Pandemic Challenge Accepted: The Philippine Board of Ophthalmology Shifts to Online Administration of its Certifying Examinations

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ABSTRACT

The ongoing global COVID-19 pandemic triggered a series of events that resulted in the disruption of the delivery of various certifying examinations including that which was given by the Philippine Board of Ophthalmology (PBO). This paper shares the experience of the PBO using digital technology in administering its first ever online delivery of its certifying examinations. Online platform requirements used for delivering the examination are enumerated, online proctoring described, as well as the conduct of oral panel examinations and skills evaluation via video submission. Challenges encountered, feedback reported by both examinee and examiner, lessons learned from this endeavor, and future directions are discussed.

Keywords: Philippine Board of Ophthalmology, certifying examinations, online examination

INTRODUCTION

The Philippine Board of Ophthalmology (PBO) was founded in 1971 with one of its primary goals being the setting of standards in determining the qualifications of licensed Filipino physicians devoted to the practice of ophthalmology, to become certified as specialists in ophthalmology.[1] Today, it remains as the designated and recognized organization that undertakes this certifying function. While the examination process has evolved over the years, the last major revision to this process was implemented in 2005 with the revision of its oral examination format. Since then, until the year immediately prior to the pandemic, the certifying process consisted of a two-part examination administered two-months apart. The first part, scheduled during the second quarter of each year, consists of a 400-item multiple choice question examination divided into four (4) modules. The test is administered via pen and paper in a single center that is proctored on-site. Successful candidates subsequently qualify to take the second part of the examination which is scheduled during the third quarter of each year. In contrast to the written examinations, the second part of the certification process focuses on the assessment of clinical judgment and reasoning skills of candidates. This is divided into three parts, a slide examination where candidates are expected to recognize photographs and videos of various ocular diseases; a skills examination where candidates demonstrate their level of competency in performing the basic skills that every practicing general ophthalmologist should possess; and a panel examination which assesses each candidate's clinical reasoning and communication skills. Candidates who successfully complete these series of

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evaluation are granted certification and are conferred the title of Diplomates in Ophthalmology by the PBO.

The ongoing global COVID-19 pandemic was declared by the World Health Organization on March 11, 2020. This triggered a series of events that resulted in the disruption of the delivery of the various certifying examinations intended to assess the competency of graduates of various medical and surgical training programs across the globe. The PBO certifying activities for 2020 were not spared. Within the first month from the announcement of this pandemic, the PBO made the decision to defer the conduct of its written examination which had originally been scheduled in April 2020 to a later date while it awaited the lifting of health safety protocols in the country. As events evolved, the PBO came to the realization that the health situation in the country's capital was far from improving as the number of COVID-19 cases spiked. As such, an announcement was made that no certifying examinations would be administered in 2020 but would instead be given in the second quarter of the succeeding year. Cognizant of the imposed health restrictions, it was also announced that the written examinations would shift from its pen and paper format to one that would utilize an online platform. While the original intent was to administer the examinations in a single venue, surges in the numbers of COVID-19 cases dictated that proctoring also had to be shifted to a remote format.

As this was the first time that the PBO's certifying examinations were delivered using digital technology, it is the goal of this paper to share the experience of the PBO in delivering its examinations online, specifically, describe the examination process employed, the challenges that had to be addressed, and identify the lessons that were learned from the experience. Future directions of the PBO with regard to the certification process of trainees will also be discussed.

METHOD OF EXAMINATION ADMINISTRATION

Online Examination Platform

Minimum requirements were set by the PBO Examination Committee in its search for an online examination software. As this was a high-stakes examination, the validity and reliability of the examination had to be ensured. A primary consideration was that the online platform should be accessible to both the administrators and prospective users. Internet connectivity had to be ensured particularly during the administration of the examination. In addition to this, the preservation of academic integrity was among the requisites set forth by the PBO Examination Committee. Table 1 lists down the features the PBO required of the software as anti-cheating measures.

While most platforms were able to deliver items 1 to 5 listed in Table 1, including automatic checking of multiple-choice questions (MCQs) and delivery of results shortly after examination administration, most platforms could not generate item analysis reports as part of its standard package. The few platforms encountered that offered this service came with additional costs resulting in unforeseen and unplanned increases of examination fees. Most platforms also required the candidates to download and install a lockdown browser compatible with their platform. Unfortunately, these softwares could only be installed with computers running on Windows Operating Systems (OS) and not on Apple's MAC OS. Another major consideration was the cost of the use of the platform that eventually had to be passed on to the candidates. After taking all these factors into consideration, the PBO decided to utilize the TestInvite® Examination platform. This platform could deliver most of the listed items in Table 1. It was not capable, however, of generating reports on item discriminatory indices. Item difficulty indices could be generated but required a manual review of each item. In addition to these features, the platform was also capable of webcam video monitoring and capturing of the candidates' screen as they took the examination. It also allowed for live monitoring which permitted administrators to check the progress of the candidates in real time.

Table 1. Minimum Online Examination Features Required by the PBO

1.	Capable of simultaneous delivery of the examination to at least 120 candidates
2.	Test administrators can incorporate time limitations on items, sections and modules of the examination
3.	Contains provisions for maintenance of a secure question bank and bulk uploading of questions from MS office files such as MS Word and MS Excel
4.	Capable of randomizing the sequence of test items
5.	Capable of shuffling of the order of options for each item
6.	With options for restricting the navigation between items, sections and modules
7.	Capable of performing automatic checking of tests, preferably with ability to generate item analysis reports such as difficulty and discriminatory indices
8.	Capable of integrating with a restrictive lockdown browser that prevents candidates from leaving the examination, preferably not requiring any program installation
9.	Affordable and easy to use
10.	Available and accessible technical support

After satisfactory performance in the written MCQ examination, candidates become eligible to take the oral examinations. This was likewise revised to allow for online administration. The oral examination was divided into two parts: (1) module examinations consisting of multiple-choice, matching, or open-ended questions based on file photographs, case-based videos or diagnostic result printouts and (2) panel examination. As the TestInvite® platform supported the formats in the module examinations, the same platform was utilized for this purpose.

Proctoring

It was the intention of the PBO to administer the online examinations in just one venue. This would even the playing field in terms of internet access and stability. This,

Table 2. Proctor Responsibilities during the PBO Online Certifying Examinations

	Remote Proctors	Onsite Proctors
Verify the identity of the candidate taking the examination	Test takers are instructed to show their Medical License IDs clearly showing their photographs and details. Photographs of IDs and identities are verified and documented by remote proctors.	Test takers register onsite where they are asked to present their Medical License ID and affix their signature on a specified Attendance Sheet
Check the physical set-up	Remote proctors conduct room sweeps of each of the examinee's test area. This includes inspection of the walls, floor, and ceiling of the room. Contents of the examination table and the area under the table are checked.	Work stations within the examination venue are checked by onsite proctors prior to the start of the examination.
View and monitor the examinee's surrounding during the examination	Video and audio monitoring of the examinee's environment is conducted using a webinar virtual platform for the duration of the examination. Suspicious behavior is logged and relayed to the PBO Examination Committee for further investigation.	Onsite proctors monitor the entire onsite venue taking note of suspicious behavior.
Re-check the area and scratch papers used during the examination	A repeat of the environment check is performed at the end of the examination. Used scratch paper is shown to the remote proctors using the virtual webinar platform.	Scratch papers are collected and inspected at the end of the examination.

however, had to be abandoned due to health restrictions during the scheduled date of the examination. At that time, the National Capital Region was under "General Community Quarantine with Heightened Restrictions," with meetings, incentives, conferences and exhibitions (MICE) as well as social gatherings put on indefinite hold and disallowed.[2,3] Hence, two types of proctoring were utilized for the examination: remote proctoring and hybrid onsite proctoring. In either method, key activities that had to be performed by the proctors are listed in Table 2. This process was conducted every time an examinee left the test area, such as following bathroom and food breaks (snacks and lunch).

Onsite proctoring was allowed if candidates were able to make arrangements with their respective training institutions and a venue within the institution could be identified. The venue had to be approved by their institution's officials and it should comply with all health safety standards in place at that time. These health safety standards included maintenance of required physical distance between examinees, compliance to air flow exchange or ventilation requirements, and use of appropriate personal protective equipment during the examination.

Prior to administering the examinations, candidates, remote proctors, and the technical team were given an orientation on the examination platform. Following the orientation, a dry run of the entire examination process, from identity verification to submission of a mock examination was conducted by the PBO Examination Committee. In addition to familiarizing all users with the examination software and proctoring process, feedback was gathered on some finer details regarding the format of the items such as font and image sizes or number of items per page. Perceptions regarding ease of use and acceptability of the online platform were also analyzed.

Panel Examinations

Another part of the certification process was a panel examination. Each panel consisted of three examiners. As with previous panel examinations, the examination was standardized by providing the panels with a set of case guides which contained the same cases, corresponding questions, and rating rubrics. As a virtual format was adapted, case materials and rating rubrics were made available to the examiners thru a Google Drive link. To ensure the integrity of the examination, the panel examination was conducted simultaneously, and links to all materials were only provided to examiners one hour prior to the start of the panel examination. A list of email addresses of the examiners was prepared and only those included in the list were given access to the uploaded examination materials.

Skills Evaluation via Video Submission

The skills examination focuses on the assessment of a candidate's ability to perform selected clinical skills that each general ophthalmologist should possess. Because of face-to-face restrictions at the time of skills evaluation, the PBO required examinees to submit videos of themselves performing these clinical examinations, utilizing actors as patients. Examinees were instructed to annotate the video as they show themselves performing the examination. The examinee received a list of skills required with guide questions identifying objectives and minimum competencies. Time limits were set with optional speed-up of up to 1.25 times.

ETHICAL CONSIDERATIONS

All information was used with the permission of the PBO. Said information on the process of transition from the traditional pen and paper written certifying examinations were based on records and transcriptions of meetings of the PBO Examination Committee and reports presented and submitted by the same to the PBO Board of Trustees in its regular meetings. Feedback from both the proctors and the candidates were likewise included in the said reports. There were no human subjects involved. Any form of information regarding the examinees, including individual examinee results were excluded. Examinees' privacy remained protected consistent with the Data Privacy Act of 2012.

DISCUSSION

Assessment serves multiple purposes in medical education. In the context of certifying or licensure examinations, the primary purpose of assessment is to ensure that professional standards set forth by accrediting bodies are met by graduates of a training program, thereby ensuring that they are competent to deliver safe and quality care to their future patients.

Criteria for Good Assessment

One of the basic components of the education process is to measure the learning and performance competence of learners upon completion of instruction. It is standard practice across the different medical and surgical specialties to confer diplomate status to graduates of residency and fellowship training programs upon satisfactorily demonstrating the minimum required competencies in their field of specialization through written, practical, and/or oral examinations.

A consensus statement and recommendations from the Ottawa 2010 Conference list seven criteria for good assessment that applies to single assessments. These include validity, reproducibility or consistency, equivalence, feasibility, educational effect, catalytic effect, and acceptability. The weight and importance of each criterion would vary depending on whether the assessment is being utilized for formative or summative purposes. Of higher importance in summative assessment are validity, reproducibility, equivalence, and acceptability.[4]

Comparison of Assessment Methods

Among the major forces that had significant influence on licensure and certification in the past 25 years are the changes in technology and psychometrics that have opened new avenues for assessment.[5] The COVID-19 pandemic paved the way for educators to utilize digital technology not only in the conduct of assessment of learners but also expand its role in education as a whole. A shift from the traditional paper-pencil-based testing to computer-based assessment (CBA) became necessary due to the pandemic. According to a systematic review by Al-Ari and Ali, medical schools utilized CBAs more than in post-graduate training. The same publication mentioned that these were used primarily for formative purposes.[6]

In addition to the qualities of good assessment, a study conducted by Annika Milbradt mentioned characteristics that a CBA assessment software should possess. Aside from being reliable, functionality, usability, efficiency, maintainability and portability should also be taken into consideration.[7] Numerous literature have also been published citing the advantages of CBAs over traditional pen and paper tests. Among these advantages are the ability to deliver and administer the assessment to large numbers, and scoring efficiency since immediate scoring and reporting is possible particularly when multiple choice questions are used. The test revision process has also been noted to be more efficient.[8] Despite these advantages, educators remain apprehensive when it comes to their validity and reliability. Validity and reliability studies doing head-to-head comparisons between CBAs and paper-based examinations have been performed in other levels of education showing varying results.[9] Unfortunately, there remains a paucity of publications conducting similar studies in higher education.

Questions that were used for the 2021 PBO Written Certifying Examination were developed in 2020 and were originally intended to be delivered via the traditional pen and paper-based examination. It would have been interesting to observe if giving the same items to the same candidates via the traditional pen and paper method would have yielded comparable scores. Pairwise comparison of the mean of scores obtained in the 2021 written examination against the mean of scores of the 4 previous written examinations only showed statistically significant difference with the 2019 examination. The passing rate for 2019 was also noted to be lower at 63% compared to the 76% passing rate in 2021. There are, however, numerous factors that could have influenced these results that goes beyond the scope of this current publication. It is noteworthy however that with the deferment of the examinations in 2020, a majority of the examination takers were provided with more time to prepare compared to the 2019 candidates who would have had only 4 months to prepare for the written examinations.

Challenges and Feedback

Candidates' Feedback

Feedback from the candidates was collected following both parts of the examination. The feedback focused not only on the content and distribution of test items, but also focused on candidate perceptions on the use of the online platform. Of the 112 candidates who took the written examination and the 88 oral examination candidates, 24 (21%) and 26 (29.5%), respectively, reported having issues while taking the examination. The slightly higher number of candidates experiencing problems during the conduct of the oral examination was possibly related to the examination content. In contrast to the written examination, items in the oral examination had numerous media attachments in the form of photographs or videos which would explain why loading of media was the most common issue reported for the oral examination. Platform access problems were encountered more in the written examination and was later identified to be an issue with the Domain Network Server (DNS) settings of the device and the conflicts with the internet/wi-fi modem being used by the candidates. The other issues listed in Table 3 such as early examination termination, non-recording of answers and timer issues were found to be related to system security measures implemented by the examination platform. A review of the log records of the concerned candidates showed that these were related to flagged full screen violations and exceeding the time allotted

Table 3. Examination Issues Reported by Candidates

Issues Identified	Written Exam (N=24)	Oral Module Exam (N=26)
Platform access problems	10 (41.7%)	6 (23.1%)
Pre-termination of the examination	8 (33.3%)	5 (19.2%)
Internet stability	3 (12.5%)	-
Loading of media	-	7 (26.9%)
Recording of answers	-	5 (19.2%)
Examination timer issues	-	2 (7.7%)
Power interruption	-	1 (3.8%)
Webcam issues	1 (4.2%)	-
Not specified	2 (8.3%)	-

Table 4. Challenges Encountered during the Panel Examination and Suggested Solutions

Challenges	Suggested Solutions
Procedures	• Standardize examiner roles (e.g., timer, questioner, access to case materials, screen sharer) • Conduct a mock examination going thru the entire process with designated individuals acting as examinees
Zoom Platform issues	• Provide distinct links for different batches of examinees • Use of alternative conferencing platform with screen-sharing capability that eliminates the need for sharing of slide presentations
Technical issues	• Increase the number of the technical team to immediately address issues that may arise • Hire a professional technical team familiar with the conferencing platform
Communication issues	• Establish clear house rules and procedures for using the group chat platform

for the item or section of the examination. While candidates were able to input their responses, the system recorded them but no longer considered them as valid for grading purposes. The platform's support and technical team addressed these issues to ensure proper inclusion of the candidates' answers after the examination. In cases of early examination termination, reviews of the live monitoring files of candidates were utilized to determine who among the candidates would be allowed to re-enter the examinations with the necessary time adjustments.

Majority of the candidates gave a positive response regarding the use of an online or computer-based examination for future certifying examinations. This format was particularly advantageous to those candidates who would require travel to and from their respective regions to the venue site which was in the National Capital Region. Majority of the candidates found the platform easy to learn, use and navigate. There were a number who also appreciated the security features included in the platform such as time limits, restricted navigation, lockdown browser and enforcement of full screen mode, considering the high-stakes nature of the examination. Negative reviews of the platform included difficulties with accessing the platform and downloading of media files. Inconsistencies in the timer countdown was also raised as an issue by a few candidates. These problems arose even if internet connectivity speeds were compliant with published speed requirements of the platform used. The presence of technical support during the conduct of the examination was therefore important so that solutions to these issues were provided in a timely manner.

Panel Examination Examiner Feedback

A total of 88 out of 116 (75.9%) panel examiners provided feedback using a rating scale from 0 to 10, with 10 as the highest score. More than 90% of the examiners rated the clarity of the orientation including the provided paraphernalia, with at least a score of 8, although only 85% rated the technical requirements as easily achievable. Ninety-two percent judged the cases given by the PBO as within the competencies expected of a general ophthalmologist and ascertained that each examinee was given ample time allotment during the conduct of the examination to discuss the cases (97.8%). The online Zoom® format with breakout rooms for each panel was rated at least an 8 by 81.8%, with the overall conduct of the virtual examination getting a rating of at least an 8 for 82.9%. Positive feedback was given for the administration of the certifying examination using an online platform, stating the advantages with regards travel and safety in this time of the pandemic. Panel examination questions were described as well written and well prepared. The cases used were considered thorough, easy to understand, objective, fair, and measured the examinees' knowledge adequately and comprehensively. Google forms utilized for grading were considered easy to use, although a handful of examiners required minor technical assistance in this regard.

A major challenge noted by the PBO was the sharing of examination access amongst examiners where individual access was preferred and provided. This could be due to the non-reading of orientation paraphernalia that was given before the actual conduct of the examination. Practice sessions with the examiners, with mock examinees would have reduced the glitches encountered by the examiners and would have provided for smoother flow. A PBO-specific email address for the sole purpose of the panel examination would have been a more secure option that will be considered in future iterations of this examination. Designated roles from amongst the three examiners per panel, such as designated screen sharer, and timer would allow for a seamless conduct of the panel evaluation. Other suggestions of examiners are listed in Table 4.

The issues presented here echoed the challenges associated with the implementation of delivering an examination using a virtual digital platform presented by Petit, et al.[10] It is worth mentioning here that one of the recommendations provided by the authors of this publication was to investigate the possibility of delivering online examinations 'offline'. In such a set-up, candidates are instructed to download

Table 5. Challenges and Recommendations for Using Online Examination Platforms

Challenges	Recommendations
Maintaining the integrity of the examination	Integration of security features to the examination platform • Restrict browser access • Screen captures (video or photographs) • Webcam monitoring of candidates • Randomization of the order of items • Shuffling of choices of MCQs • Restrict navigation between pages and sections • Incorporate time restrictions on exam, section and/or question items
Poor candidate internet access	• Ensure compatibility of internet bandwidth with examination platform requirements • Provide for back-up internet source
Systems failure and compatibility	• Secure a listing of system requirements for platforms to be used from providers • Conduct a mock examination and a dry run of the intended examination process with proctors and technical team in attendance • The examinee's device and location should ideally be the same as the one intended for use during the actual examination
Monitoring of examinee home environment	• Provide candidates with listing of allowed behavior • Define behavior that will be flagged as suspicious behavior • Provide candidates with requirements for acceptable examination home environment
Maintaining the integrity of the question bank and its items	• Limit the access to the platform's question bank and examinations to a few key individuals • Restriction of examination availability to a short, limited time • Simultaneous examination administration
Detection of cheating	• Verify examinees' identity • For remote proctoring, monitor environment continuously with the aid of additional cameras • Employ digital technology and artificial intelligence to identify suspicious examinee behavior • Keep a log of examinee/platform interactions; screen capture photos/videos and webcam photos/videos

examinations but can only access the downloaded material within a predetermined prescribed time. In this instance, the platform should be able to filter access by incorporating a program that recognizes previously registered internet provider addresses that were given prior access to the pre-loaded examinations.

Lessons Learned

Table 5 summarizes the various challenges encountered with online examination administration and corresponding recommendations on how these challenges can be mitigated.

From the perspective of examination administrators, advantages of the online or computer-based examination included removal of security risks associated with printing and storage of all examination materials and more efficient delivery of feedback on the performance of the candidates follo-wing administration of the examination. Results from MCQ examinations were available almost immediately after their administration as these can all be corrected by the platform. While open-ended questions still required manual scoring, the burden of reading answers from examinees with unreadable handwriting was eliminated.

Examination administrators should, however, ensure that the proctors and technical support team have received adequate orientation and training on the features of the platform and the examinee monitoring process prior to examination administration. In terms of costs, while additional expense from purchasing the use of the online examination and webinar platforms had to be considered, remote administration translated to removal of the cost for reproduction of the examination, venue rental and food.

Questions remain as to the validity of utilizing the virtual platform for assessment of clinical ability. As there remains to be a paucity of evidence from existing literature on the validity of online case-based simulation assessments, the PBO did not venture on conducting online case-based simulations and limited itself to the assessment of clinical reasoning using standardized cases through its panel examinations. The examination content was similar to what had been used during the pre-pandemic years, the main difference being the shift to use of virtual breakout rooms instead of physical rooms. Examiners gave the virtual format positive feedback and assessed it to be a viable alternative to physically conducted examinations. The main issue that had to be addressed with the virtual format, aside from ensuring continuous internet connectivity of both the examinee and examiners, was the security of the examination materials as this was shared with all examiners. Should the virtual format be used for future examinations, it was recommended that only board-selected examiners be provided with the examination material to minimize potential security risks. While the use of Google Forms to record examiner ratings appeared adequate, other platforms capable of delivering and recording rating rubrics such as Likert scales can be explored. The possibility of utilizing CBA platforms with these capabilities should be explored for future use.

FUTURE DIRECTIONS

The PBO continuously looks for ways to improve its certifying and accreditation processes. The shift to online or computer-based delivery of the certifying examinations was demanded by the existing global pandemic. Despite the numerous challenges posed by the implementation of the virtual platform, it proved to be a viable alternative to the traditional paper and pen-based assessment that can return valid and reliable results. Computer-based examinations have been found to be efficient in terms of their ability to provide immediate feedback on the candidates' performance, randomization of item selection from a question bank, shuffling of alternatives when using MCQs, and incorporation of media files to the questions. Integrity issues are addressed by integrating them with security features such as the enforcement of restricted browsing, and webcam and screen recordings. In addition, CBAs eliminate the security and environmental issues associated with printing of examination materials. Data analysis capabilities of the software should be looked into so that the performance of the test as well as the quality of the individual items used can be reviewed. Future examinations can be administered in test venues identified to have sustained stable internet connectivity. Ideally, these venues can be equipped with standard devices to ensure compatibility with examination and monitoring platforms. There are continued efforts to further improve already existing online examination platforms. Perhaps, in the future, even evaluation of the performance of clinical skills can be done using the virtual platform.

Statement of Authorship

Both authors contributed in the conceptualization of work, data gathering and analysis of information, drafting and revising, and final approval of the version to be published.

Author Disclosure

Both authors declared no conflicts of interest.

Funding Source

None.

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