

## Perception of Undergraduate Medical and Health Sciences Students Regarding Online Formative Assessments During COVID-19

Noor Ul Ain, Sadiq Jan, Rahila Yasmeen, Hassan Mumtaz

Islamic International Dental College & Hospital, Islamabad Pakistan

### ABSTRACT

**Objective:** To look into the experience of undergraduate medical and health sciences students regarding perceptions of online formative assessments.

**Study Design:** Online cross-sectional survey.

**Place and Duration of Study:** Riphah International University, Islamabad Pakistan, from Aug to Dec 2020.

**Methodology:** Three hundred fifty-one pre-clinical and clinical students of disciplines including MBBS, BDS, and Pharm-D participated in the study. Data was collected through a convenient sampling technique. An online questionnaire containing 22 closed-ended questions with a three-point Likert scale on five themes related to online formative assessments and one open-ended question was used.

**Results:** 86 (24.5%) students agreed that online formative assessments improved their learning. The motivation for learning was increased in 120 (34.2%) students. 214 (61%) students felt that online formative assessments were stressful, and the majority were well aware of the use of technology except for connectivity and login issues highlighted by the students. Regarding the question paper, the majority were comfortable with the construct of online formatives. 158 (45%) students were not satisfied with the allotted time to complete the formative assessments. 163 (46.4%) students were satisfied with the feedback provided, yet 258 (73.5%) students recommended formal feedback provided on the same day to improve their learning by knowing their deficiencies.

**Conclusion:** The study results support the contention that well-designed online formative assessments have considerable untapped potential to assist learning by motivating students. Their problems and challenges need to be addressed to improve the online assessments that help in the learning of undergraduate students.

**Keywords:** Medical and health sciences students, Online feedback, Online formative assessments.

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### INTRODUCTION

Assessment is very important as it has a direct and vital impact on learning. It is at the core of higher education and a crucial element for effective learning.<sup>1</sup> Formative assessment is intended to provide both the student and the teacher with information about the student's progress and is usually described as an 'assessment for learning'.<sup>2</sup> It is "an iterative process of determining what, how much, and how well students learn about learning objectives and expected results to inform targeted feedback and support further learning".<sup>3</sup> The formative assessment varies from informal comments made at the end of a case presentation to formally structured computer-based learning tools.<sup>3</sup>

Online and blended learning usage has grown significantly in the twenty-first century and throughout the COVID-19. As the classes are conducted online, the assessment is also taken online.<sup>4</sup> In addition, online

examinations are increasingly implemented in higher education to supplement paperbased tests.<sup>5</sup> The online assessment can be defined as "a system that involves assessments through the web or the intranet".<sup>6</sup> Online formative assessment (OFA) can be taken by a dedicated system or included in a learning management system (LMS) such as Blackboard, Moodle, or Sakai.<sup>5</sup> Undergraduate students are typically exposed to traditional methods of teaching and assessment. As an initiative, students are exposed to e-learning and e-assessment during the COVID-19 era.<sup>7</sup>

Significant research shows staff and student perceptions of online examination benefits and obstacles and the necessity for effective implementation.<sup>8,9,10</sup> Online formative assessment provides quick feedback, allowing students to learn in new ways.<sup>10</sup> Such feedback can encourage pupils to reflect on their learning and take ownership of it. With the test results, the answer keys and explanations for the answers can be viewed.<sup>10</sup> These suggestions may also help students prepare for summative assessments.<sup>3</sup> Online

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**Correspondence:** Dr Hassan Mumtaz, Department of Medical Education, IIMC, Islamabad-Pakistan

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assessments offer quick feedback, reliability, validity, and convenience.<sup>3</sup> Marking is transparent, results are instant, and cheating is reduced. However, some students may experience technological issues.<sup>10</sup> Still, OFAs provide an alternative to the written examination to assess a single candidate. While online assessment has been there for some time, it is relatively recent in medical schools. No previous study has examined the pattern of medical students' participation in an online formative evaluation combined with online classes. Therefore, the study's objective was to look into the experience of undergraduate medical and health sciences students and provide much-needed evidence about the student's perception of online formative assessments.

## METHODOLOGY

An online cross-sectional survey was conducted because it elicited participants' perceptions of current trends and analyzed data from a representative subset at a specific time that was deemed suitable for this study. The study was carried out at Riphah International University from August to December 2020 on pre-clinical and clinical students of different disciplines, including MBBS, BDS, and pharm-D. Ethical approval was obtained from the Ethical Review Committee (ERC) of Riphah International University (Ref No. Riphah/IIMC/IRC/130). The sample size was 297, calculated through Rao soft with a target population of 1300. Data collected was 351 exceeding the estimated sample size. The confidence interval was 95%, with a margin of error of 5%.<sup>11</sup>

**Inclusion Criteria:** Students of both gender from MBBS, BDS and Pharm-D appeared in five OFAs were included in the study.

**Exclusion Criteria:** The students who appeared in less than five OFAs and those who were unwilling to participate were excluded from the study.

Informed consent was taken from the participants at the beginning of the questionnaire. They were informed about the study objectives and reassured that research data would be treated anonymously.

To obtain data from the participants, a structured questionnaire was used. Items for the questionnaire were derived from concepts about online formative assessments. Furthermore, feedback mechanisms are identified from existing literature.<sup>10,11</sup> The online questionnaire contained 22 closed-ended question items. It was developed on a three-point Likert scale (1=agree, 2=neutral, and 3=disagree). Three medical

educationalists helped determine the construct validity of the questionnaire items. Students were asked to reply to statements in the questionnaire relating to (i) demographic description including discipline, year of study, gender and academic background, number of OFAs taken, (ii) perception of students on learning from OFA, (iii) perception of feedback in OFAs and (iv) perception of feasibility and relevance of OFAs. In addition, one open-ended question regarding the recommendations was asked. The questionnaire was given using Google Forms to the students. Descriptive analysis was performed, and data were analyzed using percentages and frequencies.

## RESULTS

Out of the 351 participants in the questionnaire received, mainly responses were from the MBBS discipline (Figure-1).

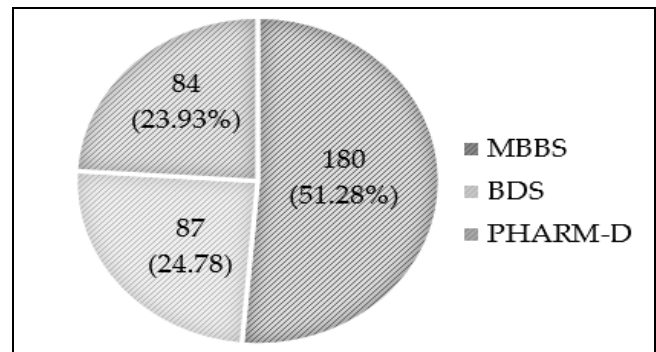


Figure-1: Distribution of discipline among the study participants.

124 (35.4%) students were from pre-clinical years, and 227 (64.6%) were from clinical years. The majority of the participants were female students. Regarding educational background, 216 (61.53%) participants were high achievers (high achievers >70% marks, average 50-60% marks, low achievers <50% marks) shown in Figure-2.

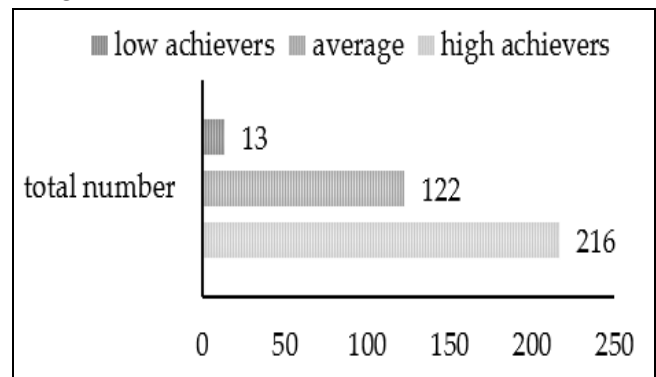


Figure-2: Participants educational background in terms of test scores.

## Undergraduate Medical & Health Sciences Students

86 (24.5%) of the students agreed that OFAs improved their learning, and 120 (34.2%) students get motivated for future learning after online formative assessments. 214 (61%) students said that they were stressed while attempting online assessments more than routine paper assessments and said that the stress was due to connectivity issues 203 (57.8%), time constraints 187(53.3%) and difficult concepts 92 (26.2%).

261 (74.4%) students were aware of the use of computers for educational purposes, with 191(54.4%) trained in attempting questions on Moodle. 112(31.9%) students had issues with login and quiz access. 107(30.5%) students agreed that the duration of the quiz was enough to complete the OFAs (Table).

ment of learning, indicating deficiencies and motivation gained from OFAs. It is apparent in the results that the OFAs improved the learning process, which is the primary purpose of it as 'an assessment for learning. Literature indicates that the formative assessments in undergraduate students have effectively promoted learning 12. Our findings contrast with a recent study, a randomized control trial of online formative assessments for medical students in clinical clerkships. It was found to have no positive effect on learning.<sup>13</sup>

These OFAs were structured, and students were usually informed one week before the test to improve their learning and preparation. A study done by

**Table: Results of the key areas of OFA with percentages of the scale.**

<b>Perception on Improvement in Learning and Progress.</b>			
<b>Question</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>
There is an improvement in my learning after online formative assessments?	86 (24.5%)	158 (45%)	116 (33%)
I recognized my deficiencies after online formative assessments.	137 (39%)	122 (34.8%)	101 (28.8%)
I am motivated for future learning after online formative assessments.	120 (34.2%)	115 (32.8%)	127 (36.2%)
<b>Perception on Stress</b>			
I was stressed while attempting online assessments more than routine paper assessments.	214 (61%)	83(23.6%)	67 (19.1%)
If you agree to the above question, what was the reason?	Concepts were difficult	Connectivity issues	Time constraints
	92 (26.2%)	203 (57.8%)	187 (53.3%)
<b>Perception of Training, Moodle Functionality, and Technical Issues</b>			
I was trained for attempting online assessments.	Agree	Neutral	Disagree
	108 (30.8%)	128 (36.5%)	128 (36.5%)
I was aware of the use of computers for educational purposes.	261 (74.4%)	75 (21.4%)	26 (7.4%)
I was trained to attempt the questions on Moodle.	191 (54.4%)	109 (31.1%)	64 (18.2%)
I have internet/electricity freely available in my home	180 (51.3%)	101 (28.8%)	82 (23.4%)
I had issues with login and quiz access.	112 (31.9%)	106 (30.2%)	144 (41%)
<b>Perception Regarding Question Paper</b>			
I was timely informed of the OFA (one week before the OFA).	203 (57.8%)	95 (27.1%)	65 (18.5%)
Instructions about the quiz were clear.	234 (66.7%)	99 (28.2%)	29 (8.3%)
Questions were easily understandable.	202 (57.5%)	124 (35.3%)	42 (12%)
All questions were aligned with the learning objectives.	189 (53.8%)	122 (34.8%)	52 (14.8%)
The duration of the quiz was enough to attempt the question.	107 (30.5%)	95 (27.1%)	158 (45%)
There were frequent problems with the answer key.	94 (26.8%)	146 (41.6%)	125 (35.6%)
<b>Perception Regarding Feedback</b>			
I got immediate feedback in the form of the correct option answer key.	141 (40.2%)	112 (31.9%)	111 (31.6%)
I got formal feedback sessions from the teachers to improve learning.	158 (45%)	122 (34.8%)	81 (23.1%)
I recommend having formal feedback sessions by the teachers.	240 (68.4%)	101 (28.8%)	16 (4.6%)
I am satisfied with the feedback, and it helps in clearing my misconceptions.	163 (46.4%)	141 (40.2%)	56 (16%)
I prefer having feedback from the teachers on the same day.	258 (73.5%)	82 (23.4%)	18 (5.1%)
Online formative assessments should be part of continuous formative assessments in the future and should remain online.	113 (32.2%)	90 (25.6%)	158 (45%)

### DISCUSSION

Our purpose was to find the opinion of undergraduate biomedical students regarding the OFAs experience during the COVID-19 pandemic. The authors were able to find the opinions related to the improve-

ment of learning, indicating deficiencies and motivation gained from OFAs, and this study supports this observation. It was worth noting that most of these students belong to the post-millennial generation and are technology savvy. Results showed that they were

aware of the use of computers for educational purposes. More than fifty percent of the students agreed that they were provided training for OFAs beforehand. It was strange that after training, students still found difficulties accessing the quiz and logging in.

Once the test was complete, the students could see the correct answers on the keys and get their scores immediately. They were provided feedback, so they could learn from the errors they had committed. This survey proved that students appreciate the pros and cons of the OFAs. The most valued is the possibility of obtaining the result immediately after the exam is completed with immediate feedback, which is always called the essential component of formatives.<sup>15</sup> Despite the challenges of shifting to online teaching and learning, 66% of the biomedical students reported that their OFAs contained clear, easily understandable quizzes and keys and had fewer problems. Their assessment material addressed the learning objectives.

The limitations mentioned by the students were: internet access was not good, power and electricity breakdown slow the process, some students responded that there was a delay in the appearance of the next question, due to that they were unable to finish in the stipulated time. These issues were genuine and explained in the literature on e-assessments.<sup>16,17</sup> Stress level is higher while attempting the OFA due to time constraints and connectivity issues. More than half of the students found OFA stressful compared to paper exams. The majority of these respondents were female students. Some researchers found that female students do worse than males because of anxiety toward computers.<sup>15,18</sup> Literature showed that technical problems were more in the past; students face technical difficulties and internet connectivity issues.<sup>10</sup> Almost 52% of biomedical students have freely available internet access and are trained in using Moodle.

Most of the present study respondents preferred mid-module formatives to practice as mock. Some of them did not like being evaluated by OFAs due to issues faced in the form of power and time. This may surprise you because it is a way that guarantees objectivity. Some students have a neutral opinion regarding its future use of it. For the authors, it is a guideline that this question should be examined in more detail. Similarly, previous studies in the literature have reported that hybrid assessment is becoming more accepted among students because it combines "the best of both worlds" if issues are resolved.<sup>16</sup>

However, the effectiveness of hybrid assessment depends on several other factors as well.

Formal feedback from teachers was more effective and provided to most of the students. Forty percent of the students surveyed from three disciplines preferred to have formal feedback from teachers on the same day of the online assessment. Online instructors need to provide feedback packaged in a manner that makes sense and allows students to correct their misconceptions.<sup>19,20</sup> Feedback is also a critical component in online assessment. It must be meaningful, timely, and supported by a well-designed rubric.<sup>3</sup> A study done in 2011 by Shaikh *et al*, found that e-formative assessment had a significant effect on student learning interest.<sup>21</sup> Another experimental study found that students in online formative assessment generally learn and showed more positive attitudes towards learning materials.<sup>19</sup>

This study suggests that OFAs can be designed as part of continuous assessment to increase student engagement and learning and improve the quality of the overall student experience as an alternative to paper formatives.<sup>22</sup> The concept of embedded OFAs can be centred on ongoing monitoring of learning and feedback. The findings of various studies support this concept. At the same time, many participants found this an innovative way to conduct the assessment in this pandemic situation and reported that this was the first experience for them, and they were enthusiastic.

Some of the suggestions given by students were that; they should be provided with back navigation, answer with explanations in keys will save time for feedback, and the difficulty level should be the same as summative assessments. Despite the limitation of time, we believe this study provides relevant insights into the challenges faced by OFAs in healthcare crises. By removing these challenges, OFAs can be improved for taking the continuous assessment for learning in undergraduate and health sciences students even after the pandemic.

#### **ACKNOWLEDGMENT**

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#### **LIMITATIONS OF STUDY**

This study was limited to one university. Results can be diverse if it was done at a multicentric level.

#### **RECOMMENDATIONS**

It would be interesting to determine whether our online formative assessments could have diagnostic

value. In addition, the relationship between performance in online formative assessments and summative examination marks needs to be explored in the future. One step forward would be to conduct the research within contexts that focuses on the in-depth qualitative investigation into the design and embedding of online formative assessment within biomedical courses.

### CONCLUSION

Our study corroborates that well-designed online formative assessments have considerable potential for use to assist learning for undergraduate students. Careful planning and systematic monitoring are needed.

**Conflict of Interest:** None.

### Authors' Contribution

NUA: Concept design, SJ: Acquisition data, RY: Analysis, interpretation, HM: Critical analysis.

### REFERENCES

- Norcini J, Anderson B, Bollela VR, Burch VC. Criteria for good assessment: Consensus state-ment and recommendations from the Ottawa 2010 Conference. *Med Teacher* 2011; 33(3): 206-214.
- Wilkinson TJ, Tweed MJ. Deconstructing programmatic assessment. *Adv Med Educ Pract* 2018; 9(1): 191-197.
- Gikandi JW, Morrow D, Davis NE. Online formative assessment in higher education: A review of the literature. *Comput Educ* 2011; 57(4): 2333-2351.
- Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. *Med Educ Onlin* 2020; 25(1): 1764740.
- Nagandla K, Sulaiha S. Online formative assessments: exploring their educational value. *J Adv Med Educ Prof* 2018; 6(2): 51-57.
- Ataei E, Sadeghian R, Najafi P. Identification of factors affecting the burnout in the employees of ardabil regional water company and providing solutions using the system dynamics method. *Iran J Ergon* 2020; 7(4): 21-30
- Walsh JL, Harris BHL, Denny P. Formative student-authored question bank: perceptions, question quality and association with summative performance. *Post Med J* 2018; 94(1108): 97-103.
- Khan RA, Jawaid M. Technology Enhanced Assessment (TEA) in COVID-19 Pandemic. *Pak J Med Sci* 2020; 36(S4): S108-S110.
- Walsh K. Online assessment in medical education-current trends and future directions. *Malawi Med J* 2015; 27(2): 71-72.
- Baleni ZG. Online Formative Assessment in Higher Education: Its Pros and Cons. *Electr J e-Learn* 2015; 13(1): 228-236.
- Tawalare K, Pawar J, Tawalare K, Karade R. Need of multiple choice questions (MCQs) in assessment criteria of BAMS curriculum. *J Educ Technol Health Sci* 2020; 7(2): 54-57.
- Setia MS. Methodology Series Module 3: Cross-sectional Studies. *Indian J Dermatol* 2016; 61(3): 261-264.
- Arja SB, Acharya Y, Alezaireg S, Ilavarasan V, Ala S, Arja SB. Implementation of formative assessment and its effectiveness in undergraduate medical education: an experience at a Caribbean Medical School. *Med Ed Publish* 2018; 2018(1): 7.
- Ferrel MN, Ryan JJ. The Impact of COVID-19 on Medical Education. *Cureus* 2020; 12(3): e7492.
- Kühbeck F, Berberat, PO, Engelhardt, S. Correlation of online assessment parameters with summative exam performance in undergraduate medical education of pharmacology: a prospective cohort study. *BMC Med Educ* 2019; 19(1): 412.
- Palmer E, Devitt P. The assessment of a structured online formative assessment program: a randomised controlled trial. *BMC Med Educ* 2014; 14(1): 8-10.
- Fatima SS, Idress R, Jabeed K, Sabzwari S, Khan S. Online assessment in undergraduate medical education: Challenges and solutions from a LMIC university. *Pak J Med Sci* 2021; 37(4). [Internet] Available at: <https://www.pjms.org.pk/index.php/pjms/article/view/3948>
- Gunn C, French S, McLeod H, McSpornan M. Gender issues in computer-supported learning. *Res Learn Technol* 2002; 10(1): 1-5.
- Veugen MJ, Gulikers JTM, den Brok P. We agree on what we see: Teacher and student perceptions of formative assessment practice. *Stud Educ Evaluat* 2021; 70(1): 101027.
- Carless D, Salter D, Yang M, Lam J. Developing sustainable feedback practices. *Stud High Educ* 2011; 36(4): 395-407.
- Shaikh N, Shah S, Mirza N. Impact of Formative Assessment on Students' Learning at Private Schools in District Sanghar, Sindh. *Pak Soc Sci Rev* 2020; 4(2): 473-482.
- Holmes N. Student perceptions of their learning and engagement in response to the use of a continuous e-assessment in an undergraduate module. *Assess Evaluat High Educ* 2015; 40(1): 1-14.