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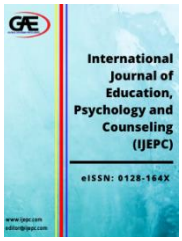

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A NEW APPROACH IN PREPARING ASSESSMENT TO GAUGE STUDENTS' PERFORMANCE

Mohd Ikmal Fazlan Rozli[1]*, Rohamezan Rohim[2], Yee Hooi Min[3]

[1] Centre for Civil Engineering Studies, Universiti Teknologi MARA, Cawangan Pulau Pinang, Permatang Pauh Campus, 13500 Pulau Pinang, Malaysia
Email: ikmal601@uitm.edu.my
[2] Centre for Civil Engineering Studies, Universiti Teknologi MARA, Cawangan Pulau Pinang, Permatang Pauh Campus, 13500 Pulau Pinang, Malaysia
Email: rohamezan627@uitm.edu.my
[3] Centre for Civil Engineering Studies, Universiti Teknologi MARA, Cawangan Pulau Pinang, Permatang Pauh Campus, 13500 Pulau Pinang, Malaysia
Email: minyh@uitm.edu.my
* Corresponding Author

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Abstract:

To gauge students understanding after taking a subject, training and others, an assessment will be conducted. The assessment can be in the form of verbal, practical and the most popular among all is in writing. The teacher or lecturer will assemble questions in accordance to topics covered by the syllabus that had been taught to the students. This assessment gauge the understanding of the students in grasping the knowledge of the subject. Usually, no one will bat an eye if the student performance is good, however, the assessment is suggested to be relook if the performance of students getting worse. In traditional way of writing assessment, all the topics will be questioned in final examination. This traditional method has been proven suitable for most of the subjects. However, for a subject that has many topics to be covered in syllabus, the students may find it hard to perform and obtained good result. The objective of this study is to analyse the effectiveness of new proposed method of assessment to gauge the understanding of students taking the course of Statics and Dynamics (CES420). This proposed new method is where only a selective topic will be asked once in assessment and will not be repeated as per old conventional method. For this study, the results, and performances of 451 students were analysed. Out of 451 students, 97 students wre tested using traditional exam method whereas 354 students were using the new exam method. The result shows a promising result on the performance of the students using new method of writing assessment.

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Keywords:

Assessment; Topics; Education

Introduction

Education is the most important traits for humans. To grab or learn this knowledge, one must attend a session, class, observation, and others to understand what it is about. After that process, the mentor or teacher or lecturer will gave an assessment to the students for determining the understanding of their students. This assessment can be in form of oral conversation, practical and writing in among others. The assessment in the form of writing has been established for a long time. According to Talib et al. (2018), assessment plays an important role to reflect students' achievement and differentiate proficient students from the amateur.

This study focusses on the method of writing assessment that has been practised in the subject of Statics and Dynamics (CES420). The students that took this subject is in Year 1 of their Civil Engineering Undergraduate studies in Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia. This subject compromise of Eight (8) topics ranging from statics and dynamics chapter. This is a main subject that every civil engineering must take and pass before moving on semester. This subject has three (3) main assessment and totalled up to 100% in marks. The assessment were Common Test (30%), Assignment (10%) and Final Examination (60%). This course and syllabus also has been tailored to meet Malaysia Quality Assurance (MQA) supervised by Ministry of Education Malaysia (MOE) and also Engineering Accreditation Council (EAC) governed by Institution of Engineers Malaysia (IEM)

The rate of students failure in this subject is alarming. Thence, a new method of writing assessment has been proposed to overcome this problem. Traditional method of writing assessment for this subject is that every topic will be asked in final examination. The earlier chapter taught will be asked again and again in common test, assignment and final examination. The students complain that they feel overburden to be asked all topics and repeated topics in final examination. A new method proposed and tested was that the topics only will be asked in ONE assessment only. So now, there is no repetition of question from any topics throughout the assessment. Thus, the main objective of this study is to determine the effectiveness of this new method in this subject before implemented in every course in civil engineering.

Literature Review

Academic performance and other competency skills of students in higher education are essential to ensure the student's well-development throughout the study programmes as well as enhanced employability. The so-called performance is compromised of academic achievement, acquisition of knowledge, skills, competencies, persistence and retention (York et al., 2015).The required competency, such as creativity or critical thinking, is a skill set that, if nurtured sufficiently during their university studies, will continue to evolve even after completing their studies.

Assessments and evaluation at the higher education level promote appropriate development among university students by explicitly engaging them in learnings. A study on the quality assurance in learning has been conducted by Ole Pors (2001). The researcher studied about the

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performance of students by different way of marking the answer for examination. If the learning environment is carefully planned and thoughtfully implemented, it can be successful and enjoyable. The educators' proactive role increased student engagement in the learning environment while carefully measuring the required learning outcomes. Educators' use of instructional teaching techniques has a significant impact on increasing student engagement and maintaining their attention to the delivered content. According to (Ismail et al., 2011), teachers or educators were in dilemma because the pressure of producing students with good grades but still using traditional way of teaching and learning.

Indeed, most students will find it difficult to learn critical and creative thinking skills, as well as complex reasoning skills, in an uninspiring classroom environment. The students perception or mood also will be affected with the outcome of this assessment. Vaessen et al. (2017) suggested when designing assessments, educators should consider the nature of the course as well as the students' initial intrinsic motivation.

A study conducted by Short and Hawley (2015) showed that an evolution in education is needed to improve the current state of practice. For an example a study on different impact of formative assessment has been conducted by Tigelaar and Sins (2021). Porter et al. (2001) studied about advancement in assessment and its uses. The researcher suggested that the teacher plays an important role to improvise their style of assessment. However, to implement or replacing the new method will have many challenges. One of the best example is when Malaysia choose to use English to teach Mathematics and Science for students. Yahaya et al. (2009) documented the concern and problem raised by the educators in Malaysia.

The traditional method of assessment to gauge students understanding is by using writing examination. The students will be given ample time to answer all the question asked and all the question is made from what they had learnt in the syllabus of the subject. Usually, the final examination is where the big chunk of percentage and its determine whether the students will get good grades or fail the subject. In final examination, the question usually covered all topics taught in the syllabus. Topic from week 1 until week 14 will be asked in final examination. The students were forced to read back and memorized all the things that they had learnt from the first week of class. According to Pereira et al. (2021) traditional methods was usually negatively correlated with fairness. Villarroel et al. (2020) suggested to redesign written exams and test to further improve the quality of that method of assessment.

This traditional method has its own advantages and disadvantages. Among the advantages is that the lecturer or teacher can gauge the performance of the student throughout the semester. The lecturer or teacher will have a vast set of question to be put in the exam. The disadvantage of this method is that the students will have to study all topics and feel stress of overburden especially for a subject that has many topics. As a result of that, a lot failure will be witnessed by the teacher or lecturer and a lot of drop-out from students that could not take the stress. The failure rate also hinting that something is not right being practised for this kind of subject. Lutovac and Flores (2021) take the feedback of failure and make a reflection on how to make assessment a better practiced. The students also shows some dissatisfaction when an interview session being conducted. Deeley et al. (2019) take the opportunity of students complaint and make proper adjustment to their subject.

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The improvement has been made in order to overcome this problem, especially for a subject that covers a lot of topics. Boud et al. (1999) has also conduct an interesting study on assessment. It shows that the students will resort to cheating if the assessment is wrongly addressed. A study on repetition of assessment also had been conducted by Flores et al. (2015). It mainly discussed about the effectiveness of assessment.

For this new method, the lecturer or teacher only test the topic only once in assessment. There will be no more repetition of question to be asked in common test, assignment and final examination. It is believe that this method will take some burden off from the students thus reducing the failure and drop-out rate for that subject.

Methodology

This course were offered to Civil Engineering students only. Normally, the students who took this subject was in their first year of studies. The students were allocated four hours of class in a week. The students will have a mass lecture for lecture and then divided into smaller groups for their tutorial class. The lecture class was allocated for three hours whereas one hour is allocated for tutorial thus making a total of four hours.

Usually, the number of students per class is about 30 students. These 30 students will sit together in lecture class and then divided into a group of 15 students for tutorial class. The total number of students taking this subject in fluctuated. The total number of students taking this subject were as high as 300 students and as low as 60 students. It depends on the intake situation and others.

For this case studies, two different semesters of students achievement were analyse and compared. The first group is called Current Semester, whereas the second group is Previous Semester. Current Semester represents the time of the students taking this subject during semester September 2019 until January 2020. Whereas Previous Semester represent the time of students taking this subject during semester March 2019 until July 2019. Table 1 shows the details of the said sampling

Table 1: Students Sampling

Groups	Duration	No. of students	Final Question Method
Current Semester	September 2019 – January 2020	354	Selective Topic
Previous Semester	March 2019 – July 2019	97	All topic

As shown in Table 1, there were 451 total number of students that were used in this study. 354 students taking this course in Current Semester, whereas 97 students in Previous Semester. The percentage difference is about 53%.

Question Method

In CES420 course, the students were tested in four major assessments. The percentage were quiz (10%), common test (30%) and final exam (60%) which in totalling to 100%. The students were exposed to TWO major divisions of topic that is Static and Dynamic. In Static, there were

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4 topics that will be covered whereas another 4-topic covered in Dynamic part. These topics will be taught to students for a 14 week period of study.

For preparing question purposes, the lecturers will prepare according to Master Specification Table. This table is like a Blue Print for lecturers to follow and adhere. The Blue Print were prepared by a Resource Person that is an expert in this subject matter. This Master Specification Table then will be detailed to Quiz Specification Table, Test Specification Table and lastly Final Specification Table. All these three tables must meet the specification detailed in the Master Examination Table. The level of question was set by using Bloom's Taxonomy Cognitive.

In Previous Semester question setting, all the topics will be on the final examination paper. The question asked will be from Topic 1 until Topic 8. The students will only have 3 hours to sit for the exams. As mentioned earlier, there were quiz and common test besides final examination. Take for example Topic 1. The topic was taught at the early semester and of course it will be asked in Common Test. That topic was then also will be asked again in either quiz or final examination or BOTH. The students will have to do the same pattern of calculation for three times. It also goes the same for all early topics taught.

Figure 1 show the common test specification table, Figure 2 show the assignment specification table and Figure 3 Show Final Examination Specification Table. All this figure were just an example to show how the questions were prepared. As can been seen from Figure 1, 2 and 3, Topics 1 and 2 were redundantly questioned in every assessment.

TEST SPECIFICATION TABLE-TST- IBS
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CONFIDENTIAL

CODE	CES 420	PART	1
COURSE	STATICS AND DYNAMICS	CREDIT UNIT	3
PROGRAMME	SARJANA MUDA KEJURUTERAAN AWAM (INFRASTRUKTUR)	CONTACT HOUR	4
TEST	OCTOBER 2020 - JANUARY 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	3/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF EXAM MARKS	30

ITEM	Q1			Q2															-						-						Total lecture hour	
	Topic 1			Topic 2																												
Description																-			-			-			-			-				
Time (hr)	12			4			0			0			0			0			0			0			0			0			16	
Time (%)	75%			25%			0%			0%			0%			0%			0%			0%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive level	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cogniti	*	Marks	
CO1 : PO1	s	C1-C2	4																												4	12
	S	C1-C2	2																												2	
	S	C1-C2	6																												6	
																															0	
CO2 : PO2	S	C3-C4	4	M	C3-C4	10																									14	28
	M	C3-C4	8																												8	
	S	C3-C4	6																												6	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			30			10			0			0			0			0			0			0			0			0	40	

Figure 1: Previous Common Test Specification Table

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ASSIGNMENT SPECIFICATION TABLE -AST-IBS
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CONFIDENTIAL

CODE	CES 420	PART	1
COURSE	STATICS AND DYNAMICS	CREDIT UNIT	3
PROGRAMME	SARJANA MUDA KEJURUTERAAN AWAM (INFRASTRUKTUR)	CONTACT HOUR	4
ASSIGNMENT	OCTOBER 2020 - JANUARY 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	3/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF ASSIG. MARKS	30

ITEM	Q1&Q2			Q3															-						-						Total lecture hour	
	Topic 1			Topic 2																												
Description																-			-			-			-			-				
Time (hr)	12			4			0			0			0			0			0			0			0			0			16	
Time (%)	75%			25%			0%			0%			0%			0%			0%			0%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive level	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cogniti	*	Marks	
CO1 : PO1	M	C1-C2	8																												8	12
	S	C3-C4	4																												4	
																															0	
																															0	
CO2 : PO2	M	C3-C4	12	M	C3-C4	8																									20	28
	S	C5-C6	4	S	C3-C4	4																									8	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			28			12			0			0			0			0			0			0			0			0	40	

Figure 2: Previous Assignment Specification Table

TEST SPECIFICATION TABLE-TST- IBS
Fakulti Kejuruteraan Awam, UiTM Cawangan Pulau Pinang

CONFIDENTIAL

CODE	CES 420	PART	1
COURSE	STATICS AND DYNAMICS	CREDIT UNIT	3
PROGRAMME	SARJANA MUDA KEJURUTERAAN AWAM (INFRASTRUKTUR)	CONTACT HOUR	4
TEST	OCTOBER 2020 - JANUARY 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	3/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF EXAM MARKS	30

ITEM	Q1						Q2						Q3						Q4						-						Total lecture hour	
	Topic 1			Topic 2			Topic 3			Topic 4			Topic 5			Topic 6			Topic 7			Topic 8										
Description																-			-			-			-			-				
Time (hr)	12			4			8			8			12			8			8			8			0			0			68	
Time (%)	18%			6%			12%			12%			18%			12%			12%			12%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive level	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cogniti	*	Marks	
CO1 : PO1	M	C1-C2	10				L	C1-C2	15							S	C1-C2	5	M	C3-C4	15										45	45
																															0	
																															0	
																															0	
CO2 : PO2				M	C1-C2	10				M	C3-C4	15	L	C3-C4	15							L	C5-C6	15							55	55
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			10			10			15			15			15			5			15			15			0			0	100	

Figure 3: Previous Final Examination Specification Table

The structure of the course (pre-Covid 19) requires numerous assessments. The assessments were made to gauge the students performance in understanding the course. However in Current semester, the styles of arranging the questions were change. The same specification table were used but the topic included in every assessment is different and does not repeated.

Figure 4 shows that for the Assignment, the instructor only selected two topics that are Topic 6 and 7. Figure 5 depict the selection of topic to be included in Common Test. Again, only two topics were selected that are Topic 4 and Topic 5. Figure 6 shows the selection for Final Examination. In Final Examination, only FOUR topics were selected by the lecturer to be answered by the students. This time around, there’s no repetition of Topic asked in each assessment.

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CONFIDENTIAL

CODE	CES 420	PART	1
COURSE	STATICS AND DYNAMICS	CREDIT UNIT	3
PROGRAMME	SARJANA MUDA KEJURUTERAAN AWAM (INFRASTRUKTUR)	CONTACT HOUR	4
ASSIGNMENT	OCTOBER 2020 - JANUARY 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	3/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF ASSIG. MARKS	30

ITEM	Q1&Q2			Q3															-						-						Total lecture hour	
	Topic 6			Topic 7																												
Description																-			-			-			-			-				
Time (hr)	12			4			0			0			0			0			0			0			0			0			16	
Time (%)	75%			25%			0%			0%			0%			0%			0%			0%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognit	*	Marks	
CO1 : PO1	M	C1-C2	8																												8	12
	S	C3-C4	4																												4	
																															0	
																															0	
CO2 : PO2	M	C3-C4	12	M	C3-C4	8																									20	28
	S	C5-C6	4	S	C3-C4	4																									8	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			28			12			0			0			0			0			0			0			0			0	40	

Figure 4: Current Assignment Specification Table

TEST SPECIFICATION TABLE-TST- IBS
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CONFIDENTIAL

CODE	CES 420	PART	1
COURSE	STATICS AND DYNAMICS	CREDIT UNIT	3
PROGRAMME	SARJANA MUDA KEJURUTERAAN AWAM (INFRASTRUKTUR)	CONTACT HOUR	4
ASSIGNMENT	OCTOBER 2020 - JAN 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	2/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF TEST. MARKS	30

ITEM	Q1			Q2															-						-						Total lecture hour	
	Topic 4			Topic 5																												
Description																-			-			-			-			-				
Time (hr)	4			12			0			0			0			0			0			0			0			0			16	
Time (%)	25%			75%			0%			0%			0%			0%			0%			0%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive	*	#	Cogniti	*	#	Cogniti	*	#	Cognitiv	*	#	Cogniti	*	#	Cogniti	*	#	Cognitiv	*	#	Cognitiv	*	#	Cognit	*	Marks	
CO1 : PO1				M	C1-C2	9																									9	12
				S	C1-C2	3																									3	
																															0	
																															0	
CO2 : PO2	M	C3-C4	10	M	C3-C4	11																									21	28
				S	C3-C4	7																									7	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			10			30			0			0			0			0			0			0			0			0	40	

Figure 5: Current Common Test Specification Table

TEST SPECIFICATION TABLE-TST- IBS
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TEST	OCTOBER 2020 - JANUARY 2021	DURATION	14 WEEKS
QUESTION STRUCTURE	SUBJECTIVE	NO OF QUESTION/ANSWER	3/ ANSWER ALL
		TOTAL MARKS	40
YEAR	1	PERCENTAGE OF EXAM MARKS	30

ITEM	Q1			Q2			Q3			Q4									-						-						Total lecture hour	
	Topic 1			Topic 2			Topic 3			Topic 8																						
Description																-			-			-			-			-				
Time (hr)	12			4			6			8			0			0			0			0			0			0			30	
Time (%)	40%			13%			20%			27%			0%			0%			0%			0%			0%			0%			100%	
Parameter	#	Cognitiv	*	#	Cognitive	*	#	Cogniti	*	#	Cogniti	*	#	Cogniti	*	#	Cogniti	*	#	Cogniti	*	#	Cognitiv	*	#	Cogniti	*	#	Cognit	*	Marks	
CO1 : PO1	s	C1-C2	4	M	C1-C2	7	M	C3-C4	10	M	C3-C4	10																			31	39
	S	C1-C2	2																												2	
	S	C1-C2	6																												6	
																															0	
CO2 : PO2	S	C3-C4	4	M	C3-C4	10	S	C1-C2	5	M	C3-C4	8																			27	41
	M	C3-C4	8																												8	
	S	C3-C4	6																												6	
																															0	
																															0	0
																															0	
																															0	
																															0	
																															0	0
																															0	
																															0	
																															0	
TOTAL			30			17			15			18			0			0			0			0			0			0	80	

Figure 6: Current Final Examination Specification Table

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Results and Discussion

To analyse the outcomes from these practices, an excel method developed by a team of Civil Engineering lecturer's in UiTM Pulau Pinang were used. As mentioned earlier, this course will have THREE main assessments and all of it will address two Programme Outcome that is PO1 and PO2. These POs were obtained from Malaysia Engineering Accreditation Council (EAC).

Assessment

There were 3 assessment that's been given to students and address to two programme outcomes. As shown in Table 2, the excel already gave the overall results. For common test, Current Semester students score an average of PO1 and PO2, 80% and 62% respectively. When compared with Previous Semester, the students only manage to obtained 44% and 41% for PO1 and PO2 in Common Test. It shows a significant jump when the new method has been adopted. The difference between Current and Previous students was about 46% and 34% for PO1 and PO2 respectively.

Going on for Assignment, for Current Students, they score 66% and 95% for PO1 and PO2 respectively. Whereas, for previous students, they score an average of 92% and 77% for PO1 and PO2 respectively. This result show a decline in percentage for PO1 and still better performance in PO2 when compared with the new method. The difference is about -40% for PO1 and still better performance with 19% for PO2.

Lastly, in Final examination the Current Students scored at an average of 51% and 37% for PO1 and PO2 respectively. Previous Students scored 69% and 44% for PO1 and PO2 respectively. This show a decline in the achievement of the new method. It shows that the new method of assessment do have a positive effect to the achievement of students especially in PO2.

Table 2: Data Obtained

ASSESSMENT	**Assessment Type**	PO for Assessment (Current)					
		PO1	PO2	NA	NA	NA	NA
	Common Test	80	62				
	Assignment/Quiz	66	95				
	Final Examination	51	37				
	Assessment Type	PO for Assessment (Previous)					
		PO1	PO2	NA	NA	NA	NA
	Common Test	44	41				
	Assignment/Quiz	92	77				
	Final Examination	69	44				
	Assessment Type	PO for Assessment (% Difference)					
		PO1	PO2	NA	NA	NA	NA
	Common Test	46%	34%				
	Assignment/Quiz	-40%	19%				
	Final Examination	-36%	-18%				

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For overall grade achievement, the marks for students in PO1 and PO2 were totalled together. All the assessment will be added and totalled to 100%. This also will give an overall overview about this new method in assessment. Again, the analysis was carried out in a excel formula made by UiTM Pulau Pinang lecturer.

Table 3 show the overall results for Current and Previous Students taking CES 420. The performance of students relatively is getting better in the current semester. A lot of students manage to score a passing grade compared to previous semester. The number of students failure also has reduced for about 4%. Figure 7 shows the graph of achievement for Current and Previous Students. Do note that the number of students taking this subject varies quite significantly, thus it is best to look for percentage difference. This is the first time that the new method has been implemented and of course there has been a lot of changes has been made to improve this outcome.

Table 3: Overall Grade Obtained

Semester	GRADE ACHIEVEMENTS										
	A+, A, A-	B+,B,B-	C+, C	C- ,D+,D	E	F	Total	% A+,A, A-	% B+,B,B-	% C+,C	% Fail
Current	4	105	185	21	31	8	354	1	30	52	17
Previous	2	21	54	5	8	7	97	2	22	55	21
Difference	2	84	131	16	23	1		-1	8	-3	-4

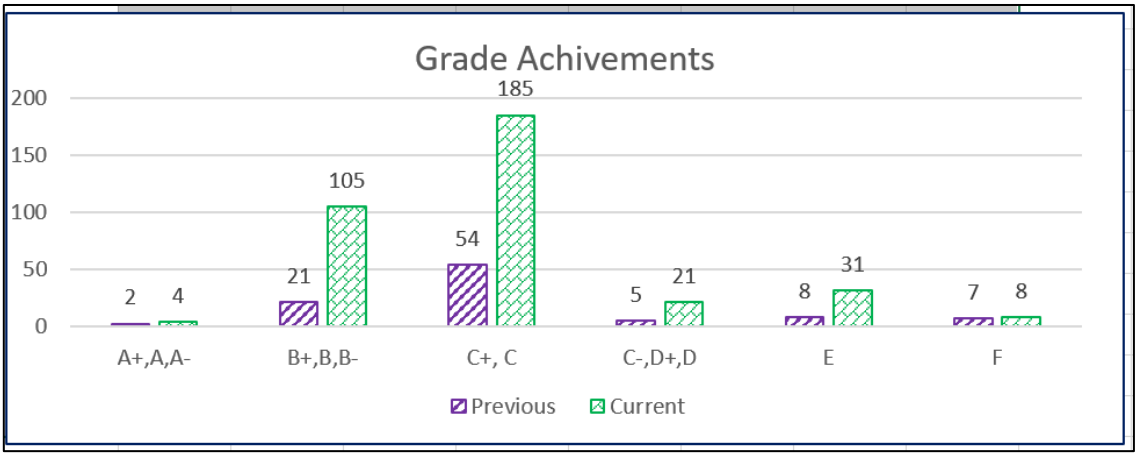

Figure 7: Overall Grade Achievement

Conclusions

The transition of method in assessing the students shows a promising result. The students are now getting better in their performance for this subject. This new approach able to reduce the numbers of student failure that has been a major concern for this subject. The students also able to understand more clearly on how to tackle or solve a question in each assessment. It is because the students now can focus directly on the chapter that only will be tested in the upcoming assessment. There is no repetition of chapter especially in final exams that forced the students to study back everything they have learned from week 1 until week 14 and added to stress level.

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