

# eyes*i*

by VRmagic

## Direct Ophthalmoscope Simulator



# Simulation Improves Diagnostic Training



## Teaching Direct Ophthalmoscopy is a Challenge

Direct ophthalmoscopy is an important part of every routine eye examination, and not only for ophthalmologists. Educators all over the world face the same challenges when helping trainees master this essential diagnostic skill: how to present a wide range of retinas to their students, provide a comparable experience to every student, and assess student performance objectively.

## Eyesi Direct can Help Master this Challenge

The Eyesi Direct Ophthalmoscope Simulator offers students the opportunity to perform examinations independently and 24/7, regardless of the availability of patients or fellow students. Systematic exposure to important pathologies ensures the same clinical experience for every student. After the examination, the students' performance is evaluated objectively.

## Diagnostic Training for all Medical Students

With Eyesi Direct, medical schools can offer a standardized training method to each medical student learning primary care, as well as residents in neurology, internal medicine, family medicine, and emergency medicine. Eyesi Direct is a paradigm shift in training, providing a truly effective learning experience to students.

## Status Quo in Ophthalmoscopy Training

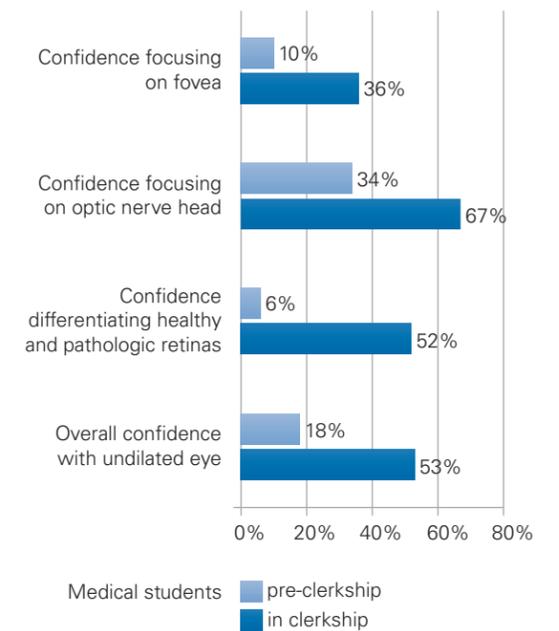
Although every medical student needs to practice direct ophthalmoscopy, current teaching methods are regarded as insufficient by medical literature.

*"Only 22% of all respondents felt their undergraduate ophthalmic medical education to be adequate. [...] Despite the availability of an ophthalmoscope [...] only 56% felt confident with the ophthalmoscope [...]."*

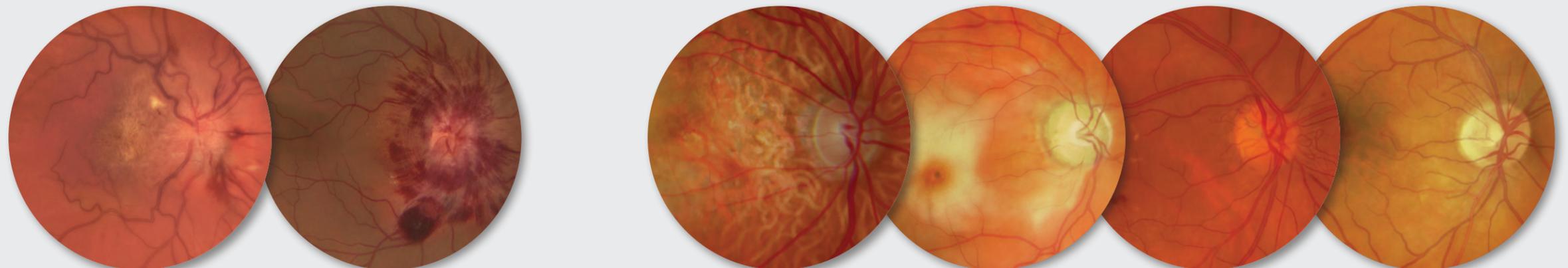
Shuttleworth GN, Marsh GW. How effective is undergraduate and postgraduate teaching in ophthalmology? Survey among 150 randomly selected primary care practitioners. Eye (Lond). 1997;11 ( Pt 5):744-50.

*"Most program directors believe that less than half of their residents meet the AUPO standard at the completion of medical school, and a significant minority do not meet the AUPO standard at the completion of their residency."*

Stern GA. Teaching ophthalmology to primary care physicians. The Association of University Professors of Ophthalmology Education Committee. Arch Ophthalmol. 1995 Jun;113(6):722-4.



Proportion of preclerks and clerks either "somewhat," "quite," or "extremely" confident in performing direct ophthalmoscopy. Source: Gupta RR, Lam WC. Medical students' self-confidence in performing direct ophthalmoscopy in clinical training. Can J Ophthalmol. 2006 Apr;41(2):169-74.



Top: Students using Eyesi Direct.

From left to right: A selection of the retinas shown in Eyesi Direct (hypertensive retinopathy, papilledema, AMD, central retinal artery occlusion, diabetic retinopathy, healthy retina).

# A Better Way to Teach Direct Ophthalmoscopy



## An Innovative Training System for Retinal Examinations

The Eyesi Direct Ophthalmoscope Simulator is an innovative virtual reality training system for teaching direct ophthalmoscopy. Eyesi Direct is handled in the same way as its real counterpart. All components are designed to deliver a training experience that feels like a real examination.

## Compact Simulator Set-Up

The simulator consists of four main components. The ophthalmoscope handpiece with a built-in screen looks and feels like a real ophthalmoscope. The model head represents the patient. The touch screen displays the user interface with patient information and a live view of the examination, and the processing unit runs the simulator software.

## Advanced Technology for an Optimal Practice

Eyesi Direct offers a sophisticated simulation model that makes it possible to see a high-fidelity virtual patient instead of the model head when looking through the ophthalmoscope. Combined with quality medical training content, Eyesi Direct is an advanced training system that is truly unique.

## Improved Learning through a Lifelike Experience

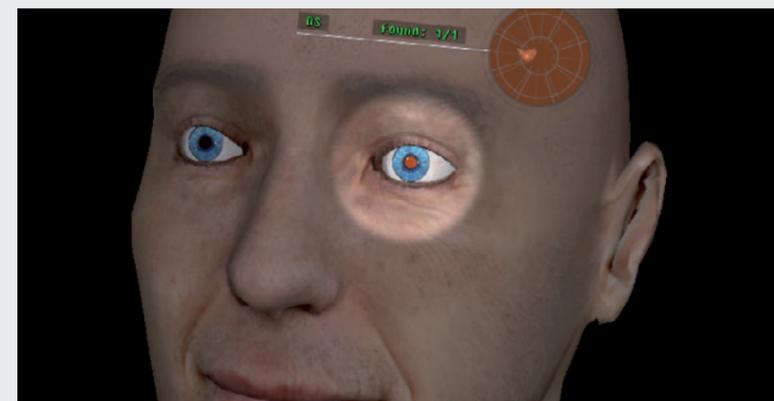
Traditionally, students only see retinal pathologies in books or websites before their clinical training begins. With Eyesi Direct, students can go through the whole physical examination process. Students learn in a dynamic, immersive environment where the patient blinks, moves his eyes, and reacts to light.

## Systematic Skill Acquisition and Independent Learning

Eyesi Direct uses a case-based approach to teach diagnostic skills. Introductory cases training basic motor skills are followed by cases where patients of varying gender, age, and ethnicity present with common pathologies. This ensures that trainees possess a defined level of knowledge after the training. As a result, students are better prepared and feel more confident when examining their first patient.

## Deliberate Practice and Competency-Based Evaluation

The simulator's capacity to provide immediate, objective feedback on students' actions allows for a competency-based assessment and systematic improvement of skills. Evaluated parameters include, for example, the examined retina percentage, light exposure, and found pathological signs.



Top: Eyesi Direct Ophthalmoscope Simulator.

Right: Student training on the Eyesi Direct Ophthalmoscope Simulator – an immersive experience.

Top: Eyesi Direct Ophthalmoscope and touch screen controls for aperture and color filter.

Left: Virtual patient as seen by trainees.



# Working with Eyesi Direct is Easy

## Out of the Box Training Curriculum

Eyesi Direct comes with a structured curriculum developed in co-operation with ophthalmologists. The curriculum consists of four courses that contain several cases each. Students advance through the curriculum independently by completing the cases of a course. Educators can lock or unlock courses as required.

### Courses A and B: Basic Ophthalmoscope Handling

The first two courses teach how to use a direct ophthalmoscope and how to document findings. In course A, trainees have to examine the retina systematically to find abstract objects. In course B, trainees have to document the shape, size, and location of objects found on a fundus scheme.

### Courses C and D: Anatomy and Pathologies

The third and fourth courses feature a selection of healthy and pathological retinas, based on real patient retinas. Course C teaches anatomical features and pathological signs and provides students with medical background information on every sign found. In course D, signs have to be detected and specified correctly.

**A** Device Handling

Basic understanding of the direct ophthalmoscope and motor skill training

**B** Retina Documentation

Orientation in the eye and documentation of abstract findings

**C** Anatomy and Pathology Introduction

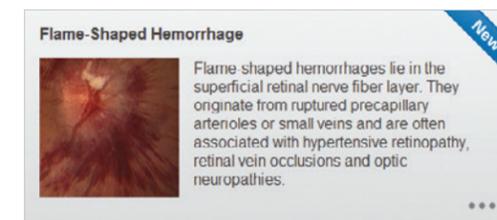
Introduction to different healthy retinas and pathological findings

**D** Anatomy and Pathology Quiz

Recognition of common pathological findings and specification of retinal characteristics

## Guidance and Medical Content for Students

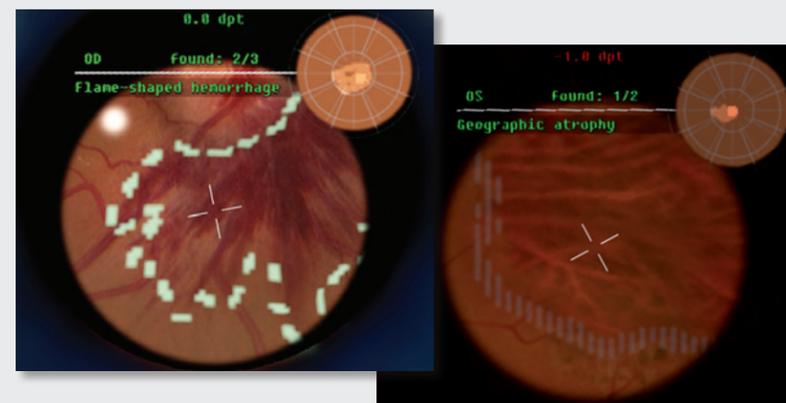
When a trainee detects a pathological sign, it is highlighted on the retina and a brief description of the sign is shown on the touch screen. The trainee can tap the text to view additional medical information. All detected findings are stored in the trainee's personal findings library.



## Eyesi Direct Compared with other Training Methods

● possible   ○ not possible

	Eyesi Direct	Fellow students	Retina slides
Spontaneous venous pulsation	●	●	○
Observer screen for teaching	●	○	○
Map showing which retinal areas were examined for quality control	●	○	○
Real time neurophysiologic model of pupil response to light	●	●	○
Repeated exposure to pathologies	●	○	●
Ready-to-use curriculum	●	○	○
Live view, pause & zoom function during the examination	●	○	○
Guidance during the examination and immediate objective feedback	●	○	○

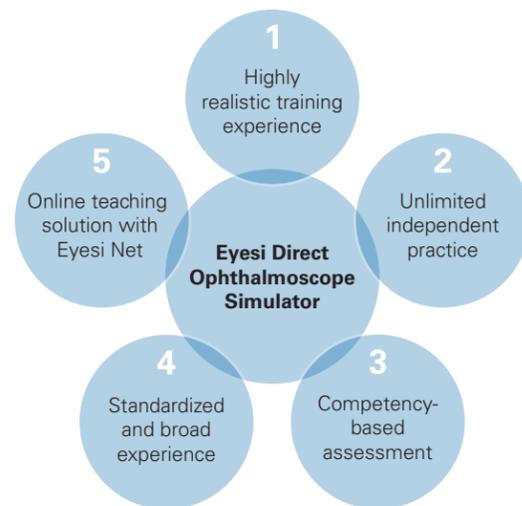


Top: Courses of the curriculum.

Right: In introduction mode, findings are highlighted and the title is displayed.

Left: In quiz mode, trainees examine the retinas and specify their observations in a designated input form.

# 5 Reasons for the Eyesi Direct Ophthalmoscope



## Highly Realistic Training Experience

The Eyesi Direct Ophthalmoscope Simulator uses virtual reality and real ophthalmoscope components to offer a highly immersive and realistic experience. Trainees will learn to identify pathological findings reliably on lifelike retinas using correct ophthalmoscopy techniques – without risk to patients and independent of patient flow.

## Unlimited Independent Practice

The diagnostic skill of direct ophthalmoscopy can only be gained through intense practice. At the same time, teaching time is an ongoing cost for medical schools. The use of high fidelity simulation allows medical students to practice independently until they feel confident using the ophthalmoscope. The curriculum is based on the principle of “deliberate practice”: frequent practice at a suitable level of challenge with immediate objective feedback. This ensures that refinements can be made after each examination.

## Competency-Based Assessment

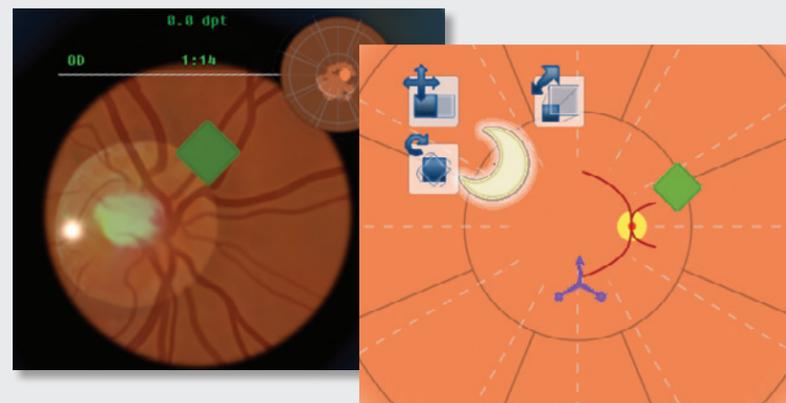
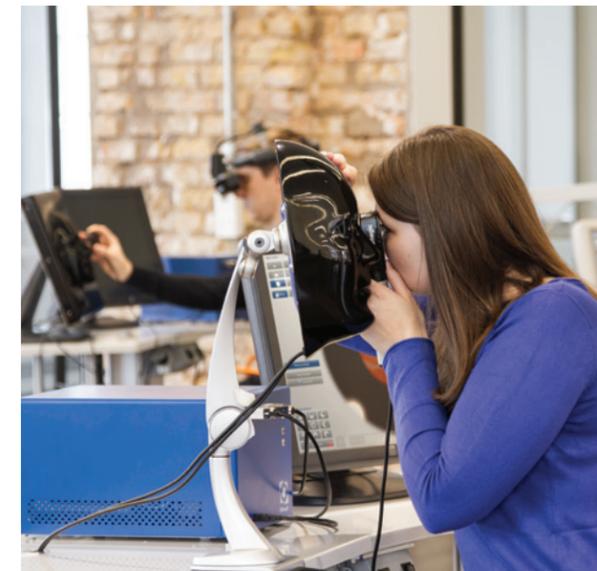
Eyesi Direct provides objective and immediate feedback after each virtual exam, so that students can systematically improve their skills. Designated educators can access students’ training data through a secure web portal. This way, educators can keep track of training progress and assess students’ skill levels as they advance through the curriculum.

## Pattern Recognition of Retinal Pathologies

The curriculum contains a selection of the most common retinal pathologies every medical student must be able to recognize, such as optic disc edema (including papilledema), diabetic and hypertensive retinopathy, or vascular occlusions. Frequent exposure to pathologies in different stages and varying degrees of severity fosters a solid foundation of how to diagnose specific pathologies. This is difficult to achieve when training on healthy fellow students.

## Complete Teaching Solution with VRmNet

Eyesi Direct is more than a stand-alone simulator. The online features that come with VRmNet bring it to life, and help you to teach large groups of students efficiently. Manage large numbers of students with the web-based user administration, get them up to speed quickly using the online learning resources, and have their training progress always at your fingertips via a user-friendly web interface.



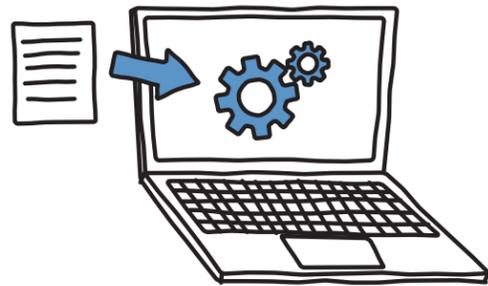
Right: Introductory cases teach ophthalmoscope handling using abstract objects that have to be found and marked on a fundus scheme.

Examined Retina		Classification	
Score: 30.0 pts (Range: 0 - 30 pts)		Score: 40.0 pts / [0,50] pts	
Retina examined: 16.4%			
Per quadrant examination:			
	temporal	central	
superior	0.7%	0%	
central	0%	73%	
inferior	0%	1.4%	
	actual	yours	
Vitreous	Proliferations	Yes	Yes
Optic disc	Color	Orange or pink	Orange or pink
	Cup-to-disc ratio	0.3 - 0.7	0.3 - 0.7
	Indistinct or blurred margin	No	No
	Neovascularisations (NVD)	No	No
	Obscuration of vessels	No	No
	Paton lines	No	No
	Vein pulsation	Yes	No
Vessels	Copper- / silverwire vessels	No	No

Left: Students can view an evaluation of each examination performed, for example the examined retina area.

# Teaching a Class of a Hundred Students

## VRmNet in a Nutshell



### #1 Automatic User Creation

You can create user accounts with only a few clicks. All you need to do is upload a list with student names to VRmNet.

## Efficient Management of Large Numbers of Students

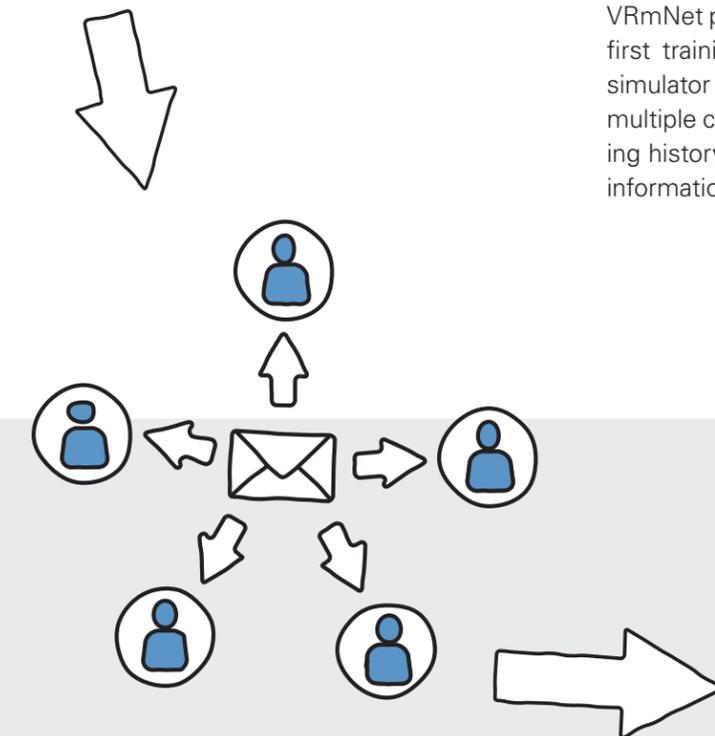
Integrating Eyesi Direct into medical education has two main advantages. The first is quality: each student can achieve a similarly high level of proficiency using the simulator. The second is efficiency: With VRmNet, a web-based teaching solution, hundreds of students can learn ophthalmoscopy completely independently.

## Comfortable and Secure Web-Based Administration

Teachers can manage all Eyesi simulators through the secure VRmNet website. Creating new user accounts for students can be done within minutes from any PC with an Internet connection, without physically sitting in front of a simulator. As soon as the students have received their user accounts via email, they can start training.

## Online Orientation Course and Quality Medical Content

VRmNet provides an online orientation that prepares students for their first training session. Trainees can activate their user accounts for simulator access by completing the online orientation and passing a multiple choice test from any mobile device or PC. The individual training history and a personalized findings library with additional medical information are available for students via the VRmNet website.

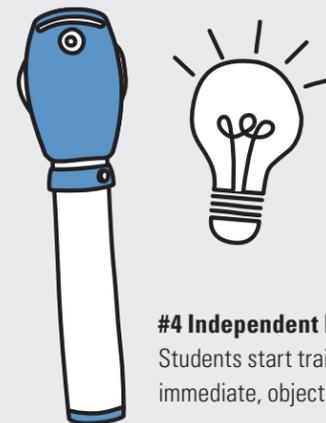
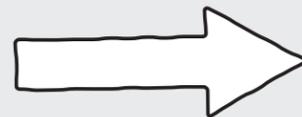
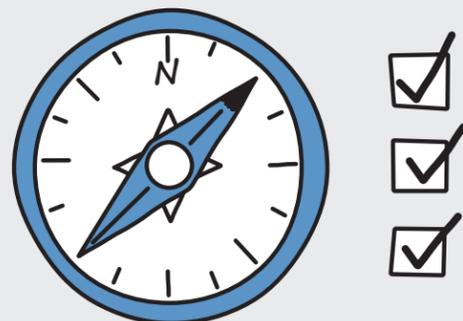


### #2 Automatic Email

An automatic email with an individual user account and a link to the VRmNet website is sent to each student.

### #3 Online Orientation

Students log in to the VRmNet website and complete an online orientation to activate their user accounts for simulator access.



### #4 Independent Practice

Students start training independently and receive immediate, objective feedback on their performance.

## Efficient Use of Multiple Devices in Your Institution

To teach a large numbers of students, multiple Eyesi devices can be installed in one institution. With VRmNet, your students' training progress is synchronized between selected devices and stored on a central server. This way students can start training on one device and continue on a different device the next day. Data synchronization also provides for an automatic backup. The training data is stored locally on your devices and centrally on the VRmNet server.

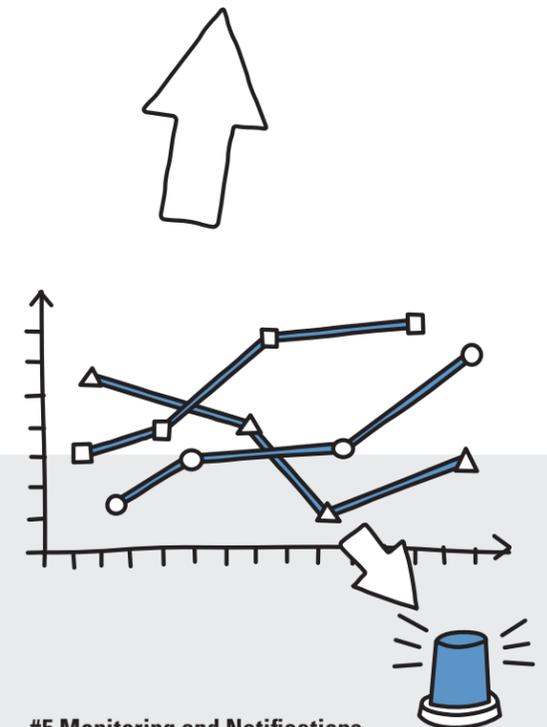
## Easy Monitoring of Your Students' Progress

The training data of your students is consolidated into a single training history. Designated teachers can access this history from any mobile device or PC and monitor the students' progress easily via an encrypted SSL connection. Automatic reports and notifications on important milestones keep you informed, for example when a student has finished the training curriculum.



### #6 Certificate and Assessment

Students automatically receive a certificate after completion, and can view an objective assessment of their skills.



### #5 Monitoring and Notifications

You can monitor your students' training progress online. Configurable notifications and reports keep you informed on important milestones.

For more information on the Eyesi Surgical Simulator or on the Eyesi Indirect and Direct Ophthalmoscope Simulators, please contact:



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