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Review Article

Maximizing the utility of online assessment tools in the pandemic era- A narrative review

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ABSTRACT

The COVID-19 pandemic has made a significant impact on the education system. Due to the pandemic, the students are not able to attend the courses physically, so most of the universities have now resorted to online teaching. It is extremely challenging for the faculty to teach via the online mode as they are used to the traditional way of face to face instructional model. Assessment of students is a challenge in the medical field where the students especially are assessed based on case studies and clinical examination. Regular assessment methods may not be possible in an online environment, still, they can be made rigorous by considering and incorporating a few points as narrated in this review.

1. Introduction

In the present era of COVID-19, online academic programs have become a necessity for educational institutions worldwide, and medical education is no different. Over the past 10 years, offering online courses has increased from 11% to almost 100% in the present situation.[1] Due to the pandemic, the students are not able to attend the courses physically, so most of the universities have now resorted to online teaching. Assessment of students is a challenge in the medical field where the students especially are assessed based on case studies and clinical examination.

In general, the major role of assessment is to demonstrate student's achievement of the course learning outcomes for formative feedback, a grade, or for a pass.[2] The students in the present situation may be in the perception that they need not be dedicated to attending the classes, or completing the assignments as they are not accessible to the teachers.[3] Regular assessment methods may not be possible in an online environment, still, they can be made rigorous. Before starting the course itself, specific online activities should be planned so that the students can achieve their learning outcomes.[4] Adjustments have to be made in the assessment strategies so that the standards in medical education are not compromised.

In this review we have listed a few online assessment strategies, challenges faced while using these tools, how the instructors can overcome them, and achieve maximal utility in assessing the students.

2. Online Assessment Types

Similar to traditional assessment methods, online assessment can be categorized into 2 types- formative (Assessment for learning), designed to monitor the learning, motivate students towards improvement and to provide feedback to the learning, or summative (Assessment of learning), designed to evaluate students if the program objectives are achieved, record student's achievement and certify the level of knowledge/skill achieved and make

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decisions about future eligibility.[5]

2.1. Principles of effective assessment

The principles of an effective assessment remain the same for any type of assessment conducted either traditionally, blended, or via online mode -reliability, validity, feasibility, and educational impact.[6] There has to be an alignment between the assessment methods, teaching-learning strategies, and objectives. Students learning experiences can be improved by evidence-informed assessments.[7]

2.2. Methods of online assessment

Students can be assessed by several methods online. All the reviewed methods in the literature may not be feasible, hence the teacher should decide which may be practically applicable to achieve the learning outcomes. Also, alignment with learning outcomes, the availability of supporting staff, administrative requirements, student workload, expert technical team, etc should be considered while designing the online assessments.

2.3. Factors influencing the selection of online tools

a. Objectives of the course(domain, level).
b. Characteristics of the learners (literacy, socioeconomic status, knowledge of technology, compliance).
c. Tools used (availability, accessibility, effectiveness, reliability, efficiency).

Few examples of choosing the correct online assessment strategy based on the domains, skills to be tested are given in Table 1.

2.4. Online assessments -recommendations

a. The assessments have to be planned and designed at the beginning of the academic year.
b. The course syllabus and assessment plan should be made available to the students on the learning management software (LMS) at the beginning of the semester.[8]
c. Instructions for the assessment and all the checklists and rubrics need to be very clear and complete.[9]
d. A discussion board can be created for students to clarify their questions.
e. Different types of assessment can be used to check the understanding of the students.[10]
f. For deeper engagement of students, case studies, patient videos, simulations, or other resources can be provided.[11]
g. After the completion of the assessment, constructive feedback has to be provided to the students.[12]
h. Proper planning should be done to maintain academic integrity. The same has to be discussed with the students.[13]
i. In case of technical issues, a backup or contingency plan for submitting or completing the assignments should be ready.[14]

3. Discussion Boards

These are discussion forums within an LMS, which can be used for full class / small group discussions. The students make posts, can debate on issues, analyze case studies, work collaboratively on each other's ideas, etc.

3.1. Anticipated challenges

a. Students' can post unrelated content to the actual conversation.[15]
b. Peer pressure among a few students.[16]
c. Few students may not accept comments on their posts.[10]
d. Few students may not provide feedback or comments.

3.2. Suggestions

a. To keep the students stay focused on the course content and build interpersonal relationships with colleagues, continuous discussions should be maintained throughout the course.
b. Specific topics can be given and facilitated by the instructors so that the conversations are on track.[15]
c. Personalized feedback to the students can be provided on how to make their discussion points effective.[10]
d. Word limits can be set for each post so that the posts are more manageable and students can make their points clearer. This may prevent the students from writing and reading long discussion posts.[16] e. To encourage participation and engagement, students can be rotated as facilitators or any other roles.[17]
f. Appropriate grades have to be allocated to the discussion board so that the students prioritize them. The workload of grading can be reduced by asking the students to have a self-assessment, select the best discussion posts and the student explain why they chose these posts.

4. Online Quiz

Online quizzes usually employ the LMS in which the students can complete the assessment from any location, rather than in a controlled, supervised environment.

4.1. Challenges

a. Student copying.
b. Higher-order thinking skills may be difficult to assess.[18]
c. Time-consuming to develop, test, implement, and provide feedback for multiple-choice quizzes.

4.2. Suggestions

a. Continuous assessment employing the online quiz with detailed feedback will engage the students with the course content.[19] b. Practice tests can be given on the LMS

Table 1: Examples of online tools depending on the domain of learning and skills to be tested

Domain	Skills to be tested	Methodology	Tools used
Cognitive	Knowledge Understand	Asking questions in class Multiple choice questions (MCQs) Short answer questions (SAQs)	Intext questions Web conferencing Comments on social media, blogs Online quiz Discussion forums Online assessment
	Apply Analyze Evaluate	PBL, Case studies, identify the picture, question on video	Intext question Discussions in web conferencing Online assessment Intext questions
	Create	Posters, charts, video, audio	Uploading videos on YouTube Attach posters/files/videos/pictures in forms
Psychomotor	Limitation	The demonstration followed by a reverse demonstration	YouTube video streaming Online meeting for interaction Skill lab
	Manipulation Precision	Demonstration	YouTube video streaming Online meeting for interaction Posting own video
	Articulation Naturalization	Practice with/without supervision	OSCE Demonstration /Roleplay Checklist manual Logbook Telemedicine
Affective	Receiving Responding	Asking questions in class Multiple choice questions (MCQs) Short answer questions (SAQs)	Attendance in Web conferencing Online quiz Discussion forums Online assessment
	Evaluation Organization	PBL, Case studies, identify the picture, question on video	Discussions in web conferencing Online assessment Attendance in Web conferencing
	Characterization	Presentation of case studies, posters, charts, videos, audio	Uploading videos on YouTube Attach posters/files/videos/pictures in forms

before attempting the actual quiz so that the students can familiarize themselves with the software and any challenges can be addressed.[20]

c. Peer review of the questions should be done by a co-instructor, so that there is no ambiguity in the framing of the questions, as the students cannot seek clarification as they would normally do in traditional assessment methods.[9]

d. To prevent cheating, security features such as pooling of questions, randomization of the question order, and answers have to be enabled in the LMS.[18]

e. To assess the higher-order thinking skills, case-based/problem based /videos/simulations/reflections can be added at the end of the quiz.[11,21]

f. To prevent any technical glitch, more than one attempt can be allowed and the highest score can be included in the final grade.

5. Essays/Written Assessments/Projects

5.1. Challenges

a. It may be difficult for students, who struggle with typing on the computer.[12]

b. It can be time-consuming, to provide feedback to each student.

c. The grading process can be delayed as the essays/projects require a lot of time for evaluation.

5.2. Suggestions

a. Word limits can be set to write essays so that the students can provide the required information.[6]

b. The essays can be posted as blogs or discussion posts so that the students can interact and learning happens.

c. Timely feedback can improve the writing process. The feedback should focus on the process and the product.[12]

d. Adequate time has to be provided so that the written assignments/projects are done promptly.[24]

e. The available junior faculty have to be adequately trained

Table 2: Advantages and disadvantages of e-Assessment

Advantages of e-Assessment	Disadvantages of e-Assessment
Faculty:	**Faculty:**
1. Online assessment tools can provide a more holistic way of assessing knowledge.[22]	1. Academic misconduct
2. Can monitor the progress of the students to give personalized feedback.[23]	2. Increase in workload as online teaching and assessment requires to invest a lot of time and effort
3. Interactive and multimedia questions can be incorporated.	**Students:**
4. Accessibility and flexibility.	1. Can feel isolated and less collaborative with their peers
Students:	**Costs:**
1. Can monitor their academic progress through formative tests with time-bound feedback.	1. Obtaining a license for LMS
2. Assessments can be modified to accommodate their special needs.[22]	2. Strong IT support
3. Interactive and multimedia questions possible with high validity.	3. Training costs
4. Answers can be entered/altered quickly and cleared.[22]	4. Additional qualified staff for training the faculty and students
5. Accessibility and flexibility.[22]	**Training:**
Administration:	1. Both students and faculty have to be trained in using the LMS and conducting the online exams
1. Fast grading	**Threats:**
2. Saves paper	1. Security issues
	2. Internet connectivity issues and software issues
	3. Hacking/viruses
	4. Student cheating/Plagiarism in assignments
	Assessing the learning domains:
	1. Psychomotor skills cannot be assessed completely.

in using the rubrics effectively so that the workload can be shared.

6. ePortfolios

These are electronic compilations of the personal, academic, and professional development of the students which showcase their best work and are used to monitor the skill development, and course achievements.[25]

6.1. Challenges

a. The purpose of creating an ePortfolio may not be completely understood by the students.[26]
b. If the e-learning platforms are not user friendly, the students may experience stress.[27]
c. Sometimes the ePortfolios can be distressing to the students and they may feel stressed about the workload in preparing it.[28]

6.2. Suggestions

a. The ePortfolio can be introduced early in the semester and students should be asked to work continuously on it.[26]
b. The students should be told about the importance of creating an ePortfolio in the current competitive world.
c. The students should be given detailed instructions and expectations on how to use the platform to make the most of it.[26]
d. Adequate access to technical support should be present.
e. Students gain new insights by seeing what others are doing and can build relationships by watching one another develop skills.[27]
f. The students can be provided with the rubric so that they can understand the components on which they will be assessed.[28]
g. A draft portfolio can be submitted mid-way of the course to encourage them to start working early and get feedback.
h. Reflections can be included at the end of the portfolio by providing guiding questions.

7. Online Peer Feedback

This is a process in which students are encouraged to provide comments and suggestions about an assignment or project to each other. This type of culture increases student accountability, motivation, and better engagement.[29] The students can be graded based on the feedback they are providing their peers.

7.1. Challenges

a. The students may not understand the importance of giving peer feedback.
b. The feedback they provide may not always be fair or effective.
c. They can provide only surface-level comments, which

may not be useful practically.[22]
d. Time-consuming process and intimidating for instructors.[30]

7.2. Suggestions

a. Roleplay can be done by the faculty with a feedback model to use specific action-oriented language so that the students can understand the process of giving the feedback.
b. As the students provide feedback to each other, forums/discussion boards/blogs/ announcements can be used to provide support to the students.[30]
c. When the students know that they are graded, they are more likely to provide effective feedback to peers.[31]
d. Guidelines about the process of the feedback and rubrics for evaluation should be shared with the students.[23]
e. The students should be informed to maintain a professional attitude when conducting a peer review and providing feedback.

Hence different tools can be incorporated to monitor the "assessment of learning" and "assessment for learning" in the online environment. However, in this present pandemic time, there are challenges faced by both the medical faculty and the students to get acquainted with the technical expertise.

The advantages and disadvantages of e-Assessment are listed in Table 2.

8. Conclusion

With advancements in technology, there are multiple online tools available for assessing our student's learning. However, we have to remember the dictum "No one test fits all". The feasibility, validity, and reliability of the assessment should not be compromised while using the online tools. Mapping of the assessment to the domains, learning objectives, and course content should be done to achieve maximal educational impact. Adjustments have to be made in the assessment strategies so that the standards in medical education are maintained.

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10. Conflict of Interest

The authors declare that there is no conflict of interest.

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