1-6.
6. Kementerian Pendidikan Malaysia (KPM). (2015). *Dokumen Standard Kurikulum dan Pentaksiran Reka Cipta Tingkatan 4*. Putrajaya: KPM.
7. Mohamad Sattar, R., & Nur Farhana, W. R. (2015). Pembentukan Karektor Pelajar Kreatif Mengikut Teori Sternberg: Suatu Analisis Kandungan dan Pembangunan Kerangka Konseptual. *Sains Humanika*, 63(1), 7–15.
8. Mohd Ridzwan, M. I. (2016). Transformasi Ekonomi Guna Sains dan Teknologi. *Utusan Malaysia*. <http://www.utusan.com.my/berita/nasional/transformasi-ekonomi-guna-sains-teknologi-1.331541>.
9. Musa, F., Mufti, N., Latiff, R. A., & Amin, M. M. (2011). Project-based learning: Promoting meaningful language learning for workplace skills. *Procedia - Social and Behavioral Sciences*, 18, 187–195.
10. Nor Fadila, M. A., & Mohd Fairul, M. N. (2002). *Amalan Penyelesaian Masalah Secara Kreatif di dalam Mata Pelajaran Reka Cipta di Kalangan Pelajar SPH*. Research Report, Johor: Universiti Teknologi Malaysia.
11. Norhafezah, Y., Rosna, A. H., Hasniza, N., Fauziah, A. R., Sarimah, S. A., & Wan Zalina, W. D. (2011). PBL project reflection: Challenges in communicating change. *Pertanika Journal of Social Science and Humanities*, 19(2), 335-348.
12. Norizan, A. M. (2014). Guru Perlu Kreatif dan Inovatif. *Utusan Malaysia*.
13. Iberahim, A. R., Mahamod, Z., & Mohammad, W. M. R. W. (2017). Pembelajaran Abad Ke-21 dan Pengaruhnya Terhadap Sikap, Motivasi dan Pencapaian Bahasa Melayu Pelajar Sekolah Menengah (21th Century Learning and the Influence of Attitude, Motivation and Achievements Malay Language Secondary School Student). *Jurnal Pendidikan Bahasa Melayu*, 7(2), 77-88.