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Learning Based On Flipped Techniques Among The Technical Students With Different Learning Styles

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Abstract--- *Flipped learning is a relatively new method of learning in the Malaysian education system. This is because the percentage of usage is still not satisfactory. This method of learning is to use active learning concepts where students are exposed to several activities in the classroom to help students understand the learning and indirectly enhance their academic achievement. This study used the Quasi-Experimental method and this study involved 74 students from two polytechnics in Malaysia and were selected using purposive sampling method. For the control group, their learning used traditional methods whereby they would carry out their teaching and learning process as usual while the treatment group would carry out the teaching and learning process using flipped learning. The findings show that a total of 41 students had visual inputs compared to 33 verbal inputs. Besides, there was a 97.2% increase in academic achievement among students using flipped learning methods compared to students who followed conventional learning. The mean of students in the treatment group who used visual input as a medium in their learning was more likely to increase by 45.68 than for students who used the 35.91 auditory medium. On the whole, students who follow flipped learning methods can improve their academic achievement. The conclusion can be made that, by designing appropriate learning methods for students, this can help them overcome problems in learning and indirectly help educators in the process of delivering knowledge.*

Keyword---*Flipped Learning, Teaching And Learning, Student-Centre Learning, Academic Achievement.*

I. INTRODUCTION

Educational learning and technical and vocational training (TVET) is a longstanding phenomenon in the Malaysian education system. The development of TVET in Malaysia began in 1964 under the Department of Engineering Management. It is now known as the Technical and Vocational Management Division (BPTV). The main purpose of this Technical and Vocational education was introduced to prepare students for employment as it is a governmental effort for economic and industrial development to flourish [4]. The four key factors identified to contribute to the decline in student participation in the Science and Technology field are curriculum, awareness and importance in science and technology, career pathways and teaching and learning quality [8]

Witmuishwara and Ahmad (2015) state that the quality of teaching and learning process contributes to the quality of educational institutions, which in turn positively affects the existence of quality graduates [26]. In this regard, the quality that a teacher possesses can also influence the quality of his or her teaching and learning achievement. The role of teachers is important in educating students and in the classroom as teachers,

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facilitators and facilitators. Therefore, diversifying teaching methods, providing teaching aids and deepening the content to be taught are effective teacher practices for teaching and learning (R&D).

Teaching and learning methods are at the highest level if students are able to overcome the most appropriate cognitive and affective learning methods to enhance their ability. Teachers are expected to encourage students to improve their knowledge and skills through accurate and effective teaching and learning [1]. Therefore, Gijsbers and Schoonhoven (2012) suggest that teachers need to be creative and have the capacity to increase students' interest in exploring various knowledge throughout the learning process [6]. Teachers are individuals who have the knowledge and skills and are given the responsibility to provide knowledge and education to students.

II. LITERATURE REVIEW

The education system in Malaysia has undergone drastic changes since independence. This is because it enhances the quality of existing education. Various opportunities are provided by this multimedia-based learning and teaching, for example, educators can apply various teaching techniques and students are allowed to control the learning situation (student-centred learning) [14, 28]. Students can determine the learning techniques that suit them, build their knowledge according to their needs and make the learning environment more attractive and effective. Reference books and textbooks can no longer block these students from accessing information from the internet. The presence of useful reference materials from these internet sources can further increase the percentage of information achievement where each information comes from various forms and approaches [16]. In addition to the goals set by the PPPM (PT) about this surge, the integrated learning model of "blended learning" will be the key pedagogical approach of all IPT [11, 22]. Students will benefit from strong cyber-infrastructure if use such as video conferencing, live streaming and MOOC (Massive Open Online Courses) are used in the Malaysian education system. According to Hussin, Siraj, Darusalam and MohdSalleh (2015), blended learning is a blend of multimedia technology, CD ROM video streaming, virtual classroom, voicemail, email, telephone conference, animation, text and online.

Blended learning is a flexible learning process where students can learn anywhere not necessarily in the classroom, not only during a lecture, can talk to anyone and they are not bound by just one piece of information [7]. Flipped learning Model is one of the methods of blended learning [23]. The Flipped learning method uses the concept of students learning the subject outside of the classroom while in the classroom the students will be exposed to active learning [21]. The concept of "flipped" learning is that lectures or lectures will be provided in the home through multimedia resources while in the classroom students engage in activities such as small group discussions, quizzes, video presentations, powerpoint slides and lectures with lecturers. The use of attractive powerpoint slides can enhance students' confidence in learning something [3, 12].

Learning Science and Mathematics is often considered a difficult and boring subject for students. This problem is due to the traditional learning environment, the ability to answer students' questions, teacher-centred teaching and the emphasis on memorizing theories or concepts as well as engaging in activities that do not attract students [24,29]. Besides, the attitude of students who do not want to ask further makes the learning and teaching process less interesting and bland [13]. Lecturers also provide students with training, training or tutorials as training materials. Many of these questions will be solved by students at home alone and this will cause students to feel frustrated and boring when they are unable to solve a given problem or question. This is because they do not understand the concepts needed to answer the question. Many lecturers rarely review students with students. This will cause students to be unsure whether or not the answer is correct [17].

Besides, other factors that lead to decline student achievement are due to early achievement, basic skills, interests, attitudes, motivation and problem-solving skills [27]. Most students do not dare to try when the lecturer asks a question. This is because they are afraid of being laughed at and ridiculed when they give the wrong answer. Furthermore, it will indirectly cause students to lag as they try to understand what is being taught. Therefore, it is important that various methods are used to enhance student achievement in mathematics to a great extent and one of them is through the strategy of student learning [20]. Learning styles mean the way a person learns [10]. Learning style refers to how the individual interacts with the information system and analyzes in the brain for knowledge. Learning style is a very important concept and needs to be focused on the educational aspect of school as it is a key factor in shaping an individual.

Filder and Silverman learning style model (1988) is a learning style developed by Richard Felder and Linda Silverman. In this model, the learning style focuses more specifically on the learning style of engineering students [2]. According to Mohamed Zakaria (2016), each students has a consistent and distinct alternative to the process of observation, rearrangement and recall that is guided or characterized by cognitive, affective and psychomotor [19]. Besides, this style of learning also gives students the freedom to engage in information seeking but at the same time the elements and features that are still present in the Filder& Silverman learning style. According to Filder& Silverman's theory, there are four domains and one is the input domain which is divided into two parts. The sections are visual and auditory. Visual learning style is a learning style where students enjoy learning by looking at the information they learn whether in the form of diagrams, writing, charts or computer displays [18]. They can also describe what they have read or seen before. Audiovisual learning styles are aimed at hearing learners such as listening to lectures, discussions, recordings and so on which involve a hearing.

According to a case study conducted by Velegol, Zappe& Mahoney (2015), the use of video as a medium of learning between students and teachers is one channel that can have a positive effect but taking into account some of the factors is the number of videos provided by the teacher and the length of each video provided [25]. This is because 53% of the students involved in this case study had watched all the video. The supplied video is 40 views while the duration of one video view agreed upon by this study sample is 10 -12 minutes. This is because only 24% agree that the duration of this video is more than 20 minutes compared to 10-12 minutes which is 62%. Also, the dimension studied in this study is the suitability of student learning if the flipped learning method is used. Approximately 38% of the overall sample of respondents gave positive feedback that they had the freedom to determine their learning style and were able to stimulate their ability to work without the supervision of more teachers.

Kerr's (2015) study conducted for engineering education courses found that students' perceptions and academic achievement reached impressive levels. This is evident when there is a difference between quizzes and exams, this is because the study sample says that through this flipped learning method they obtain more learning material than the lectures given by the teachers in the classroom. In addition, there is a sample of studies that suggest that in order to gain these advantages students must immerse themselves in the learning style. Furthermore, they also say that their self-confidence can also be enhanced because through the quizzes and tests they have performed give them a good response to the skills needed to compete in the world of work. Therefore, the purpose of this study is to investigate the method of flipped learning that utilizes the medium of active activities such as video presentation and presentation during learning and teaching sessions. It focuses on

student characteristics according to the input domain based on Filder& Silverman's learning styles and the methods of learning that best suit them.

The objectives of this study were to identify the dominant input (video or audio) dimensions of treatment groups and control groups for polytechnic technical students, identify significant differences between treatment groups and control groups for the academic achievement of polytechnic technical students with video input dimensions, and identify significant differences between treatment groups and control groups for the academic achievement of polytechnic technical students with audio input dimensions.

III. HYPOTHESIS DEVELOPMENT

To get a good start on the results of the research, a hypothesis study should be done. The following hypothesis is used to answer the research question:

Ho_1 = There were no significant differences between treatment groups and control groups for the academic achievement of polytechnic technical students with video input dimensions.

Ho_2 = There were no significant differences between treatment groups and control groups for the academic achievement of polytechnic technical students with auditory input dimensions.

IV. METHODOLOGY

A. Research Sample

The students involved in this study were 74 people. These students are 1st-semester students pursuing a Diploma in Electrical Engineering at Polytechnic Malaysia. A total of 38 students from the Polytechnic Merlimau, Malacca was treated as treatment group while 36 students from the Port Dickson Polytechnic, Negeri Sembilan were treated as control groups. These students are considered to be of the same degree in terms of the learning environment as well as lecturers who have similar teaching experience for both groups. The students participating in this course are large but only 74 students are directly involved.Students from the treatment group are provided with the active ingredient for the Introduction to Electric Circuit subject, which is one of the topics covered in Electrical Technology course 1. For that topic, there are four sub-topics including Ohm's Law, Circuit (Equivalent Series Resistance and Voltage Divider), Parallel Circuit (Equivalent Parallel Resistance and Current Divider) and Combination of Series and Parallel Circuit.

B. Procedure

A total of 74 students were divided into two groups: the treatment group (Polytechnic Merlimau, Melaka) and the control group (Port Dickson Polytechnic, Negeri Sembilan). For the control group, their learning process was using traditional methods whereby they would carry out their teaching and learning process as usual while the treatment group would carry out the teaching and learning process using flipped learning. Prior to this study, all students were given an ILS (Learning Styles Index) test to find out the category of their input domain (video and audio). In addition, students are asked to answer the pre-test set to find out their basic knowledge of the subject. The time given to students to answer the pre-test set is 1 hour and 30 minutes. The time taken to complete this study was eight weeks. After students have completed the teaching and learning process, students are again given a set of post-tests to determine their level of knowledge of the subject they have studied. The software used to analyze the findings of this study was SPSS version 25. ANOVA analysis was used to

determine the academic achievement of the treatment group and control group. For all the analysis tests used a significance value of x = 0.05.

V. LIMITATIONS

This study examined only the input (visual / auditory) dimensions. Researchers also focus on the academic achievement of students with different dimensions based on the use of flipped learning methods during the learning and teaching process. The concept of this study refers only to Felder-Silverman's (1996) Learning Model.

VI. FINDINGS

Table below shows the results of the analysis.

Descriptive Statistics

Dependent Variable: skorpost

group	dimensi	Mean	Std. Deviation	N
0	video	45.682	1.9244	22
	auditory	35.906	.9169	16
	Total	41.566	5.1349	38
1	video	30.895	.7375	19
	auditory	26.412	.8521	17
	Total	28.778	2.4007	36
Total	video	38.829	7.6105	41
	auditory	31.015	4.8966	33
	Total	35.345	7.5856	74

Estimated Marginal Means

1. group

Dependent Variable: skorpost

group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
treatment	102.338	.517	101.307	103.369
control	60.587	.525	59.539	61.635

2. dimension

Dependent Variable: skorpost

dimension	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
active	82.255	.508	81.242	83.269
reflective	80.669	.534	79.604	81.735

Descriptive Statistics

Dependent Variable: skorpost

group	dimension	Mean	Std. Deviation	N
treatment	active	105.86	1.521	22
	reflective	98.81	5.382	16
	Total	102.89	5.050	38
control	active	58.65	2.523	17
	reflective	62.53	2.458	19
	Total	60.69	3.143	36
Total	active	85.28	23.803	39
	reflective	79.11	18.771	35
	Total	82.36	21.648	74

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Tests of Between-Subjects Effects

Dependent Variable: skorpost

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	33517.501[a]	3	11172.500	1127.482	.000
Intercept	483925.397	1	483925.397	48835.717	.000
group	31779.419	1	31779.419	3207.045	.000
dimension	45.854	1	45.854	4.627	.035
group * dimension	544.523	1	544.523	54.951	.000
Error	693.648	70	9.909		
Total	536225.000	74			
Corrected Total	34211.149	73			

a. R Squared = .980 (Adjusted R Squared = .979)

VII. RESULT AND DISCUSSION

From the findings a total of 22 individuals from the treatment group were visual learners and 16 were auditory dominant students while the control group consisted of 19 visual learners and 17 auditory dominant. The total number of students was 41 visual dominant students and 33 auditory dominant students.

The results of two-way ANOVA tests for the independent samples in this study showing that there was a main effect of group independent variables [F (1,70) = 1682.66, p <0.05] and dimensions [F (1,70) = 580.22, p <0.05 against significant dimensional dependent variables. Also, the effect of interaction between the two independent variables (group * dimension) on the dependent variable was also significant [F (1,70) = 79.94, p <0.05]. The results of the data analysis also indicate that the main effects and the interaction effects between the two independent variables accounted for 97.2 % of the change in the dependent variable. This means that 97.% of academic achievement scores are due to flipped learning, dimensions and the combination of flipped learning and dimension.

The study data showed that for the independent variables, the mean value of the treatment group (mean = 40.79) outperformed the control group (mean = 28.65). This shows that significantly, students who are engaged in flipped learning have higher rates than students who are engaged in traditional learning. For the non-dimensional variables, the study data showed that the mean value for visual dimension students (mean = 38.29) outperformed the auditory dimension students (mean = 31.16). This shows that significantly, students with visual dimensions have higher academic achievement than students with auditory dimensions. In addition, for the combination of the two independent variables, the data analysis results indicated that the mean value of the visual dimension treatment group (mean = 45.68) outperformed the control group (mean = 30.90), while the auditory dimension treatment group (mean = 35.91) outperformed the group. control of the auditory dimension (mean = 26.41). This means that students pursuing flipped learning that have visual or auditory dimensions are likely to achieve greater academic achievement.

Based on the data analyzed, students who have flipped learning can improve their academic achievement compared to those who have convensional learning. The academic improvement of the treatment group students also revealed significant differences before and after flipped learning used by their lecturers. Visual learning style is a learning style where students enjoy by looking at the information they learn whether in the form of diagrams, writing, charts or computer displays [18]. They can also describe what they have read or seen before. Auditory learning styles are aimed at hearing learners such as listening to lectures, discussions, recordings and so on which involve a hearing.

Flip-based learning means that the process of teaching by the lecturers has been carried out at home or outside the classroom while in the lecturer class only discusses topics related to learning [5]. During the learning process in the class, the students only engaged in discussion with the lecturers. In the process, the lecturer only acts as a facilitator in which the lecturer will explain the lesson as needed by the students. The learning environment will also be student-centred. In addition to the study conducted by Heng (2012), hands-on learning or active activities can stimulate students and attract students to focus on the learning and teaching process. Flipped learning is one of the lessons that use the concept of active and student-centred learning.

There are several strategies in student-centred learning or active learning. Among the strategies mentioned are creating learning experiences that will interest students and encourage their involvement in the teaching and learning process. In addition, it provides opportunities for students to learn how to learn individually, in groups and in class. Involvement of students in shaping the learning process through discussions based on student strengths and weaknesses. Students are also free to make choices about resources and learning activities. Lecturers are also able to establish a procedure where lecturers only monitor students so that they are responsible for what they have learned. Criteria for assessment can be done between the lecturer and the student collaboratively and at the same time, the lecturer can plan the collaborative assessment collaboratively. Under student-centred strategies, students play an important role in the learning process. According to this strategy, students are encouraged to actively participate in the research and development process. In this research and development process, more time is devoted to student learning activities. Group methods, inquiry, discussion, questioning, problem-solving, play, simulation and stimulation are taken into consideration when using this strategy.

VIII. CONCLUSION

The purpose of this study is to study the best method of learning for technical students with different learning styles. Eligible technical lecturers who study in these institutions of higher learning in Malaysia still use modules or books as teaching aids. For example, the subject of Electric Technology 1 is not suitable to use only one or two teaching methods. Also, in this subject, there are several topics that have a theory that is difficult for students to understand if the teaching method used by the lecturer is not in line with the student learning method. The findings show that flipped learning is appropriate when used by lecturers to enhance student academic achievement and basic knowledge of the subject. This is because, for the most part, technical students are visual learners or students who prefer learning methods using pictures, graphs or drawings as a learning medium compared to students with auditory learning methods. In line with this, the flipped learning method is proposed to be used by lecturers in improving the academic achievement of technical students in polytechnic Malaysia.

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