

Innovative Use of a Fish-eye Lens in Tele-Education: Our Experience

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Abstract

Telemedicine has been used for many years to deliver, treatment, education programs and training, especially to healthcare professionals of remote areas and countries with limited resources. But Telemedicine came into limelight during the SARS COVID-19 pandemic, when the lockdown compelled the use of technology than ever. The Tele education is also a part of Telemedicine which helped millions to carry on the learning during the last two years. The main modes used for telemedicine are Photographs, audio, video or combined which can be done using handheld cameras, mobile phones or computers. Tele education provides tools and methods to make teaching better. To make the Tele education better, cost effective and friendly there needs frequent revisions and introduction of newer technology, especially now when we anticipate further surges of the Pandemic wave. In this study, we share our experience of using Fish eye lens, which can take wide angle images, in our daily clinical practice and in Tele Education. Fisheye lens is used for taking images which can be up to 180 degrees. The novelty of the study is that there are very limited data available on the use of wide-angle lens in clinical practice as well as Tele-education.

Keywords: Fish eye lens; Telemedicine; Tele education; Plastic Surgery; COVID-19, Omicron.

Introduction

A fisheye lens is an ultra wide angle lens that creates a wide panoramic or hemispheric image by causing significant optical distortion.^{1,2} Fisheye lenses achieve extremely wide angles of view. Fisheye lenses use a special mapping, which gives images a characteristic convex non rectilinear appearance. The Fisheye lens is usually used to take images of extreme sports, sky etc.

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Tele education, defined as the application of information and communication technologies (ICTs) in the delivery of distance learning, has been used for many years to deliver continuing education programs to rural healthcare professionals.⁵ Tele education offers a means of providing better utilization of time and availability of the few professionals who are willing to train. It is commonly acknowledged that information and communication technology (ICT) not only contributes to advancements, but also gives tools and ways for improved training. Because mistakes made by individuals with less experience or who have yet to be qualified are virtual, the risk of injury from those with less experience or who have yet to be qualified is minimized.⁶

Materials and Methods

This study was conducted in the Department of Plastic surgery in a Tertiary care center in south

India. Departmental ethical clearance and consent from the subjects were obtained. In this study, we have used a fish eye lens as a clip on attachment that could be attached to the mobile phone camera lens (Fig. 1). This was then used for Tele education in seminar halls, wards, operating, dressing rooms to evaluate the merits and demerits (Fig. 2,3,4). This study was conducted for a period of 30 days and feedback proforma was taken to from 10 residents after the end of the period.

Results

The fish eye lens clip-on was easy to use, easy to carry, cost effective, convenient to use, and covers a wide field of view. The disadvantages mentioned were the need to constantly hold the phone, small screen when compared to computer/laptop, image distortion. (Table 1)



Fig. 3: Wide-Angle View of the Minor Operating Room.

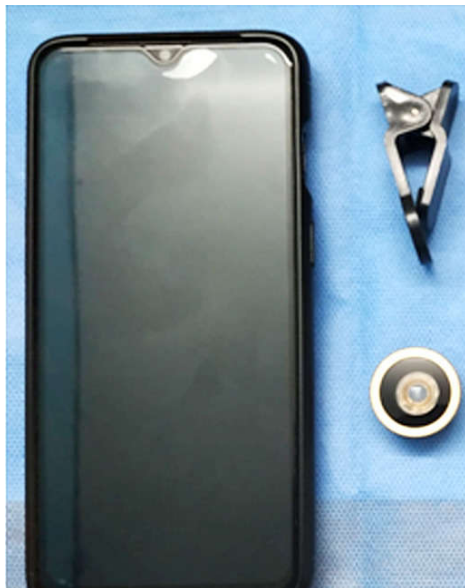


Fig. 1: Phone, Clip-on with The Fish-Eye Lens.



Fig. 4: Wide-Angle View of Ward.

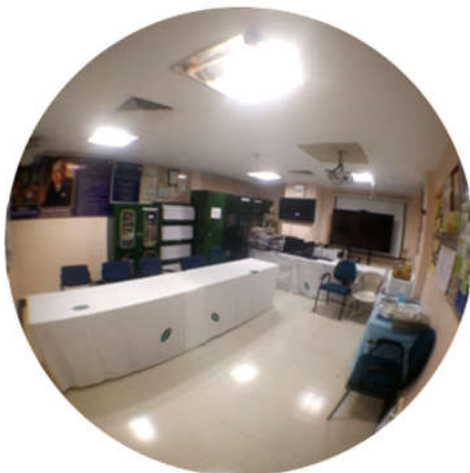


Fig. 2: Wide-Angle View of a Seminar Room.

Table 1: Feedback form

Questionnaire	Rating 1 to 5 (1 being worst, 5 being best)
How easily were u able to use the clip-on	
How much was the reliability of the device compared to regular webcam	
How affordable was the clip-op leans	
Would you like to recommend other for usage of this device	Yes/No
Suggestions	

Table 2: Physician and their experience on scale of 1 to 5 rating, the higher the score the more was the satisfaction level.

Physician	Ease of usage	Reliability	Cost-effectiveness	Field of View	Will you recommend others this device
Physician-1	4	4	4	3	No
Physician-2	4	4	4	4	Yes
Physician-3	5	4	5	4	Yes
Physician-4	4	5	4	3	Yes
Physician-5	4	4	5	5	Yes
Physician-6	4	5	4	3	No
Physician-7	3	4	4	5	Yes
Physician-8	5	5	4	4	Yes
Physician-9	3	4	5	4	Yes
Physician-10	4	4	4	4	Yes
Average	4	4.3	4.3	4	Yes= 8/10

Discussion

The Fisheye lens is a camera component capable of taking ultrawide field. Robert. W. Wood a physicist is given the credit of inventing Fisheye lens in 1906. He developed a lens based on how a fish would see the world from the water. In 1920s the fisheye lens were used to study cloud formations in meteorology. "Circular fisheye" lenses, which took in a 180° hemisphere and projected it as a circle within the film frame, were the first types of fisheye lenses to be produced. For scientific applications, some circular fisheyes were provided in orthographic projection models. These have a 180° vertical angle of view, and the horizontal and diagonal angle of view is also 180°. Since most circular fisheye lenses have a smaller image circle than rectilinear lenses, the frame's corners will be completely dark. Mostly only used to give the user a wide field of view.

Teleeducation has been utilized to give continuing education to rural healthcare practitioners for many years. Audio, video, phones, and computer are the main modes. Audio technologies involve the synchronous or asynchronous transmission of the spoken word (voice) between learners and instructors. Audio conferencing and short-wave radio are examples of the former, whereas audiotape or audiocassette are instances of the latter. Video for distance learning can be used synchronously or asynchronously, much like audio. Because there is the possibility of live visual and vocal interaction between instructors and learners, videoconferencing, also known as interactive television, is considered synchronous. Slow-scan video, interactive videodiscs, and videotapes are examples of asynchronous instructional video tools.

Among its advantages are a reduction of travel costs and related risks, a wider reach with the democratization of knowledge opportunities, a possibility of flexibility in deciding the hours of study, and a higher potential of receiving on the job training without a need to leave one's place of work. Some of these are very relevant for the health sector. There are potential disadvantages though: the need for specialized staff (including additional training of teachers and tutors), the existence of stable and sufficient connections, and digital competence (digital and information literacy) on the part of the students. There are special challenges regarding online discipline, which is required both from the teachers as well as the students. Many do not adapt well to online teaching, sometimes due to a tendency towards procrastination or because of other digital limitations.⁶

The SARS COVID-19 has resulted in schools shutting across the world. Globally, over 1.2 billion children are out of the classroom. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. Research suggests that online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have caused might be here to stay.

Tele education can assist learning and capacity building of healthcare professionals, both ab initio as well as in the form of continuing medical education. Once Telemedicine is being used, distance is no longer a limiting factor, so this can very much be part and parcel of telehealth. It is recommended that any incorporation of information technology in day to day care should include tele education and capacity building to allow the staff and personnel to use telemedicine to troubleshoot issues, which are

not infrequent. In remote areas, where information technology is less used, a separate workforce skilled in both healthcare and Telemedicine is required. Fortunately, the same system can train them further too.

In a case study of e-teaching in Cardiology in India by Sunita Maheshwari following advantages were offered by virtual live e-teaching or tele-teaching in medicine: One teacher can teach multiple students in multiple geographic locations at the same time, obviating the issue of teacher shortage. The same content can be disseminated to all the centers undergoing specialist training, so there is a national consensus on diagnostic and management approaches among all trainees. The e-classes can be recorded and replayed, so they can be viewed repeatedly by the same group or new trainees. The question-and-answer sessions are fully interactive and like a normal classroom.⁷

Conclusion

Tele education needs to be incorporated into educational practices from the undergraduate level onwards. Other aspects of information technology in health, such as the usage of the electronic patient record, health information systems, decision support systems, telehealth and telemedicine, video collaboration, and teamwork training, can be taught concurrently. In the context of the new and current digital world, this will make it easier to establish a convergent vision. The use of fish eye lens is encouraged in primary and secondary level centers, out-reach clinics, and camps, where there

are no funding computers/laptops with webcams as it is easily available, cost-effective, easy to carry, easy to use (even for beginners), offers a wide angle of view.

Conflict of Interest: Nil

Authors Contributions: All authors made contributions to the article.

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