RESEARCH ARTICLE

West African College of Surgeons Basic Ophthalmology Resource: Development and Initial Evaluation

Shuaib Abdulsalam, Dupe Ademola-Popoola, Adetunje Adenekan, Olukorede Adenuga, A.O. Adio, Iheanacho Agbo, Akwesi Ahmed, Ingrid Selom Akafo, Stephen Akafo, Sade Akinsola, Bruce Allan, Nishani Amerasinghe, Kwesi Nyan Amissa-Arthur, Winfred Amoaku, Olufisayo Aribaba, Femi Babalola, Ronke Baiyeroju, Hannah Bassey-Faal, Michele Beaconsfield, Sola Bob-Egbe, Imoro Zeba Braimah, inston Ceesay, Chimdi Chuka-Okosa, Jimi Coker, Catherine Cross, Claudia Dacosta-Paula, William Dean, Edith Dogbe, Ros Duhs, Vincent Ekpe, Vera Adobea Essuman, Edak Ezeanosike, Oluyemi Fasina, Gladys Fordjor, Nigel Griffith, Catherine Guly, Kirsty Hall, Fatima Kyari, Pat Lockley, Abdulraheem Mahmoud, Evelyn Mensah, Christine Moore, Caleb Mpyet, Ian Murdoch*, Tunje Nelcon, Eleni Nikita, Winifred Nolan, Ojo Perpetua Odugbo, Kayode Odusote, Olufunmilola Ogun, Kolawole Ogundimu, Bade Ogundipe, Olusola Olawoye, Tunji Sunday Oluleye, Bolutife Olusanya, Adeola Onakoya, Peter Osei-Bonsu, Joshua Owoeye, Kehinde Oyewole, Maria Papadopoulos, Natasa Perovic, Manish Raval, AshwinReddy, Serge Resnikov, Elsie Samaila, John Sandford Smith, Yusrah Shweikh, Dawn Sim, Mina Sotiriou, Paul Sullivan, Naa Naamuah Tagoe, Ok Thaller, Raymond Toseafa, Eno Udongo, Claire Walker, Louisa Wickham,

*Corresponding author: i.murdoch@ucl.ac.uk

ABSTRACT

Purpose: To describe the process of development of the West African College of Surgeons (WACS) Basic Ophthalmology Educational Resource and to report the feedback from the first five cohorts to utilise the resource at the commencement of their training in ophthalmology.

Methods: After initial meetings topics considered essential foundations for training in ophthalmology were identified. Faculty members subsequently searched the internet to identify suitable online open source learning materials relevant to each topic, which were then collated and cataloged. Where suitable quality learning materials could not be identified, materials were created or re-used from existing WACS courses. Following the creation of the resource, questions were developed for a summative assessment, taken by learners upon completion of the resource.

Results: The resource went 'live' on 10th July 2019. As of March 2024, a total of 203 learners in 5 cohorts had completed the course. The feedback responses of 150 (74%) learners from the first 5 cohorts are described in this report. Regarding their overall assessment of the course, 64 (43%) learners rated the resource as very good', 63 (42%) as 'good', and 23 (15%) as 'satisfactory'. Most (>98% respondents reported that the course met their expectations and that the content was relevant to their learning needs.

Conclusion: The WACS Basic Ophthalmology Resource appears to be a valuable opportunity for acquiring foundational knowledge.

Introduction

This article aims to analyze the creation of resources for learners commencing ophthalmology training in West Africa. In July 2006, a memorandum of understanding (MOU) was signed by the West African College of Surgeons (WACS), KorleBu Teaching Hospital (KBTH), Moorfields Eye Hospital NHS Foundation Trust (MEH), the Ministry of Health, Ghana (MoH), the University of Ghana Medical School (UGMS) and the West African Health Organisation (WAHO). This MOU was to facilitate the creation of an Ophthalmic Surgical Training Centre for West Africa within the site at KBTH. Subsequent consensus meetings primarily involving the Faculty of Ophthalmology of the WACS led to the development of a new curriculum for the training of ophthalmologists in West Africa. The need for this is highlighted in two more recent articles on human resource in the region.[1,2] . We sought to assist in the improvement of the structure of ophthalmologists' training in the West African subregion. This educational innovation involved active guidance and input from the University College London (UCL) Arena Centre for Research-based Education (formerly the Centre for Advancing Learning and Teaching).

In the development of the aforementioned curriculum, WACS faculty members noted the unique challenges faced by those entering ophthalmic specialist and subspecialist training. Ophthalmology education during medical school is often very limited.[3] The skills developed during medical school for systemic examination become less relevant. In contrast, the specialty of ophthalmology involves a plethora of skills, such as slit lamp examination, indirect ophthalmoscopy, orthoptic examination, and retinoscopy; skills with which new starters may lack confidence or with which they may not have received previous training[4] . Additionally, ophthalmic trainees are required to gain an understanding of topics including the scientific basis of ophthalmic diseases, clinical ophthalmology and optics.

To address the gap in skills and knowledge, we devised an online learning resource. This resource introduces fundamental skills and concepts essential to our specialty, with the primary goal of providing new trainees with the foundational knowledge necessary for advanced training.

An 'off the shelf' introduction to the 'world of ophthalmology' did not exist for us to offer to those entering the training program. This article describes the creation of this resource and the feedback from the first set of cohorts to use it as they commenced their training in ophthalmology.

Method

The UCLeXtend online platform offers a diverse range of courses designed for students at UCL and affiliated institutions (https://extend.ucl.ac.uk). The development of each course is a time-intensive process. As there was not enough time to generate new learning resources, freely accessible materials, readily available on media platforms (eg YouTube.com) were explored. Topics considered essential foundations for training in ophthalmology were identified. Individual faculty members scoured the internet for specific topics and gathered relevant high-quality teaching resources. Original material was used where information was insufficient; additionally, we re-used the teaching materials we had previously created, including content from other WACS courses, such as those on glaucoma and medical retina. The content of the resource is shown in figure 1 a screen shot of the front page. The resultant resource was free to access.

Following resource creation, questions were developed to enable learners to assess their understanding of each topic. These questions are presented as an assessment to be taken upon completion of the resource. It is recognised that engaging with assessment quizzes reinforces the retention of newly acquired knowledge[5]. Learners in the first 5 cohorts were able to complete the assessment without limits on the number of attempts (the number of attempts has now been restricted, as detailed in the discussion). As an integral component of the curriculum, trainees are required to successfully complete the resource modules and attain a passing grade of 70% or higher in the final summative assessment quiz.

Evaluation of the learning experience is key[5]. Learners are invited to complete an online questionnaire upon course completion. The format of the feedback included multiple choice questions in the form of a 5-point Likert scale, and free-text responses. The questionnaire had 18 questions exploring the learners' overall rating of the course in relation to their own expectations/requirements and what aspects were particularly liked and disliked. Individual sections were similarly graded by the learners for their 'usefullness'. We report the results below.

Results

Figure 1 shows the first page of the course. The topics covered and overall structure can be seen.

Figure 1 Screen shot of WACS basic ophthalmology on-line resource showing structure.
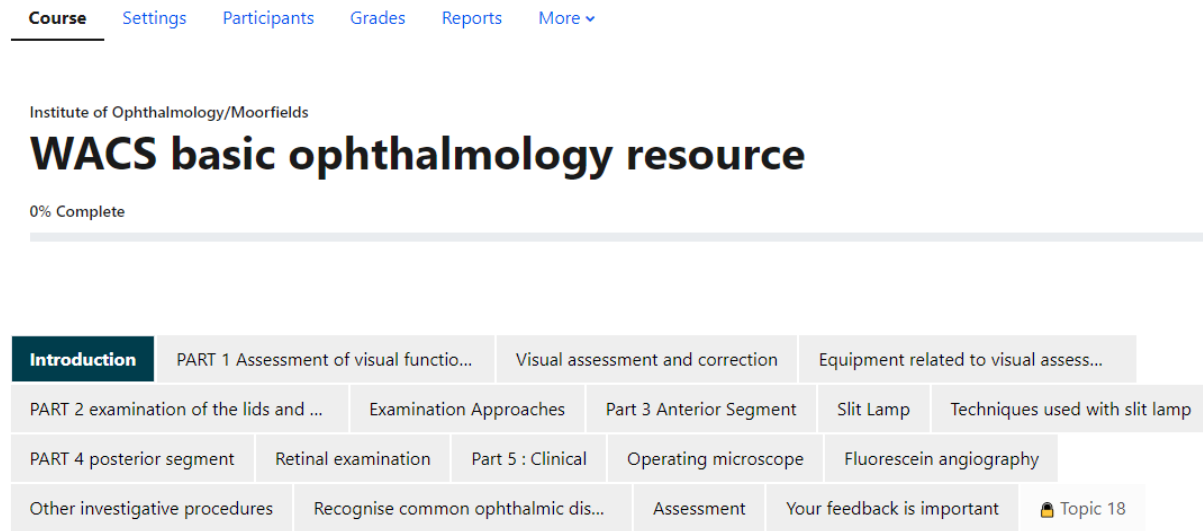
From the 5 cohorts to complete the course (updated March 2024), 203 feedback responses were received. Duplicate accounts were identified and removed. For learners who opted to submit more than one response to feedback, their most recent response was included in the analysis. A total of 150 separate responses from learners in cohorts 0-4 are included in this article.

When asked to provide an overall assessment of the course, 64 (43%) rated the resource as 'very good', 63 (42%) as 'good' and 23 (15%) as 'satisfactory'. There were no 'unsatisfactory' or 'very unsatisfactory' responses in the evaluation. Further detailed feedback was provided by all of the 150 learners, with >98% of respondents reporting that the course met their expectations, containing content relevant to their learning needs (See Figure 2). Ten learners (7%) reported difficulty navigating the online material, with 5 of these offering further comments. One response highlighted the difficulty navigating the material using their phone but not when using their computer, while 3 felt the organisation of the material could be improved. All but 1 respondent felt the learning materials and assessment quizzes supported their learning. One-hundred and twenty seven learners (85%) felt the material was attractive, while 16 (10%) were unsure; the 7 (5%) of respondents who disagreed with this statement offered no further comment.

Respondents were asked how the course had influenced their development. All 150 free text responses were positive. Figure 3 breaks down the areas of professional development highlighted by the learners. Amongst the 104 reporting knowledge enhancement, an improved understanding of optics was entered most frequently. Gonioscopy was most frequently mentioned by those reporting improved understanding of examination skills. It was encouraging to note one respondent felt better prepared to mentor junior trainees in the field.

In response to the question "How did this course contribute to your professional development?" learners shared their insights, as illustrated in Figure 3. It is notable that some participants indicated a broad improvement in their overall learning experience, whereas others distinctly emphasized advancements in specific areas such as examination skills.
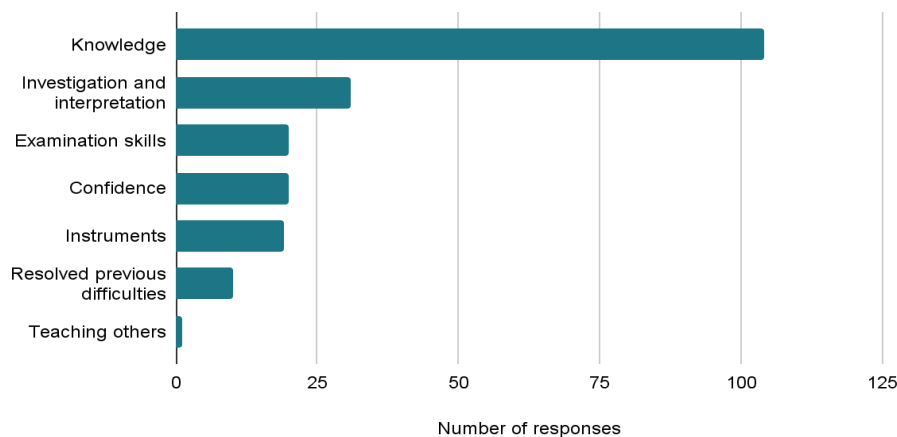
Figure 2: Evaluation of WACS basic ophthalmology on-line resource: responses on overall course content

Course Feedback (n=150)

■ 1 : Strongly agree ■ 2 : Agree ■ 3 : Don't know ■ 4 : Disagree ■ 5 : Strongly disagree
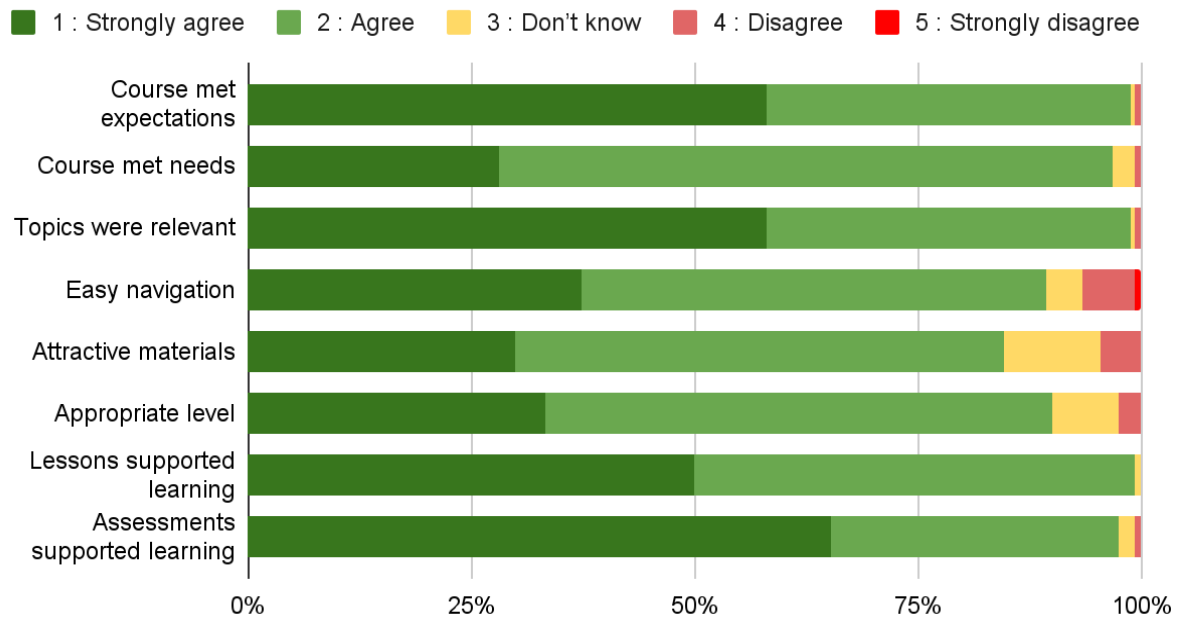
Figure 3: Evaluation of WACS basic ophthalmology on-line resource: How did this course develop you professionally?


How did this course develop you professionally?

Learners were asked which aspect of the course was felt to be either too complex or too simple. The results are summarised in Figure 4.

Ninety-three learners (62%) reported their satisfaction or neutral comments regarding the overall complexity of the course. Eight respondents offered generic comments of the course being too simple, and 6 found the course too complex. The remaining 43 learners highlighted 55 specific aspects. The most common part of the course deemed too simple was visual acuity (7), while refraction was mentioned in 2 responses. Optical Coherence Tomography (OCT), Fundus Fluorescein

Angiography (FFA), and gonioscopy received 1 comment each. The most complex aspects of the course were pachymetry (6), followed by contact lenses (5), optics (5), and OCT (5). Slit lamp examination and FFA received 4 mentions, refraction received 2, and instruments, focimetry, and gonioscopy each received one mention each. Lastly, the operating microscope section and the overall navigation were felt to require improvements by 1 learner. Interestingly, in this section, one respondent took the opportunity to highlight their desire to see more African ophthalmologists presenting materials.

Figure 4: Evaluation of WACS basic ophthalmology on-line resource: Course Complexity

Course Complexity
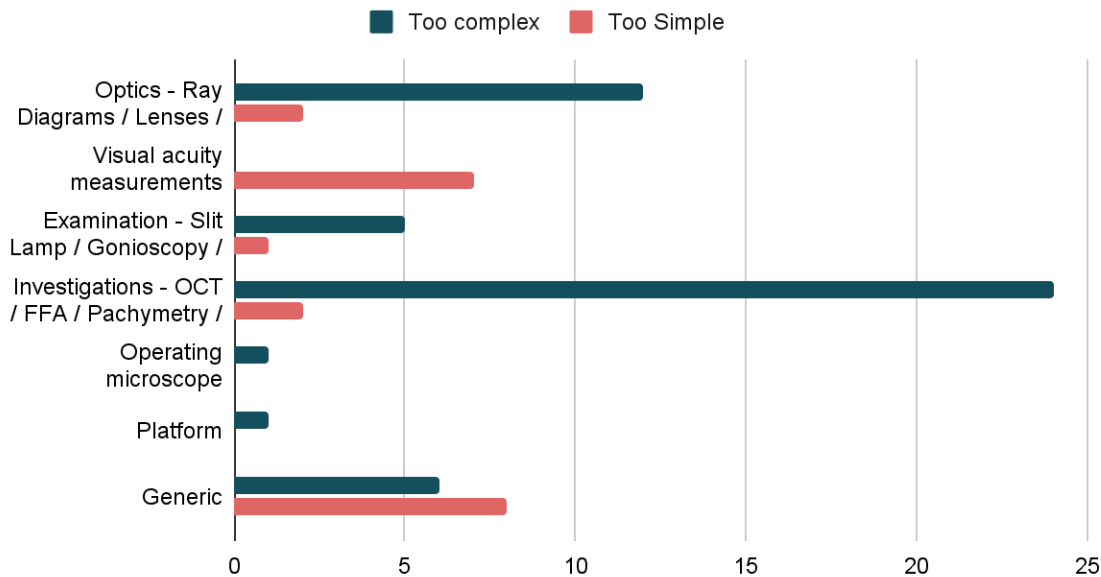
Learners were also asked to highlight which features of the course they liked the least. The online videos, which featured strongly in the most frequently liked aspects of the course, also featured in the disliked aspects. On review of the free-text comments, this predominantly appears to relate to challenges with internet access, with comments expressing frustration regarding broken links, difficulty achieving a stable internet connection and the inability to save material for offline access. Table 1 provides a summary on the least liked aspects of the course.

Table 1: Evaluation of WACS basic ophthalmology on-line resource :Aspects of the course the users liked least.

Themes	n=	Theme subcategory	Comments
Technical	48	Online Platform and Navigation	Heavy youtube videos. Instructions were not clear. lots of advertisements. Inability to save files offline for easy reference. Navigation was a bit difficult.
		Internet Connection and Data Costs	It is data and time consuming. I do have network issues sometimes. High internet data consumption.
		Technical Issues	The slides because there were some missing links. Time consuming due to technical issues
Content	79	Time and Duration	It is quite voluminous. The time frame is short.
		Course Materials	The slides were very lengthy. Some of the portions of the course were superficial. Some of the materials were not explanatory enough.
Other	21	Assessment and Quizzes	Inability to ask questions on discussed topics. I was wrongly marked down in assessment.
		Interactivity/Preference for F2F interaction	There wasn't much of an interactive platform for fellow course members to interact. The absence of live sessions with the course organisers.

Learners were asked to highlight their favorite aspect of the course. The aspects most liked are summarised in Table 2. The video content was the most commonly appreciated. The ability to undertake the course at their own pace along with the diversity of learning aids was also commonly highlighted. The layout, flow and structure were reported to aid this.

Table 2: Evaluation of WACS basic ophthalmology on-line resource:The favorite aspects of the course

Themes	n=	Theme subcategory	Comments
Content	81	Videos	The video courses were more practical and easy to understand. The video lectures and how explicit and simple they were to understand.The explanatory videos. A lecturer always gets the knowledge across better than literature.
	20	Written materials	Several different materials were used to explain the topics, making comprehension better. It covered the whole scope of basic ophthalmology.
Structure	39	Flexibility	Running the course at one's pace. It is not rigid and gave me time to combine both work and study. I can read at my own pace with no pressure. I loved how i could read and re-read the same thing over and over till I understood it;
	11	Course Organization and Structure:	The user-friendly interface. It's simplicity. The variety of links.Simple and stepwise approach. Multiple sources of information.
	9	Assessment	The quiz is what I love most because it tests one's understanding of the subject matter. It's simplicity and the fact the I get to retake the assessment
Other	7		It gave me the opportunity to have an idea of what I should know. All Encompassing. It directs one to the most important reason for conducting the ophthalmology test.

Discussion

The Basic Ophthalmology Resource went live in July 2019 and subsequently all doctors from each new cohort of Ophthalmology Trainees registered with WACS were required to complete the course materials, oversight of which is managed locally. To the best of our knowledge, this is a unique resource. Although the Royal College of Ophthalmologists has several introductory courses on https://portal.e-lfh.org.uk/, these are stand-alone modules and are not arranged into an introductory package for novices to ophthalmology. Whilst there have been quite a few publications on overall ophthalmology training[1,6-9] there is little we have found looking at the introduction to ophthalmology for new trainees.

Indicators of the success of this course are feedback, completion rates, and high pass rates. Feedback on 'overall impression' shows that 84% of participants were positive about the course.

COURSE MODIFICATIONS
We were not satisfied with the original summative assessment process. We had observed that several learners had attempted and/or completed the summative assessment on more than one occasion. Numerous additional questions have been added to the question bank to vary assessment content. Each assessment consists of a random choice of 12 questions from this bank. Although repeated engagement with assessments supports learning[5], open-ended attempts risked an overly long process for summative purposes. Following course completion, learners are allowed two attempts at the summative assessment. A set period of three months for undertaking the course has now been introduced. Summative assessment is open during this period. Following this period, access to the summative assessment is closed whilst the resource remains permanently available to all learners. If learners do not pass the summative assessment after two attempts, they are required to repeat the course with two further attempts at the summative assessment. If they are unable to pass at this stage, learners have to apply for special permission to repeat the attempt.

Evaluation of the WACS Basic Ophthalmology Resource

The key advantages of the resource include its accessibility to a variety of learners located over large geographical areas, the reduced costs when compared with in-person teaching and the flexibility of the resource to be completed at the

user's leisure, which we believe will increase learner engagement. This course also allows learners to study and work in their training centres, thus providing the opportunity to learn the practical skills observed while studying. Since the development of this course the COVID pandemic resulted in a large increase in both online courses and literature on the experience.[10] Our course, however, is designed as online learning and not emergency remote teaching as detailed by Hodges et al. [11]

A clear shortcoming of the resource lies with the fact that practical ophthalmological skills cannot be developed without hands-on learning in clinical settings. However, it is not the objective of the resource to replace the invaluable practical experience, but to provide the learner with the foundations required for further development, and to mentally prepare the learner for the 'World of Ophthalmology', and ultimately accelerate their adjustment into our specialty. The practical skills are taught in the training centres to which each learner is affiliated. Of the three interactions identified by Moore[12] the resource as it stands only has learner-content interaction. Learner-instructor and learner-learner interactions require additional resource we do not have at present. Both are logical interactions to develop in order to improve the course in the future as resource allows.

None-the-less the resource requires active monitoring. Internet links require constant review. In response to feedback relating to the issue of broken internet links, we introduced a program which checks each link for validity on a weekly basis and reports links that break or are changed such that they are significantly different. The tool extracts a corpora of words from each page and monitors those for change so they can receive attention. Additionally, to address feedback requesting support while participants complete the online resource, we introduced a forum where learners can ask questions and highlight issues. We aim to

modify various aspects of the course in the future based, on the responses received.

In 2021 Ahmed et al reviewed effective practice principles in the design and delivery of digital resources.[13] They outlined outlined five principals: Principle 1: Relevance: meeting teachers' needs, Principle 2: Educational value: focusing on learning, Principle 3: Managed and flexible learning environment, Principle 4: Social presence: participants are engaged with the content, facilitator and peers, Principle 5: Quality content: using diverse media drawn from reputable sources. We believe we have adhered to four of these principals and recognise we are presently insufficiently adherent to principal 4, primarily due to resource limitations. This provides a clear area for further development.

This WACS Basic Ophthalmology Resource appears to be a worthwhile learning opportunity. Its success to date is an excellent testament and legacy to all individuals and organisations that have contributed to its inception and subsequent achievements. We plan a future study to assess how useful participants found the knowledge in their subsequent professional lives.

Conclusion

We describe the process of development of the West African College of Surgeons (WACS) Basic Ophthalmology Educational Resource and to report the feedback from the first five cohorts to utilise the resource at the commencement of their training in ophthalmology. Over 98% of learners reported that the course met their expectations and that the content was relevant to their learning needs. We acknowledge a lack of social presence in the course at present and are using the feedback to further improve the course. However we conclude that the WACS Basic Ophthalmology Resource appears to be worthwhile learning opportunity for acquiring foundational knowledge.

References

1. Dean W, Gichuhi S, Buchan J, Matende I, Graham R, Kim M, Arunga S, Makupa W, Cook C, Visser L, Burton M. Survey of ophthalmologists-in-training in Eastern, Central and Southern Africa: A regional focus on ophthalmic surgical education. Wellcome Open Res. 2019 Nov 27;4:187. doi: 10.12688/wellcomeopenres.15580.1. PMID: 31886411; PMCID: PMC6913214.

2. Musa, K.O., Idowu, O.O., Aribaba, O.T. *et al.* Sub-specialization among Nigerian ophthalmologists: status, disposition and barriers. *Int Ophthalmol* **42**, 3005–3015 (2022). https://doi.org/10.1007/s10792-022-02286-6

3. Mortensen P, Enzor R, Keppel K, Williamson R, Jones P, Nkrumah G, Safiullah Z, Michelson S, Nadimpalli S, Shue A, Waxman E. The Ophthalmology Mini-Elective Gives Vision to Preclinical Medical Students. MedEdPORTAL. 2020 Nov 23;16:11024. doi: 10.15766/mep_2374-8265.11024.

4. Elved Roberts, Rosemary Morgan, Debra King, Louis Clerkin, Funduscopy: a forgotten art?, Postgraduate Medical Journal, Volume 75, Issue 883, May 1999, Pages 282-284, https://doi.org/10.1136/pgmj.75.883.282

5. Yang, C., Luo, L., Vadillo, M. A., Yu, R., & Shanks, D. R. (2021). Testing (quizzing) boosts classroom learning: A systematic and meta-analytic review. *Psychological Bulletin*, 147(4), 399–435. https://doi.org/10.1037/bul0000309

6. Tsai ASH, Yeo BSY, Anaya Alaminos R, Wong CW, Tham CC, Fang SK, Lam DSC, González-Andrades M, Ang M. Survey of Ophthalmology Training Experiences Among Young Ophthalmologists in the Asia-Pacific. Asia Pac J Ophthalmol (Phila). 2022 Sep 1;11(5):434-440. doi: 10.1097/APO.0000000000000556.

7. Grover AK, Honavar SG, Azad R, Verma L. A national curriculum for ophthalmology residency training. Indian J Ophthalmol. 2018 Jun;66(6):752-783. doi: 10.4103/ijo.IJO_327_18.

8. Anaya-Alaminos R, Rassmussen ML, Fung SSM, Potic J, González-Andrades M. Comparative analysis of European residency programs: benchmarking and harmonizing ophthalmology training in Europe. Eye (Lond). 2023 Mar;37(4):725-731. doi: 10.1038/s41433-022-02040-3. Epub 2022 Mar 30.

9. Masanganise R, Samkange C, Mukona D, Aagaard E. Competency based ophthalmology training curriculum for undergraduate medical students in Zimbabwe. Cent Afr J Med. 2015 May-Aug;61(5-8):44-8. PMID: 29144080.

10. Kogan, J. R., & Shea, J. A. (2007). Course evaluation in medical education. *Teaching and Teacher Education, 23*(3), 251–264. https://doi.org/10.1016/j.tate.2006.12.0206 –

11. Koh JHL, Daniel BK. Shifting online during COVID-19: A systematic review of teaching and learning strategies and their outcomes. Int J Educ Technol High Educ. 2022;19(1):56. doi: 10.1186/s41239-022-00361-7. Epub 2022 Nov 9. PMID: 36404984; PMCID: PMC9643977.

12. Hodges, C. B., Moore, S., Lockee, B. B., Trust, T., & Bond, M. A. (2020). *The difference between emergency remote teaching and online learning*. Educause Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

13. Michael G. Moore (1989) Editorial: Three types of interaction, , 3:2, 1-7, DOI: 10.1080/08923648909526659

14. Ahmed, S. K., Mitchell, P., & Trevitt, J. (2021). Rapid review of effective practice principles in the design and delivery of digital resources for teachers. Australian Council for Educational Research. https://doi.org/10.37517/978-1-74286-671-0