

# Expectation and Satisfaction Level of Students with Impact of Formative Assessment on the Scores of Summative Assessments in the Subject of Dental Materials -A Study from Private Dental College Karachi Pakistan



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**OBJECTIVE:** To evaluate the improvement in the scores of summative assessment after formative assessment practices as well as expectation and satisfaction level of students with formative assessment in subject of the science of Dental Materials.

**METHODOLOGY:** It was a longitudinal study with pre-post design that was conducted on second-year BDS students over a year. Students were selected by non-probability, convenience sampling technique from a private dental college. Summative assessments conducted at the end of semester III were considered pre-intervention tests. Semester IV was planned with formative assessment and feedback sessions after every topic and summative assessments conducted at the end of semester IV were considered Post-intervention tests. The summative assessment was done by Multiple Choice questions and a structured practical exam. A structured close-ended questionnaire was administered to record Students' level of expectation and satisfaction. The analysis was performed by using SPSS version 20. Quantitative analysis was reported by means and standard deviation. Furthermore, paired sample t-test was performed to analyze students' scores before and after formative assessment. Frequencies and percentages were calculated for the number of responses to each item in the questionnaire.

**RESULTS:** Performances of students in semester III (before formative assessment) with semester IV (after formative assessment) were compared with paired-sample t-test results showed a significant increase in the scores of students before ( $M=62.74$ ,  $SD\pm14.72$ ) to after ( $M=67.16$ ,  $SD\pm14.53$ ).

**CONCLUSION:** There was a significant difference in Semester scores with and without formative assessment. The majority of students is satisfied with the impact of formative assessment on their scores and expect a well-structured method of formative assessment in every subject.

**KEYWORDS:** Expectation, satisfaction, formative assessment, Summative Assessment, Science of dental materials

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## INTRODUCTION

Nowadays, the traditional context of assessment has significantly transformed from 'Assessment of learning' to 'Assessment for learning'.<sup>1</sup> Despite increased interest in assessment for learning teachers have minimally accepted and applied these approaches.<sup>2</sup>

In medical education, two main types of assessment are used, formative and summative. Summative assessments (SA) evaluate a student's learning progress with concrete grades. Its purpose is to measure the student's achievement

to make decisions about promotion. On the other hand formative assessment (FA) focuses on providing the student with feedback on their performance to improve their knowledge and skills.<sup>3</sup>

Even though, the purpose of both types of assessments, either formative or summative, is to take interpretations about students' learning. Formative assessment is a systemic intervention that is administered during the academic session in a relaxing non-threatening environment to improve the learning and achievements of the students in various ways; by making the students aware of the gap between their existing and expected knowledge levels, by familiarizing them with the end of session summative assessment, and by guiding them to improve their learning process and skills. Formative assessment provides feedback to the students and teachers over the course of instruction for improving their

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learning process. While Summative assessment reports student performance in an entire academic session and involves assigning grades to the students. Summative assessment sums up the learning process and looks at the post achievement only so it is considered as one way process.<sup>4</sup>

Research on the prognostic abilities of the FA with its impact on the SA scores was also reported to be rare. There is a lack of literature about students' expectations and satisfaction regarding the role of formative assessment in the subject of the science of Dental Materials. Previous literature emphasized the possible benefits of formative assessment but there is a dearth of literature related to the impact of formative assessment in term difference in scores in summative assessment, especially in the above-mentioned subject.<sup>5</sup>

There is an utmost need to know whether students are satisfied with the current scenario or what are their expectations from the assessment programs. Due to this reason, the present study is assessing the level of expectation and satisfaction of students with the formative assessment in terms of their frequency, nature, component, awareness, utility, role, and effectiveness in summative exam scores and their educational process. In addition to this, it is also assessing that timely feedback for weak students will also encourage them to work and overcome their deficiencies to improve their grades in summative assessment.

The objective of the current study was to evaluate the improvement in the scores of Summative assessment after formative assessment practices as well as the expectation and satisfaction level of students with formative assessment in the subject of the science of Dental Materials in second-year BDS students at private dental college.

## METHODOLOGY

A longitudinal study with pre-post design was conducted on the second-year BDS students of a Private Dental College from 2021 to 2022. Approval was taken from Ethical Review Committee Ziauddin University (Reference Code 3180121GNFOM). Verbal consent was taken from participants.

Non-probability convenience sampling technique was used to create a sample as per ease of access and availability at a given time slot. The Sample size was calculated by open epi using following Parameters Mean of Group I (pre intervention) is  $58.08 \pm 11.80$  and mean of group II (post intervention) was  $66.60 \pm 11.90$ . The Power of test was 80%, Confidence level was 90% and level of Significance was set as  $0.05\alpha$ . The minimum Sample in each group was  $n=24$ . However we have taken the overall sample was  $n=51$  participants in both group.

Hence fulfilling the objective, Students of the second year of the BDS program who appeared in all scheduled formative and summative examinations in the 2nd year, irrespective of age and gender were included. Irregular, uncooperative students and those who did not appear for two scheduled examinations in a year were excluded:

Science of Dental Materials was taught in two Semesters III and IV during the second year. Each semester comprised three summative assessments. Two during the semester in the form of a Continuous assessment test (CAT) and a one-semester exam at the end of the semester. During semester III there was no formative assessment planned and SA in the form of a semester exam was considered a pre-intervention test. At the start of Semester IV, students were briefed about this FA. After Each lecture, the FA session started with multiple choice questions (MCQs) and Short answer questions (SAQS) to be solved in 30 minutes on the topics taught in the last lecture. These MCQs were specially formulated for these sessions including all C1, C2, and C3 levels. After completion of the test, it was exchanged with other students to be marked by them. In the next 30 min, the teacher discussed the attempted options and gave constructive feedback with the active participation of students. The same method was repeated in the whole semester IV.

Summative scores for Semester III and IV were obtained from the examination department to compare the difference in both semesters.

A structured close-ended 12-item questionnaire related to the expectation and satisfaction of students about the FA session was self-administered to the class. Beginning 11 questions were based on a Likert scale from 1 (strongly disagree) to 5 (strongly agree) to check the level of Satisfaction with the current scenario of FA. The last question have four items with binary options related to expectations of students. The terms formative and summative assessment with examples of activities carried out in the class during the session was explained to students. Data was collected by a person who was not being a direct teacher of the student after the semester IV exam. In the construction of the questionnaire, help was taken from previous studies with the permission of the authors.<sup>7,8</sup>

The analysis was performed by using SPSS version 20. Quantitative analysis was reported by means and standard deviation. Data was checked for normality by using Kolmogorov Smirnov test. Later, Paired sample T-test was performed to analyze students' scores at baseline (Semester III scores) and after formative assessment (Semester IV exam). P Value was considered significant at less than or equal to 0.05. Frequencies and percentages were calculated for the number of responses to each item in the questionnaire.

## RESULTS

The data was analyzed on 51 students. The mean age of the study sample was  $20.5 \pm 0.5$ . Out of the total sample, 90% were girls and 10% were boys.

A paired-sample t-test was conducted to evaluate the impact of formative assessment on the scores of the subject of Dental Materials. The results showed a significant increase in the marks of the students Before ( $M=62.47$ ,  $SD=14.72$ ) to after ( $M=67.16$ ,  $SD=14.53$ ),  $T(50) = -3.12$ ,  $P < 0.005$  (two-tailed). The mean increase in the test scores was 4.68 with a 95% confidence interval ranging from -7.69 to -1.67 as shown in table I.

**Table 1:** Difference in scores with and without formative assessment in Semester Exam

Summative assessment	Mean	Std.Dev	df	Sig. (2-tailed)
Semester III (Without Formative Assessment)	62.47	14.727	50	.003
Semester IV (With Formative Assessment)	67.16	14.535		

A structured close-ended 12-item questionnaire related to the expectation and satisfaction of students about the FA session was self-administered to the class. Only 41 complete questionnaire was returned. The starting three questions are about the influence of formative assessment on the results of summative assessment. A total of 37 (95%) students strongly agreed/agreed that formative assessment significantly impacts the scores of summative assessments. In further detail regarding written and SPE exams, similar number of students agreed that written assessments like quizzes in formative assessment help them to improve their results. Regarding the Structured practice exam, 39 students (76%) strongly agreed/agreed that the SPE exam help them to improve their results.

The second category is related to the teacher's impression of a student from formative assessment impacts the results of summative assessment. Responses from students revealed that 15 students (37%) agreed/strongly agreed that teachers create an impression about students and it will affect their summative scores. 19 students (46%) disagree with the above statement while 7 students (17%) neither agree nor disagree. The third category is regarding students' opinion that the student's fear of summative exams is decreased by formative exams. Responses reveal that 39 (95%) students feel they are more ready and confident about summative assessment. Only 2 students (5%) Disagree with the above-mentioned statement.

In the fourth category, students were asked whether they recognize their learning gaps with the help of formative assessment and thus try to overcome them with more effort for summative assessment. Responses reveal that 39 students (95%) students strongly agreed/agreed that learning gaps (what the students already know in comparison to what they need to know) can be recognized by formative assessment and improved by further preparation for summative assessment. Only five percent of respondents disagreed and strongly disagreed with the abovementioned statement.

In the fifth category, there are two questions in which, students were asked about teachers' feedback given to them regarding formative assessment being useful for improved performance in the summative exam. 38 students (93%) strongly agreed/agreed that FA help them in improving summative assessment scores in further detail when students were asked that faculty recognized numerous weak areas of the students and thereby strategically give proper feedback to the students for better performance in summative assessment, 32(78%) respondents strongly agreed/ agreed that with the above statement.

The sixth category is regarding deep learning when students were asked about whether or not formative assessment helps them in their deep learning, which in turn improves their performance in summative assessment. Results revealed that; 39 students (95%) strongly agreed/agreed with the statement that FA encourages them to deep learning. On the other hand, 2 participants disagreed with the above point. In response to the question of the seventh category that numerous formative assessments negatively affect their performance in summative assessment, 35 (85%) students disagree about the statement that FA negatively impacts their performance.

The eighth category is about the opinion that the medical program needs a well-structured system of formative assessment. 40 students (98%) agreed and strongly agreed that programs like BDS need an appropriate structured and planned method of assessment. The level of Satisfaction with the current scenario of FA is shown in table II. In the last category, students were asked for their expectations that how the formative assessment can be improved to create a strong positive effect on the summative assessment. They are given four options.

The first option is teachers should give more time to it. The second option is the frequency of formative assessment should be increased.

The third option is the frequency of formative assessment should be reduced.

Fourth given opinion do they think that optimal feedback of formative assessment should be given to the students? 100% of students agreed with the first and fourth options.

**Table 2:** Students' level of satisfaction with Formative Assessment (FA)

S. No	Questions	Minimum	Maximum	Mean	Std. Deviation
1-	FA greatly influences the results of SA?	1.00	5.00	3.96	.91
	Written test of FA greatly improves the results of SA?	1.00	5.00	4.15	.80
	SPE (Structured practical exam) of FA greatly improves the results of SA?	1.00	5.00	4.27	.87
2-	Teachers' impression about a student from FA influences the results of SA?	1.00	5.00	2.92	1.11
3-	Students fear for SA is reduced by FA?	1.00	5.00	4.13	.82
4	Students identify their learning gaps Through FA and thereby try to fill it by further extended efforts for SA?	1.00	5.00	4.03	1.03
5-	Teachers' feedback to students about FA is helpful for better performance in SA?	1.00	5.00	4.15	.80
	Teachers identify students' weak points and thereby provide appropriate feedback for future improvement in SA?	1.00	5.00	3.88	.90
6-	FA encourages the students for deep learning which in turn improves the result in SA?	1.00	5.00	4.05	.78
7	What do you think that frequent FA negatively impacts students' performance in SA?	1.00	4.00	2.00	.66
8	Medical program needs a well-structured method of FA?	1.00	5.00	4.09	.75

**Table 3:** Students' expectation from Formative Assessment (FA)

Options	Yes n (%)	No n (%)
Teachers should give more time to students	41 (100%)	0
Frequency of formative assessment should be increased	39 (95.1)	2 (4.9)
The frequency of formative Assessment should be decreased	1 (2.4)	40 (97.6)
Optimum feedback of formative assessment should be given to the students	41 (100%)	0

95% and 98% of students agreed with the second and fourth option respectively as shown in table III.

## DISCUSSION

The current study reported that FAs have been effective in encouraging the learning of students and improved scores in the subject of Dental materials of second-year BDS students. In our study, Students obtained higher scores in both the CAT exam of semester IV as well as in Semester IV as compared to what they scored in CAT exams of semester III and Semesters III without any formative assessment.

In the recent study design, the selection of students in FA was not intentional or voluntary participation. We included all the students of a class whether interested or

not, better or average in the FAs. In comparison to previous studies, where highly motivated students are taken in the study so it leads to the participation of 'better' students and failed to establish a true causal relationship between FA and SA. Current research makes a contribution to the literature by establishing a causal relationship between participation in FA and performance in SA.<sup>9,10</sup> In our study, students who achieved low scores in semester 3 improved their scores in semester 4 after formative assessment in agreement Tuba Gezer & colleagues also reported that formative assessment can be more beneficial to encourage low achieving students.<sup>11</sup>

The current study reported a significant improvement in scores after intervention with formative assessment in concordance with our results other studies observed significant positive correlations between formative and summative assessments.<sup>12,13</sup>

As it was observed that Formative assessment encourages active participation and helps students in identifying weak areas in their learning it might be a reason for the improvement in scores.<sup>14</sup>

In the current study, it was discovered that the majority of students sensed that FA aided in improving their scores in summative exams. In further detail, they also believe written and SPE both greatly improve scores on Summative Assessment. The finding of the current study is in agreement with Evans et al that formative assessments are the best way of improving scores in summative exams.<sup>15</sup>

In the current study, most of the students considered that formative assessment helps them to recognize their learning gaps so that they can work on these areas for improvement. They also sensed that formative assessment encourages in-depth learning and retention of concepts for a longer period. Similar results are reported by Das et al and others that FA makes students self-directed and in-depth learners.<sup>9,16,17</sup>

In agreement with previous studies, the current study reported that FA also helps faculty and students to recognize the areas of strength and weakness in students without incurring any academic penalty. It also permits quick corrective action by them.<sup>18,19</sup>

There is a requirement for arranging and planning formative assessment activities with extreme care and diligence.<sup>20</sup> The advantages of formative assessment are clear but it needs careful planning, specialized training of teachers, and a thorough understanding of formative assessment classroom techniques with continuous monitoring.<sup>21,22</sup>

## CONCLUSION

There was a significant difference in Semester scores



with and without formative assessment. Students seem satisfied that formative assessment has a positive impact on the outcome of summative assessment. They expect a well-structured method of Formative assessment in every subject during the entire BDS program.

### CONFLICT OF INTEREST

There is no Conflict of Interest

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