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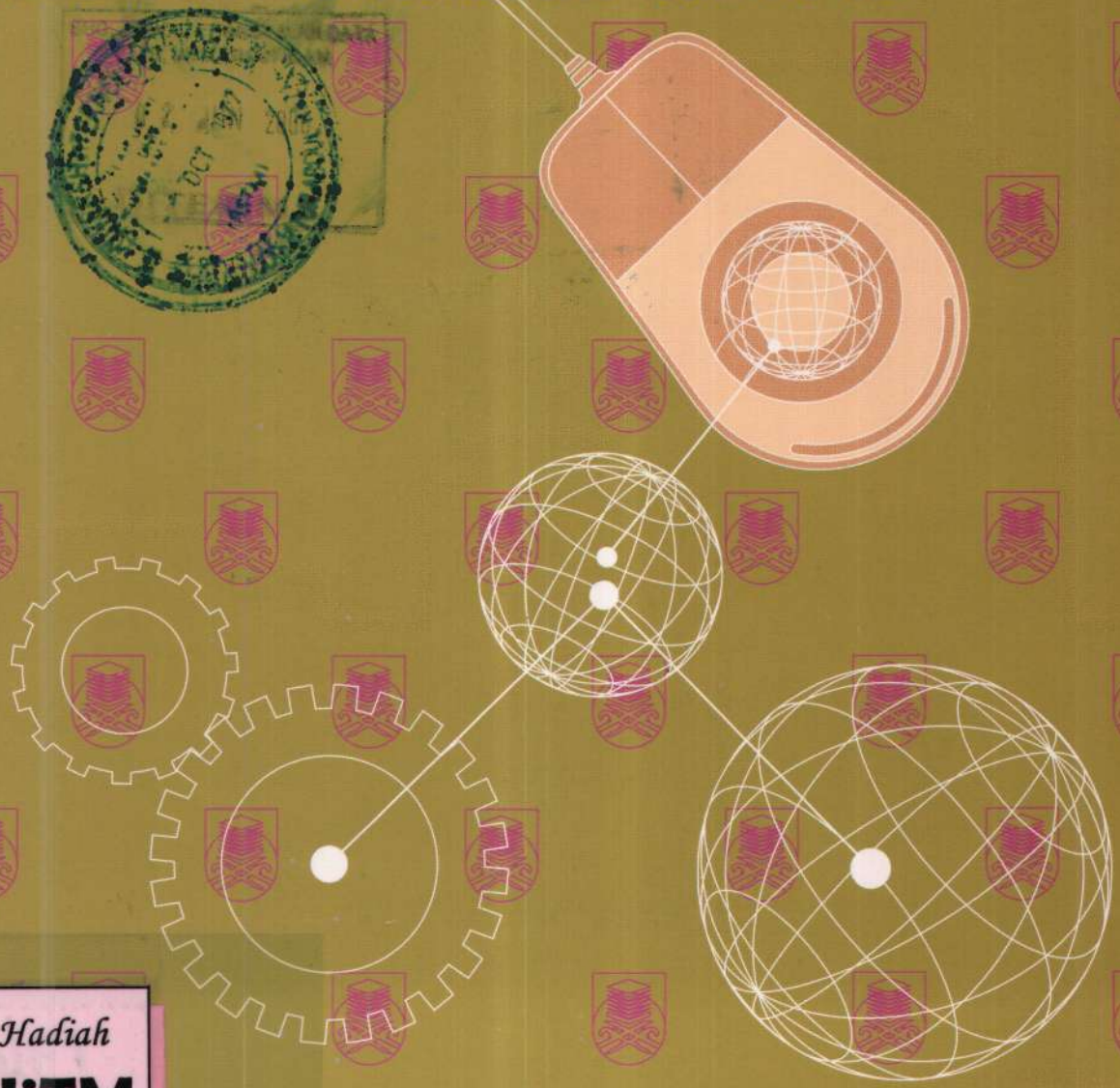

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Assessing self-study manual on students' academic achievement in UiTM Penang Branch Campus.

Jamilah Karim[a] , Peridah Bahari[b] and Norhayati Mohammad Noor[c]

[a]Department of Electrical Engineering
UiTM Cawangan Pulau Pinang Kampus Bukit Mertajam
Tel: 04 – 3802371, Fax: 04 – 3802311, Email :jamilah@ppinang.uitm.edu.my

[b]Department of Engineering Science
UiTM Cawangan Pulau Pinang Kampus Bukit Mertajam
Tel: 04 – 3802360, Fax: 04 – 3802311, Email:
peridah63@yahoo.com.sg

[a]Department of Electrical Engineering
UiTM Cawangan Pulau Pinang Kampus Bukit Mertajam
Tel: 04 – 3802371, Fax: 04 – 3802311, Email: norhayati@ppinang.uitm.edu.my

Abstract

Even for a person who has been teaching 10 to 15 years, the urge to keep on improving teaching technique will always be one prior agenda on the educators' mind. The purpose of this article is to determine the effectiveness of using student self- study manual as instructional material for UiTM Penang Engineering students. The academic performance from two different groups of students was analyzed to see whether there is any improvement in students' performance when self-study manual was used in the classroom. Sample (students) taken was from various engineering programmes and was formed into two different academic years. This paper will look into the difference of percentage for passes and failures and conclude whether the use of self-study manual will be a help to students and lecturers.

Keywords: academic performance, instructional material, novice learners, learning environment, learning styles.

Introduction

For the past 6 years, UiTM Penang Branch Campus has been taking in only Engineering students. In the earlier phase only the Electrical Engineering students were enrolled. The campus has only started taking in Mechanical students for the past 3 years. Most of our Engineering students who are enrolled here, are accepted with minimal entry level (requirement). In order to ensure that we will be producing quality graduates as other universities, we as UiTM lecturers have to work harder by finding ways to help our students grasp material taught to them more easily and effectively.

Nowadays there are abundant of methods and techniques to be applied in our teaching career. In this decade, academicians are not only expected to go to class and just convey what they know by using chalk and talk method. Academicians are encouraged to apply other teaching media in order to improve their students' academic performance and make them become world class students. Vice Chancellor UiTM Dato Ibrahim Shah has listed down the criterion of world class graduates for UiTM students, which include them being:

1. Knowledgeable /intellectual
2. Competitive/endurance
3. Critical / analytical
4. Creative / constructive / innovative
5. Independent

In order to produce quality and world class student, academicians must be sensitive and observant to their surrounding. They must consider the following criteria:

1. Learning environment
2. Students' background
3. Learning styles

This paper intends to generate interest among UiTM Penang Branch Campus Pinang lecturers to write students' self-study manual and use it as one of their teaching materials. As an educator, a person must strive to convey their subject matters in ways that allow students to experience the excitement and joy of learning the subject. This suggestion will be an advantage to lecturers because they can deliver their subject matters in their own way and only to the extent needed. On the other hand, it will help students to learn only the syllabus required to a certain depth compared to what they have to go through if they use a recommended textbook.

Background

Learning environment

Learning environment is a place where learning is fostered and supported. Educators are supposed to remain vigilant to ensure that an environment includes proper support, guidance, and full of resources and tools. It means that learning takes place under certain conditions that are specially designed to improve learning. There are three different types of learning environment as stated by Boukje Bruinsma and Wiert Berghuis, based on behaviorism, cognitivism and constructivism theories and conditions. The Behavioris theory is focused on the importance of the consequences of those performances and contends that responses that are followed by reinforcements are more likely to occur in the future. No attempt is made to determine the structure of a learner's knowledge nor to assess which mental processes are necessary for them to use. The learner is characterized as being reactive to conditions in the environment as opposed to taking an active role in discovering the environment.

Meanwhile, the theory of cognitivism emphasizes the role that environmental conditions play in facilitating learning. Instructional explanations, demonstrations, illustrative examples and matched non-examples are all considered to be instrumental in guiding students' learning. Similarly, emphasis is placed on the role of practice with corrective feedback. Up to this point, little difference can be detected between behaviorism and cognitivism theories. However, the "active" nature of the learner is perceived quite differently. The cognitive approach focuses on the mental activities of the learner that lead up to a response and acknowledge the processes of mental planning, goal-setting, and organizational strategies.

Constructivism is a theory that equates learning with creating meaning from experience. Even though constructivism is considered to be a branch of cognitivism (both conceive of learning as a mental activity), it distinguishes itself from traditional cognitive theories in a number of ways. Most cognitive psychologists think of the mind as a reference tool to the real world; constructivists believe that the mind filters input from the world to produce its own unique reality.

Novice learners

As Alias & Bahari (2000) have noted, novices represent ones who are just starting on a new task. There is no definitive description of a novice learner but this group can be described as learners who lack prior knowledge and learning strategies. Through their observation and experience, they found out that the learners lack self-regulation and have low self-efficacy. If this is the type of students that educators receive, hence they should work out something to create a learning environment that will nurture and motivate students to become expert learners. Expert learners are self-regulated and active learners who are able to select, structure and create environment that optimizes learning. They also have high motivation and perceive themselves as self-competent, self-efficacious and autonomous.

Learning styles

Shaw and Marlow, 1999, quoted Curry's, (1991), definition of an individual's learning style as a distinctive and habitual manner of acquiring knowledge, skills or attitudes through study or experience. There are various theories of learning styles. According to Honey and Mumford, students' learning styles were classified as activist, reflector, theorist, or pragmatist while Kolb's identified them as divergers, assimilators, convergers and accommodators. On the other hand, Dunn, Dunn and Price (1991) categorized learning styles in four areas: environmental stimuli, emotional stimuli, sociological stimuli and physical stimuli. Having known the students' learning styles, educators can select and adapt a certain teaching style to accommodate the students. In his paper, Felder (1988) formed a table which showed the definition of learning and teaching style dimensions.

Preferred learning style		*Corresponding teaching style*	
Sensory Intuitive	perception	Concrete Abstract	content
Visual auditory	input	Visual Verbal	presentation
Inductive Deductive	organization	Inductive Deductive	organization
Active Reflective	processing	Active Passive	student presentation
Sequential Global	understanding	Sequential Global	perspective

Nature of the MAT191 self- study manual

The self-study manual is structured into 5 components. The components are

1. Definitions
2. Properties
3. Methods
4. Examples
5. Exercises.

The objectives for each section are arranged at the beginning to enable students to identify and give attention to the important contents. After some introduction on the subject matter, the students are provided with definition of terms. The definition given is supposed to help students gain better understanding of the terms. If there are any properties then they will be listed after the definitions. Students are introduced to solving method after they have gone through the meaning of terms and able to recognize these properties. Methods given are formatted in step by step process. This structure is chosen to enable students to identify the necessary procedure and follow it closely. Thus, this will be a help to novice learners who lack self-confidence and self-motivation.

A few examples are given to expose students to various types of questions. Solutions to some sample questions are provided in step by step manner following the method given. The idea is to let the students develop problem-solving skills. Later, students are asked to attempt simple questions assigned in '**Mari Cuba**' (Lets try) section. Questions assigned are similar to the examples given, hence to lead students in grasping and understanding the concept of solving particular problems in certain topic. Exercises are provided at the end of each section to enable students to work on more complicated and difficult questions.

Purpose of the study

The purpose of the study is to compare the academic performance from two different academic years in which the course was taken. The first group consists of students who were not introduced to the manual whereas the other batch of students were exposed and introduced to the particular manual. The aim of the study is to assess the effectiveness of the manual as self-instructional materials used in teaching the course.

The course is designed for second semester students and it has normally been taught conventionally, that is with a lecturer giving lecture during class hours and writing notes on whiteboard. Students were also given a list of suggested textbooks for reference.

The effectiveness of the MAT191 self-study manual is assessed on the basis of students' grades. Since our main interest is to help our students become experts and active learners and in doing so, passing the course.It is only appropriate to assess the manual's effectiveness on the basis of percentage of students passing the course during the two different academic years.

Design of the study

Methods

In this study, two different approaches were used. They are as follows:
a) Assessing students' academic performance
b) Questionnaires were given to students and lecturers

Independent variable

Instructional condition served as the independent variable, with two levels: (a) before self-instructional manual was introduced (b) while self-instructional manual was introduced.

Dependent variable

The criterion measure was students' status when they finished taking the course. The status was converted to '0' for fail and '1' for pass. Then the percentage of passes and failures were calculated for different academic year.

Instrument

Students' academic performances were taken from students' grade record. Data extracted specified the gender, scores, and grade point average. Standard deviation and mean scores between samples were compared. Comparisons between standard deviations were analyzed to check on the variability of the two samples. Proportions between samples were also analyzed to verify the significant difference of the mean scores. To compare the effect of the two conditions, test of significance were run using SPSS' and XLSTAT. The tests include t ratio and F test.

Feedbacks on the manual were collected by distributing questionnaires to lecturers and students. In order to avoid respondents from giving neutral responds, which will be difficult to analyze and conclude, questionnaires distributed were designed using Likert scale with value from 0 to 5. Values assigned represent strongly disagree(0), disagree(1), slightly disagree(2), slightly agree(3), agree(4) and strongly agree(5). By doing this, each respondent will fall into only one category, which is **disagree** or **agree**. This scale was chosen to avoid getting uncommitted respondent who usually gave neutral stands. Responses gathered from questionnaires given to lecturers and students were analyzed using EXCEL.

Participants

Assessing students' academic performance

The number of data considered in the evaluation study is 691. 257 were data taken from Oct 2000 and Apr 2001 while 434 were taken from Nov 2001 and Mac 2002. The previous group of students took the course when the manual was introduced as instructional material in teaching and learning. The data consisted of academic performance from 437 (63.2%) Electrical Engineering students (EE111) and 254 (36.8%) Mechanical Engineering students (EM110 & EM111). From 691 data evaluated there were 216 female and 475 male students, and 362 were second semester students while 329 were from higher semesters (semester 3 to 8).

Students' and lecturers' questionnaires

Questionnaires were distributed to 95 students consists of 48 female and 47 male students. All the students were from Electrical Engineering department from various programmes and semesters. The questionnaires distributed aimed to seek the opinion of students on whether the manual benefited them or not.

There were 5 lecturers who used the manual as instructional materials in Penang Branch campus. To increase the number of responses, questionnaires were also given to 5 lecturers from Shah Alam campus. Results obtained from a bigger sample will portray better picture of the real situation. Questionnaires given to lecturers were intended to find out the effectiveness of the manual from educators' perspective and to gather information in improving the manual as instructional material to assist novice learners.

To get the overall view of each respondent, the average scores were calculated from each questionnaire. All average scores were also calculated for each question.

Results

Assessing students' academic performance

Samples t-test summary

	Sample size	Mean	Std. Deviation	Variance	Std. Error Mean
Without manual	257	50.76	15.877	252.079	.990
With manual	434	56.72	16.602	275.626	.797

Table 1

Table 1, was analyzed using Fisher's F test (XLSTAT).It was found that the inequality of variance is not significant (p=0.207,a=0.05). Hence, we can assume there was no difference between the sample variability in terms of final scores. With the result obtained from F test, it can also be assumed the samples measured merely two random samples from the same population. In other words, the two samples have no difference in competency.

With this assumption we continued with Student's t Test for independent samples, and the result given suggested that the difference in mean is significant (p=1.49E-06, a=0.05). Student's t observed value is –4.711 and student's t critical value is –1.647. Hence we can conclude there was an improvement in the academic performance when students were introduced to the manual. This statement can be justified in Table 2 formed by using cross tabulation between samples (different year) and result received by students.

Frequencies and percentages of passes and failures between samples

		Fail	Pass	Total
Without manual	Count	99	158	257
	%	38.5%	**61.5%**	100.0%
With manual	Count	110	324	434
	%	25.3%	**74.7%**	100.0%
Total	Count	209	482	691
	%	30.2%	69.8%	100.0%

Table 2

Table 2 shows that there is an increment in percentage of passes between these two samples. With the analysis of proportion, it also justified that the difference in percentage between these two samples is significant. In other words, it can be said that the academic performance fared better when the manual was introduced to students.

Bar chart (Figure 1) was formed to figure out the overall student's performance. The chart shows there was an increment in almost every grade point above 2.00(C) and there was also a decrement in all grade point below 2.00. There was an increment of 6% for grade point 4.00(A & A+) and this is the highest increment compared to other grade points.

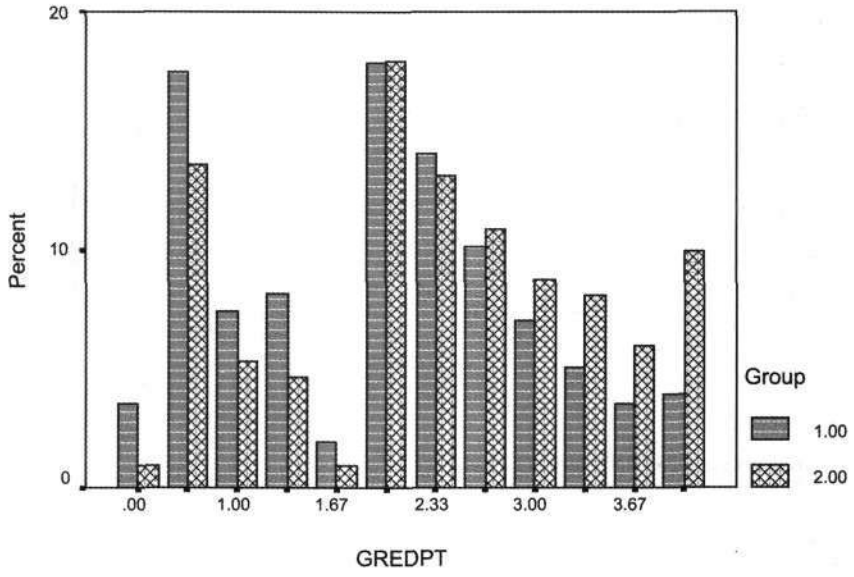

Figure 1
Bar chart for percentage of passes and failures for each grade point

Correlation between samples (1 & 2) and scores were also run. The result confirmed the correlation is significant at a=0.01 and the correlation coefficient is 0.174.

Frequencies and percentages of passes and failures between genders

GENDER		fail	pass
F	Without manual	(26) 35.6%	(47) 64.4%
	With manual	(20) 14.0%	(123) 86.0%
M	Without manual	(73) 39.7%	(170) 60.3%
	With manual	(90) 30.9%	(201) 69.1%
	Total	163	312
		34.3%	65.7%

Table 3

Results between genders were also analyzed. Using cross tabulation table (Table 3) it shows that female students performed better whether the manual was introduced or not. But the increment in percentage is very obvious for female students when the manual was introduced (21.6%). On the other hand, percentage for male students increased 8.8%. By comparing the proportion for different gender before and after the manual was introduced, the result shown by XLSTAT concluded that there were significant differences in percentage of passes for each gender (Male: p=0.025, Female: p=1.20E-04, a=0.05).

Before the self-study manual was introduced, the difference in percentage of passes was not significant (p=0.273, a=0.05) between genders but the difference was significant when the manual was introduced (p=0.0001, a=0.05).

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
Scores before manual was introduced	F	73	51.97	14.626	1.712
	M	184	50.28	16.360	1.206
Scores when manual was introduced	F	143	61.32	14.008	1.171
	M	291	54.46	17.318	1.015

Table 4
Genders t-test summary

Students and lecturers questionnaires

Observation from questionnaires showed that 45 students didn't use the manual as their learning tool while the other 50 students used it. There were 28(29.5%) male students and 17(17.9%) female students who didn't use the manual. On the other hand, 18(18.9%) male students and 31(32.6%) female students used the manual as their learning aid.

29(64.4%) feedbacks taken from students who didn't use the manual showed an average score above 2.5 and the other 16(35.6%) showed an average below 2.5. This implied that most of the students disagree that the manual can assist them in their studies. On the other hand, 50(100%) feedbacks taken from students who used the manual showed an average score above 2.5 and 18(36%) of them

showed an average scores above 3.6. This result suggested that the students who used the manual agree that they benefited from the manual.

When asked whether other courses should also provide self-study instructional material, 30(60%) of the feedbacks gathered from students who used the manual had a score of 4 or 5, which means they agree on the idea.

		Lecturers	Students
1	Manual focuses on self-instructional materials.	3.6	3.5
2	Manual is well written and compelling in contents.	3.9	3.3
3	Manual stimulates students' interest and motivates them to study in depth.	3.0	3.2
4	Manual provides opportunities for students to create and defend their own questions	2.4	3.2
5	Manual provides opportunities for students to work in group	3.3	3.3
6	Manual includes a balance of student-directed and teacher-facilitated activities.	3.2	3.4
7	Manual is well structured and easy to follow.	3.8	3.4
8	Manual enables the student to concentrate more during lectures.	4.0	3.5
9	Manual encourages students to discuss ideas with the instructor	3.6	3.5
10	Manual helps the student to select and adapt to learning strategies.	3.6	3.3
11	Suggested activities develop critical thinking and problem-solving skills	2.9	3.5

Table 5
Average scores from the questionnaires of the self-study manual

Responses gathered from all lecturers gave an average score above 2.5 with the lowest score 2.73 and the highest 4.27. All the lecturers involved in this study agree that the manual was well-written, compelling in contents and also enabled students to concentrate more in class. This can be seen from the high average score shown in question 2 and 8. Hence, it can be concluded that lecturers agree that the manual did provide some help for students. Since questions 4 and 11 have the lowest average scores, it suggested that lecturers were not satisfied with the opportunities and problem provided for students.

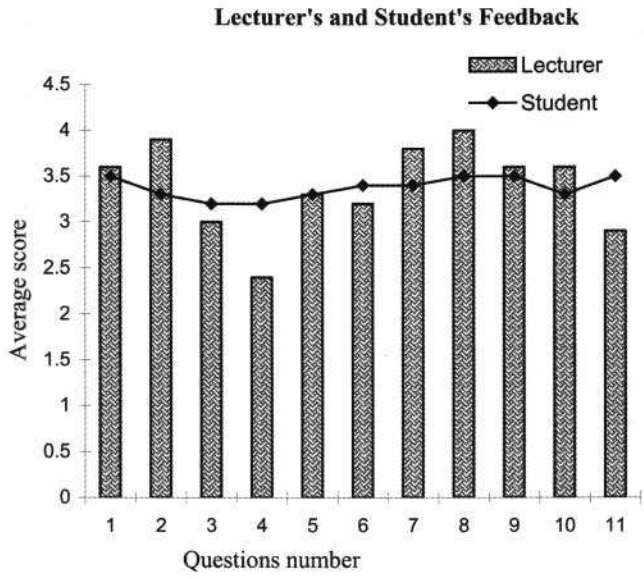

Figure 2
Bar chart for the average scores from the questionnaires of the self-study manual

For an overall view on the manual most lecturers gave a 'good' respond. For '**Mari Cuba**' section and examples with step by step solutions both lecturers and students gave encouraging comments.

Discussion

Even though there was a big jump in the number of students (68.9%) enrollment when the manual was introduced, there was also an increment in percentage of passes. The percentage increased from 61.5% to 74.7%. This scenario gives a positive indication. Hence, it can be suggested that the self-study manual did have some impact on the students' academic performance but it has to be realized that the credit is not solely on the self-instructional material, the influence of other factors should also be considered. Based on the cognitivism theory they stated that learners' thoughts, beliefs, attitudes, and values are also considered to be influential in the learning process.

On the other hand, based on gender, our study implies that female students benefit more from the manual and this could be due to the number of female students who used the manual as their learning aid. Therefore, it is recommended that male students should be encouraged to use the manual in order to improve their performance.

Conclusion

The results of this study showed that with the use of the self-study manual, the students fared better as compared to their counterparts who were not provided or introduced to the self-study manual.

Self-instructional material plays an important role in students' performance and this can be concluded from the results gathered from this study. Therefore there is always a need for educators to keep on producing self-instructional material that will support the students. Self-instructional material written should be tailored to students' background, learning styles and learning environment and it should also be structured to enable students to manage their time and thought. Furthermore, self-

study materials will encourage a student to pursue or revise anything relevant to his subject matter at his own pace and on his own effort with minimal assistance from educators. Further studies will be required to determine the specific contribution of this self-study manual as self-instructional material to its overall effectiveness.

Acknowledgement

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