



## Review Article

# Novel e-learning platform for orthopaedic training in LMICs: A descriptive review of the IGOT portal



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## ABSTRACT

**Background:** While e-learning has been written about extensively within the context of orthopaedics in the United States, there are few articles describing e-learning initiatives geared towards low-and middle-income countries (LMICs). The Institute for Global Orthopaedics and Traumatology (IGOT) at the University of California, San Francisco (UCSF) developed the IGOT Learning Portal to meet this need.

**Methods:** The IGOT Learning Portal was designed to address knowledge gaps in patient care by increasing access to high-quality orthopaedic education for surgeons and trainees worldwide. It offers 10 distinct, asynchronous courses, which are divided into a modular format. Course enrollment is free and accessible to any surgeon or trainee with a web-browsing capable device and internet connection.

**Results:** There are more than 2700 registered users and 300 active learners enrolled in IGOT Learning Portal courses. The Surgical Management and Reconstructive Training (SMART) program is the most commonly taken course. Learners represent 32 different countries across six continents. The IGOT portal also has surgical videos available on YouTube. The IGOT Portal YouTube channel has over 2000 subscribers and over 143,000 total views.

**Conclusions:** The IGOT Learning Portal is an innovative approach to address the global disparity in orthopaedic trauma care by improving access to high-quality surgical education for surgeons and trainees both in the US and internationally. The development of an interactive online forum may be a beneficial addition to the Portal. Future directions include assessing content retention, participant interaction, and expanding existing content to other orthopaedic subspecialties.

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## Introduction

Given the constraints that the Coronavirus disease 2019 (COVID-19) pandemic placed on in-person gatherings, the use of electronic learning platforms (e-learning) has become an innovative and important tool within orthopaedic training. Modalities such as online lecture series, computer-based learning modules, podcasts, and webinars have all been used to support orthopaedic education [1–3]. E-learning has not only been necessary in combating the constraints of socially-distant learning, but it has been proven to be an effective tool that meets the expectations of learners [1]. A meta-analysis of nine randomized control trials found that video-based e-learning was associated with decreased learning duration of surgical skills and increased learner satisfaction compared to in-person learning [3]. While e-learning has been written about extensively within the context of orthopaedics in the United States (U.S.), there are few studies that describe e-learning initiatives in low- and middle-income countries (LMICs) [4–6]. A review article of e-learning initiatives in LMICs found that e-learning was a useful tool that helped overcome barriers in accessing professional development and improved learning retention [7]. To this end, the IGOT Learning Portal, a free and accessible orthopaedic educational platform for surgeons and trainees in LMICs, was developed by faculty at the University of California, San Francisco to address ongoing knowledge gaps in patient care worldwide. This descriptive review describes the IGOT Learning Portal and its preliminary impact, potentially serving as a model for other surgical specialties during the COVID-19 pandemic.

## Materials and methods

**IGOT portal development description.** To increase access to high quality orthopaedic continuing education for surgeons and trainees in LMICs, the Institute for Global Orthopedics and Traumatology (IGOT) at the University of California, San Francisco (UCSF) created the IGOT Learning Portal ([www.igotportal.org](http://www.igotportal.org)). The IGOT Learning Portal houses 10 core courses in various orthopaedic topics, including Anatomy, Foot & Ankle, Hand, Oncology, Pediatrics, Physical Medicine & Rehabilitation, Spine, Sports Medicine, and Trauma. In addition to these distinct courses, the IGOT Learning Portal includes supplementary material, such as live surgery videos and webinar recordings, as well as an orthopaedic Image Library to expose surgeons to a variety of orthopaedic pathology. In addition, online material is available for IGOT's Surgical Management and Reconstructive Training (SMART) Course, a four-day in-person educational training course designed for orthopaedic surgeons who manage open fractures and soft-tissue reconstruction. The SMART course was designed in 2010 in response to the need for training soft-tissue coverage techniques to orthopaedic surgeons in LMICs, since plastic surgeons are often unavailable in these locations [8,9]. The in-person course is a combination of case-based didactics with hands-on skill sessions taught by orthopaedic and plastic surgeons on faculty at UCSF as well as partner institutions in both high- and low-income countries. Each topic within the course has been developed with input from annual attendees. After the course, attendees report a 93.3 % success rate in performing soft-tissue flaps [9]. The first course was held at Muhimbili Orthopaedic Institute in Dar es Salaam, Tanzania and over the years, the course expanded to other international partner sites including Nepal and Mexico [8]. Although the SMART course is designed and recommended for in-person training, the virtual SMART course and course materials are freely available within the IGOT Portal for reference. All course material is developed by qualified UCSF faculty educators.

Enrolling in the IGOT Portal courses requires creating a free personal portal account and is accessible to any surgeon or trainee with internet access. The IGOT Portal runs on the EdX platform, which is a Learning Management System (LMS). Learning Management Systems were developed by Harvard and Massachusetts Institute of Technology but are used by over 160 higher education institutions all over the world. By

being an LMS, the IGOT Portal is able to function as a curriculum rather than just a content sharing platform. The courses are asynchronous, which means that learners can access and complete the learning objectives at their own pace. This type of asynchronous learning platform negates the need to navigate time zone differences for learners in various countries. Each course is divided into a modular format with each module representing a relevant course topic. Within each module are subsections containing the course objectives, learning materials (outlines, videos, webinars, etc.), additional resources/references, and review questions. The viewer can progress through each module systematically or can access each module and its subsections from the course home page in outline format.

## Results

**IGOT portal utilization.** There are currently more than 2700 registered users and 300 active learners enrolled in IGOT Learning Portal courses. The SMART course is the most commonly viewed/taught course with 132 learners who have successfully completed the course. Learners represent 32 different countries across six continents. The IGOT portal also has surgical videos available on YouTube (<https://www.youtube.com/c/IGOTPortal/videos>). Since publishing the YouTube page in December 2020, the IGOT Portal YouTube channel has grown to have over 2000 subscribers and 143,000 total views with total watch time at 10,300 h. Of YouTube viewers, 59.4 % are between 25 and 34 years of age and 35.9 % are between 35 and 44 years. Similarly, 85.8 % of viewers are male while 14.2 % are female. Only 36.8 % of all YouTube viewers share geographical data, with a majority being from India (20.1 %).

## Discussion

The IGOT Learning Portal is an innovative online resource for orthopaedic residents and attendings worldwide, offering accessible and self-paced courses, didactics, surgical approach videos, webinars, study materials, and review questions for learners. Although there are other online orthopaedic continuing education resources available, the IGOT Portal is unique because it specifically is targeted towards learners in LMICs. This means that the content on the IGOT Portal focuses on core surgical principals rather than budding techniques or expensive technology. In order to maintain accessibility to learners in LMICs, membership to the IGOT portal is completely free and has no membership dues or other fees. It is also free of commercial bias, as there is no funding from industry sources of any kind.

While the user base has steadily increased over time, there are logistical barriers to accessing the IGOT Learning Portal in resource-limited settings. In order to access the IGOT Learning Portal, learners must have a web-browsing capable device as well as a reliable internet connection. While this may not present a barrier for U.S. based learners, it can pose a challenge to those based in LMICs. In line with this, other studies reporting on e-learning resources have cited limited internet connectivity, inadequate access to computers and electrical power failures as potential barriers to educational interventions in resource-limited settings [7,10]. Another potential limitation of the IGOT portal is that it may promote only one-way learning and has limited capacity to facilitate discussion, limiting the learners' ability to clarify questions about the content. The lack of face-to-face interactions may limit the capacity for professional exchange and a positive learning environment [11]. The IGOT team has attempted to combat this lack of face-to-face interaction by hosting a series of live webinars for learners to engage in alongside the asynchronous content on the IGOT Portal. The webinars allow time for questions and answers as well as polling which increases the capacity for exchange. An additional limitation to the IGOT portal is that the audio in courses, videos, and webinars are exclusively in the English language. While English is widely used across the globe, English-only educational opportunities may be a barrier to scholars in low- or middle-income countries given the diversity of language and dialects

in different continents [12]. Users can overcome this barrier by utilizing the “Auto-translate” option on YouTube, which allows real-time closed captioning translation to any listed language. Despite this, increasing language capacity and translation services are an important consideration for optimization of the IGOT portal.

Future directions for the IGOT Learning Portal include expanding existing content to include other orthopaedic subspecialties as well as basic science topics. As the pandemic restrictions decrease, the goal is to restart in-person courses while continuing to utilize the e-Learning content and live webinars in order to maximize learning opportunities. Based on engagement with the webinars and the portal itself, learners have requested more videos of cadaveric simulation and live surgery in lieu of didactic lectures. Similarly, an evaluation metric such as pre-and-post surveys for self-paced courses would be a helpful tool to assess the effectiveness of teaching material and content retention. The IGOT Learning Portal would also benefit from collecting basic demographic information of registered users to better understand its scope of impact.

### Conclusion

The IGOT Portal offers a curriculum for continuing education of orthopaedic residents and surgeons. This free and accessible resource caters specifically to learners in LMICs, but has content that is relatable and essential for learners regardless of their location. Future directions for the IGOT portal include expanding on available content as well as synergizing in-person courses and e-Learning to maximize the learning potential.

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### Ethical approval statement

This was an IRB-exempt study.

### CRediT authorship contribution statement

Content for the IGOT Portal was developed by DS and PT. IGOT Portal and webinars are managed and supported by MM. Manuscript drafting was completed by KB and MF. Revisions and data collection were completed by PR and JO. All authors contributed to manuscript editing.

### Declaration of competing interest

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article. The authors report no conflicts of interest.

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