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Practice of Classroom Assessments for Learning

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Abstract

This study was conducted to examine the effect of conducting classroom assessment and to find the effective ways of delivery for students' learning. It is found that most useful method of delivery as asking questions, demonstrating examples on the board and discussing the problems while delivering through lectures. Assessments were carried out using three different ways and students' performances were analyzed for comparison. Three methods used were fairly successful (60% to 79%) and students were able to gain high marks for the end examination. The best performance was shown when students carried out the assessment with the facilitation through interaction with the teacher (78% to 80%). Once assessments were completed by the students, demonstrations of the same on the board by the teacher acted as an effective feedback for large classroom (about 60 students) as they were able to evaluate their performances and corrected answers.

Keywords: Classroom assessments; demonstration; feedback; module delivery; students' learning.

1. Introduction

While performing delivery of the lesson, evaluation of learning of students is necessary for the teacher to understand whether the students absorb the information given in order to gain the knowledge and achieve desired learning outcomes. Students' continuous attention is to be kept throughout the lesson by presenting the information effectively during the allocated time frame while making verbal presentation with the support of power point software tools.

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A lesson which consists of mathematical analysis is to be presented in the form of demonstration very commonly writing on blackboard or whiteboard by presenting sketches, formulas, and calculations.

Construction planning and cost estimation is one of the modules in semester 3 of undergraduate civil engineering programme where students learn two sections of construction planning and cost estimation related to the building construction projects. Total number of students usually in this class is above sixty and they receive details of the module and clear understanding of learning outcomes at the beginning of the module delivery. Students receive the knowledge on building construction in previous semester so that they are able to understand the content in the delivery and teacher supports students whenever necessary to clarify their problems. Time allocation for this module is three hours per week for lectures, assessments and tutorial. Students are assessed of learning through two continuous assessments and end examination. Carrying out classroom assessments for this module is beneficial for students to gain marks from continuous assessment and end examination. Teacher includes different ways of assessments in the delivery of this module and most of the examples are demonstrated on the whiteboard by discussing with the students. Softcopies of the handout are sent to students in time so that students have chances to learn at home and ask any doubt during the lesson. Delivering of this module was planned by amalgamating classroom exercises and assessments in order to evaluate students learning so that teacher could understand the students' achievement and support them whenever it is necessary to gain knowledge to learn the module well and to sit for two continuous assessments and end examination. Since it was not a small class (average attendance per day was about 55), learning was developed during the delivery by asking small questions, giving some activities like sums as the subject has mathematical areas and making groups for doing some activities.

It was decided to conduct the study to analyze the effectiveness of these classroom activities towards learning by selecting only three classroom assessments for two batches of students in 2017 and 2018 under three different learning environments. Students' performances and comments on classroom assessments are analyzed and presented in this paper.

Results obtained from this study are useful for the teacher to understand whether the delivery process is successful or not and identify the weaknesses or difficulties faced by the students when learning the lesson.

2. Objective of the study

This study is to determine;

- a) Effect of classroom assessment for learning.
- b) Effective delivery methods for students' learning.
- c) The level of learning achieved by the students in large classroom by carrying out the assessment under following learning environments after completing the module delivery.
 - i. Self-answering without any external support.
 - ii. Answering with the support of group members.
 - iii. Answering with the support of teacher.

3. Literature review

3.1. Student learning

Effective way of teaching requires assessments in order to understand whether students are in the process of learning. There has been an increasing tendency to seek to understand activities, that are intended to guide the learning towards the intended goal, and that take place during the learning process, as forms of assessment [1]. Assessment can be made in different forms which suit to the module encouraging students' learning. Learning is the information-processing perspective, which considers learning as a change in knowledge in the stored memory [2]. The emergence of numerous learning style models over the past 25 years has brought increasing attention on to the idea that students learn in diverse way and that one approach to teaching does not work for every student or even most students [3]. Therefore, assessments is to be designed in different ways such as asking simple questions, giving mathematical problems to solve, allowing practical work or participating group work. When these activities are carried out with the lectures, students feel that they can gather the relevant information in a systematic way of developing the knowledge. Most of the students have rated lecture and group discussion are the best way of teaching [4] as well planned lecture produces only the essential information of the module and group discussions give freedom for students to talk, argue and learn from others. Most areas of learning have both mental and physical aspects, in different proportions. It is not purely a mental activity for an academic subject, or purely a physical activity for the practical subjects [5]. Some students have different attitudes towards learning. Learning does not happen incidentally, it has to be carefully planned. Planning is an essential part of a teacher's workload. A total content in the module is to be taken into account when planning. Time allocation for lectures, practical work, tutorials and assessments need to be included in the plan orderly. Teachers need to plan and create opportunities within each session for both the learner and the teacher to obtain information about a learner's progress towards the learning goals defined by the teacher at the start of the session [6]. Data analyses indicated eight main learning challenges faced by students in higher education namely: cognitive challenge, becoming an active learner, coping with reading materials, instructional problem, language barrier, time management, burden of assignments, and culture difference in higher education [7]. These learning challenges cannot be identified by doing lectures alone as there is no way to monitor the progress of students learning. Through close observation of students in the process of learning, the collection of frequent feedback on students' learning, and the design of modest classroom experiments, teachers can learn much about how students learn and, more specifically, how students respond to particular teaching approaches [8]. Classroom assessments and giving feedback of the students' performance support students to understand their strength and weaknesses and thereby students learning process is continued. When feedback is combined with effective instruction in classrooms, it can be very powerful in enhancing learning [9]. After furnishing the given tasks, students wish to know their position especially good students feel to find their marks or grades. Giving clear feedback for poor students is essential to engage them for learning thereby teacher can understand the lagging area of the poor students and amend the way of presenting information for making the lecture success. The motivation and self-perceptions of students and their assessment histories will all be important influences on how feedback is received [10]. Feedback given as part of formative assessment helps learners become aware of any gaps that exist between their desired goal and their current knowledge, understanding, or skill and guides them through actions necessary to obtain the goal [11]. Some of the challenges that face higher education are

how to ensure that assessment is meaningful and that feedback is prompt in order to promote learning [12]. Value of the feedback is dependent on two factors such as quality of the feedback and how learner receives and ultimately uses it [6]. Feedback is information about how the student's present state (of learning and performance) relates to the desired goals and standards [13] and systematic reviews show that effective feedback leads to learning gains [14]. Classroom assessments are to be conducted as planned in the delivery and the feedbacks are necessarily to be given in time once the assessment is over to enable to students to catch the gaps and enter into the learning process.

3.2. Classroom assessments

Assessment for learning began as a distinct movement in UK which is based on principles to support learners through assessments in educational institutions across the world and it is valuable to the education community [15]. When delivering module, it is necessary to keep students' attention whether they are adopting the information and gaining knowledge continuously to the end of the module as expected in the learning outcomes. What a student learns as a result of a particular sequence of instructional activities is impossible to predict and only through assessment it is possible to find whether a particular sequence of instructional activities has resulted for intended learning outcomes [16]. Assessment as a part of classroom activities is a fundamental process required to promote learning and ultimately achievement [6]. Assessments can be made in different ways. Asking simple questions while delivering the lecture is helpful to keep students with the lesson. By using number of simple classroom assessment techniques that are quick and easy to use, teachers get feedback from students on their learning [8]. In engineering modules, mostly theories are presented in the form of formulas so that applications in the real conditions are to be described. Since the conditions are not unique every occasion, different cases can be presented through assessments allowing students to engage in calculation part of the theory in different conditions. Students work need to be observed while performing and giving feedbacks to whole class or to individual student at the time of working. It assists them to motivate learning even engaging in the very complex calculations. Testing learning is an important part of classroom practice, and questioning is one of the most common methods of checking learner's understanding [6]. Questions to the class, quizzes and other means of calling upon students to demonstrate their understanding are methods used by teachers to find out if their instruction is working or if it needs to be adjusted in some way [16]. Providing examples at appropriate locations of the delivery and allowing students to attend some exercises during the sessions also supported students to understand the way of applying and to gain the knowledge. Successful assessment for learning strategies result in improved learner progress on a continual basis [6]. Assessment encompasses teacher observation, classroom discussion, and analysis of student work, including homework and tests [17]. All of these techniques are to be used for keeping students' interest and active participation. The existing research does indicate that well-designed classroom testing programs bear a positive relationship to later student achievement [16]. Through practice in classroom assessment, it is possible to understand and promote learning and increase the ability to help students themselves to become more effective, self-assessing, self-directed learners [8]. Through using appropriate classroom assessment strategies and techniques, teachers can increase their students' motivation and show them how well they have learned [18]. Black and Wiliam [14] noted that for assessments to function formatively, the feedback information had to be used. Assessment are created, administered and analyzed by teachers themselves on questions of teaching and learning that are important to them and likelihood

that instructors will apply the results of the assessment to enhance their own teaching is an advantage [8]. Black and William [14] define assessment broadly to include all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning. An effective classroom assessment and evaluation calls on teachers to become agents of change in their classrooms actively using the results of assessment to modify and improve the learning environments they create [18]. To optimize the learning from the assessment procedure the marking criteria for that assessment should be transparent and explicit, as this will enable students to understand what is required of them to gain a top mark and enables them to gain feedback, via reflection on their own work when compared with the criteria, and so will encourage deep learning [12]. The issue for the engineering education community now is how best to do assessment and how to do it effectively and efficiently [19]. This issue can be solved by the teacher by practicing classroom assessments in engineering modules as suitably and developed them gradually considering feedbacks from students and teachers' observations. Success depends on the way of issuing feedbacks for the students' achievements. Students wish to accept feedback of their performance for enhancement of their knowledge. Teachers need to spent time for checking students' work and giving the feedback in the form of clear explanation or discussion. Feedback is seen as a primary component in formative assessment and one of the factors that have the strongest influence on learning [14]. Assessment includes a wide range of methods for evaluating students' performance and attainment including formal testing and examinations, practical and oral assessment, classroom based assessment carried out by teachers [20]. The appropriate assessment model inside the classroom is one that is designed to support the teaching and learning of important skills and concepts at both basic and higher levels [21].

4. Methodology

4.1. Development of classroom assessments – Batch 2017

Literatures have well described and suggested that the use of classroom assessment, evaluation of students learning and giving feedback is essential for promoting students engagement in learning so that they are able to gain knowledge to understand the principles, applying them, analyzing problems and designing most suitable solutions for real context. This method of assessment can be applied for civil engineering modules at end of the delivery of which students should be able to cover the learning outcomes expected in the module. By considering this phenomenon, it was decided to conduct classroom assessment by selecting rate analysis section of the construction planning and cost estimation module.

Three assessments based on rate analysis and quantitative techniques which covered one section of the module were selected for this study. Major contents of the area were delivered on the white board by demonstrating calculations and doing few examples. Classroom assessment consists of three questions Q1, Q2 and Q3 where students attended the work individually for Q1, getting support from the teacher for Q3 and attending the task as groups in Q2. This module comprises of some mathematical calculations so that students can easily understand their mistakes and weaknesses by comparing the answers they received and they are able to perform self-evaluation of their learning. Assessment was developed as follows.

1. Preparing three open questions Q1, Q2 and Q3 keeping questions at an appropriate level of difficulty

where students can experience a high degree of success in answering.

2. Arranging the classroom for the assessment within 45 minutes (15 minutes per one question) after completing the delivery.
3. Presenting questions one by one using multimedia.
4. Allowing students to self-answer for Q1 first.
5. Allowing additional time when students requested.
6. Demonstrating answer for Q1 by the teacher on the whiteboard.
7. Allowing students to ask any clarification.
8. Conducting same process for Q2 and Q3 separately. Method conducted for Q2 was group work but individual student was to work out the given sum by discussing with group members. Q3 was answered by the individual students with the support of the teacher.
9. Demonstrating answer for Q2 and Q3 by the teacher on the whiteboard.
10. Asking students to give their comments for this exercise on the questionnaire.

4.2. Implementation of classroom assessments – Batch 2018

Since it is necessary to study how students evaluate their learning in teaching process, same study was conducted for succeeding batch of same programme (Batch 2018) by focusing the way of students' learning and how they present their self-learning with suitable method of teaching. Questionnaire was then redesigned for gathering the information from batch 2018. Two homework exercises were too included for this batch to allow them to practice at home. In addition, rating 3, 2 and 1 were introduced for strongly agree, agree and disagree so that students were able to rate appropriately which could be used for the analysis of the effect of teaching for learning. Implementation of this classroom assessments consumed extra time and extra care had to be taken to manage the delivery of the module within the allotted time.

5. Data collection

5.1. Classroom assessment – Batch 2017

First set of information on this study was collected using the questionnaire 1 from batch 2017. It is understood that student's comments on these exercise was required to analyze the way they performed learning while delivering the module and how classroom assessments have supported students learning to answer the given three questions. Therefore questionnaire was prepared for collection of data from the students in batch 2017 and presented as a summary in Table 1.

Table 1: Students comments for the classroom assessments – Batch 2017

	Q1	Q2	Q3
Deliver of the module were clear to answer	94.6	91.9	97.3
Able to get answers	75.7	67.6	78.4
Received clarifications from teacher for Q3	-	-	97.3
Learned from group members in Q2	-	94.6	-

5.2. Classroom assessment – Batch 2018

The questionnaire was developed in this year basically to collect information regarding the effective way of delivering the lesson and to identify the lagging areas of learning by the students. Collected information was summarized in Table 2 and Table 3.

Table 2: Students comments for the classroom assessments – Batch 2018

	Q1	Q2	Q3
No. of students participated	37	33	30
No. of students answered.	25	17	24

Following ratings were introduced to find the effective way of delivery.

3 - Strongly agree, 2-Agree and 1- Disagree

Table 3: Students’ responses for module delivery

Learning Rating	Q1 (%)			Q2 (%)			Q3 (%)		
	3	2	1	3	2	1	3	2	1
Lecture using power point presentation.	3	36	61	17	72	11	12	60	28
Using questions when delivering lecture.	28	69	3	33	67	-	36	60	4
Demonstration done by the teacher on whiteboard.	43	57	-	6	39	55	25	63	12
Discussion by the teacher made with students.	31	69	-	22	78	-	28	56	16
I studied this subject at home	15	26	59	-	50	50	15	35	50

5.3. End Examination

Question paper for the end examination consists of six questions out of which one question is usually based on the rate analysis section of the module.

End examination marks for this question (Question 4 of the examinations 2017 and 2018) were too collected to analyze the impact of classroom assessments towards the end examination.

Total marks allocated for the given section was 20.

Table 4: End examination Marks

Batch	Marks (20 marks)				Total Number of Students
	1-5	6-10	11- 15	16-20	
2017	9	15	18	11	53
2018	3	13	34	9	59

6. Analysis of data

6.1. Analysis of data - Batch 2017

More than 92% of students have expressed that the delivery was very clear to answer all three questions and more than 67% of students have answered three questions by following three methods applied in the classroom assessment (Table 1). Method of delivery applied for this lesson supported students to learn and answer the given three questions. When comparing the population of students who answered the questions, majority of students (78.4%) have received answer for Q3 where students have clarified their problems from the teacher. Success of receiving this support has been proved by the population of 97.3% of students which is fairly high value. This method can be considered as the best method out of three method applied in this study. When comparing the performance for Q2, 94.6% of students have expressed that they learned by discussing with their group members but achievement of answering is 67.6% which was the least. By studying the comments expressed by the students for these three methods, no comment was made for the self-work (Q1) but more than 75% of students were able to get the answer. Questionnaire was distributed after completing of all three questions so that students have paid more attention on the method applied on Question 2 and 3. Additional information provided by the students in the questionnaire is;

1. When demonstrating the answer on white board they were able to understand the mistakes and correct them.
2. Questions were done with good understanding the theory and applications.
3. Methods followed in Q1 and Q3 were better because students try to think on their own rather than being lazy to solve problems.
4. All three methods are equally useful.

Table 5: Students’ comments for the classroom assessments – Batch 2017

Q2	Q3
Discussion is very useful while answering the questions. Missing parts obtained from others. Group work is very interesting for learning. Had the chance to discuss each other and make sure about our answer. In a group a single person works out the problem. Discuss our ideas with others. Learn from our fellow students, discuss and get answer. Group work is more interesting.	Quite useful with the guidance of the teacher By doing individually, there is an ability to correct. Provided the chances to solve the problem individually. Save time and also it is a quick learning procedure. Can ask anything from the teacher and those answers are correct.

Students' comments for learning to answer for Q2 and Q3 were presented In Table 5. It is found that group exercise was the most interesting method students have chosen for learning as it has more ground for discussion among them. Students have mentioned that more time was taken to get in to the exercise and that may be due to the time they used for talking to each other. They were able to complete only part of the question and students used local language which could not be helpful for those students who do not understand the local language. Only one group has mentioned that one person did the exercise. The way the students have presented their ideas on method of Q3, they believe that teacher always give correct information and they are able to learn quickly to answer the question. Students who could not answer these questions were collected as their self-evaluation on this exercise and summarized in Table 6. It is found that students were able to identify their lagging areas and how to attend for corrections.

Table 6: Students' self-evaluation on their work – Batch 2017

Q1	Q2	Q3
Did not understand the question	Some mistake in calculations.	Forgot assumptions.
Need more time	Unable to calculate the nos. of bricks.	No attention was paid for the lecture.
Made mistakes in the calculation	Time was not enough to get the full answer.	Identify our mistakes.
Came to the class little late	Forgot assumptions.	Question was complicated and need time to understand
Minor calculation error	After listening to the explanation, I was able to get the answer.	Answer was little different.
Had to refer the example again.	Part of the question was completed.	Not completed the full question.
	It took more time to get in to the procedure.	
	Time was taken for talking among each other.	

6.2. Analysis of data - Batch 2018

Table 7: Students' responses for three questions - Batch 2018

	Students responses - %		
	Q1	Q2	Q3
No. of students answered.	68	52	80

It is found that 80% answered with the support of the teacher in Q3, 68% self-answered without any support in Q1 and 52% answered by participating as group work in Q2. The result in descending order of achieving high performance on learning in batch 2017 was Q3, Q1 and Q2 which was same as the results of batch in 2018.

By observing the results in both years in Table 8, it is understood that students actively engaged in classroom assessments for their learning and gave very important comments for its improvement. There were three methods of assessments and the results were not unique. When comparing the percentage of population, 52-68% students were able to answer from group discussions, 68-76% of students answered alone without any support and majority 78-80% students answered with the support of teacher. Learning from group discussion applied for

classroom assessments is satisfied only for the limited crowd. When analyzing students’ responses on module delivery, they have given high ratings 3 and 2 for learning through questions done when delivering lectures, demonstration done by the teacher on whiteboard and the discussion done by the teacher with the students. They have highly rated the teachers’ involvement in learning. Teacher’s delivery was based on the demonstration of calculations on whiteboard by taking few examples relevant to the topics and discussions were held after questioning the students while delivering. It is noted that only very few students have learned at home. Students who could not answer the questions were further analyzed in Table 9.

Table 8: Students’ performances for three questions

Batch	Able to answer		
	Q1	Q2	Q3
2017	76	68	78
2018	68	52	80

Table 9: Information collected for feedback – Batch 2018

		Q1	Q2	Q3
		(Number of Students)		
1	Not answered.	12	16	6
2	Corrected after getting feedback from the demonstration on the board by the teacher	8	11	5
3	Total number of students benefited.	89%	86%	97%

It is found that sixteen students could not achieve the performance by following group discussion (under the method of Q2) which is higher than other two methods. In this method there is no direct guidance for students to learn and they may discuss without having proper direction. Lesser failures are recorded in the method followed in Q3 where teacher guided students for carrying out the assessment. Out of total failures more than 68% of students identified their mistakes and corrected them using the demonstration done by the teacher for the answered questions on the board.

Table 10: Students preferences (%)

	2017	2018
Q1	12	12
Q2	36	23
Q3	52	65

Considerable population of students 52% in 2017 batch and 65% in 2018 batch have indicated that they prefer method adopted in Q3 where teacher have supported for learning by clarifying their problems while carrying out the assessment. Learning from group discussions is the next method chosen by the student for learning though the total group unable to complete the work successfully. Very few students have quoted the self-learning method as a good learning tool though considerable number of students successfully completed the given task. When comparing the students' preference for the method of conducting classroom assessments, it is found that they highly prefer teacher's involvement when carrying out assessment (method followed for Q3) than other two methods and majority of students satisfactorily completed the assessment which was carried out under this method. Therefore it is understood that carrying out classroom assessments with the support of the teacher gains high impact for learning.

6.3. Impact of classroom assessments for the end examination

Same classroom assessments were conducted in the same way to successive two years of students (batch 2017 and 2018) and the marks obtained out of 20 have been collected (see data collection) to determine the effect of these assessments for the end examination. In both years, the students those who have selected this question for answering end paper were found 96% in 2017 and 97% in 2018 indicating that majority of students have selected this area as they were confident to answer. Gathered information on marks were analyzed as percentage basis under the marks ranges of more than 75%, more than 50% and less than 50%.

Table 11: Marks in end examination

Batch	Population (%)		
	Marks < 50%	Marks > 50%	Marks > 75%
2017	17	83	55
2018	5	86	75

It shows that all two batches more than 83% of students have answered well for the quantitative techniques and rate analysis area of the module and there is a significant increase in achieving marks in second time (batch 2018). It may be the teacher gained experience in handling the classroom assessment for better learning. It is noted that 2 to 6 (5% to 16%) students in this batch could not attend the work and they have mentioned that they did understand the lesson may be not attended regular lectures similar results has been received for the end paper marks. It is clear that classroom assessments support for students' learning and summative assessments.

7. Conclusions

1. Demonstration in the form of calculations by taking few examples on whiteboard, questioning and discussing the problems while carrying out the delivery is found to be an effective delivery method for learning especially for engineering subjects involving mathematics.

2. Two sets of assessments each comprising three questions were conducted in two successive years (2017 and 2018). When considering the achievements demonstrated in given three questions, 78% and 80% of students answered correctly with the support of the teacher for one question, 76% and 68% of students have self-answered for second question and 68% and 52% of students have answered third question by discussing with the group members.
3. Amalgamating classroom assessments which are carried out using three methods in this exercise have helped students for learning and this technique supports for students to gain high marks for the end examination question.
4. When analyzing the students' feedback, majority of students (65% to 52%) prefer the assessment method which is conducted with the support of the teacher in the classroom as they can engage effectively in learning when teacher monitor their work.
5. After completing the assessments, demonstration of them by the teacher on the board identified as an effective feedback method for the large classroom (about 60 students) as students can either confirm the accuracy of their answers or find their mistakes and weaknesses so that they can correct. Thus, more than 86% of students have benefited by this method.

7. Recommendations

1. Demonstration of calculations in engineering modules is necessarily to be presented on the whiteboard by discussing with the students as it is an effective teaching method.
2. Giving questions, allowing students to answer through group discussions or by discussing with the teacher can be applied as one of the best methods of formative assessment technique.
3. After completing the assessment by the students, same can be demonstrated by the teacher on the whiteboard and it is one method of effective feedback for large classroom (about 60 students).
4. The usual method of conducting classroom assessments need to be practiced in delivering the modules to enhance students learning because it supports for them to gain high marks in final examinations.

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