Case Study: Self-authoring simulation toolkit used to create a *Donning and Doffing of PPE for COVID-19* module developed by eTrainetc, LLC in partnership with Eastern Virginia Medical School. Today 30,000 users and counting have taken the eMicro-Simulation.

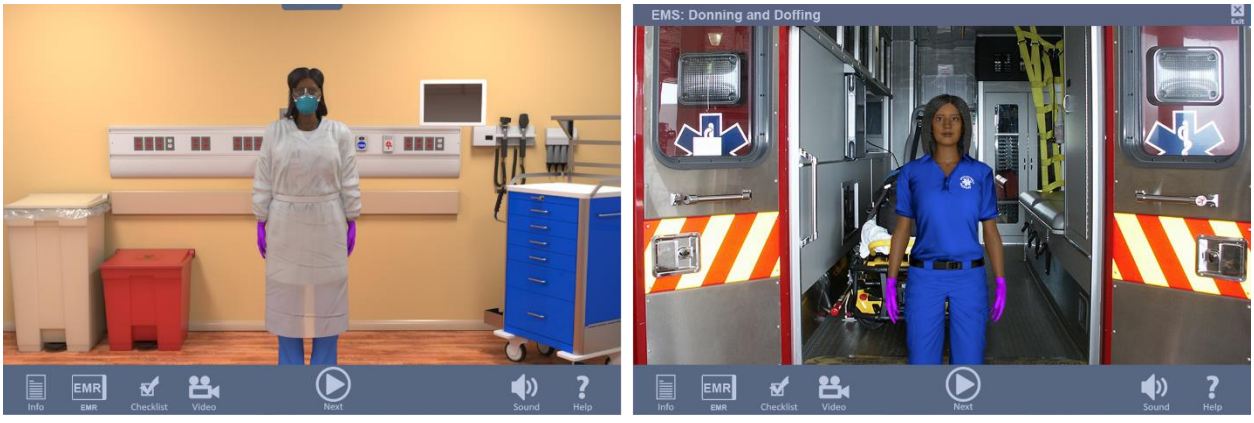
The following case study describes how eMicro-Simulation, a new format for online training developed by eTrainetc, LLC, was recently used to address an urgent need in the medical community.

eMicro-Sims, created with a specially designed authoring tool, are 5–15-minute modules that provide customized real-world simulations. Learners engage with scenarios that challenge them to make critical decisions and review the resulting actions as they would occur on the job. The customized eMicro-Sim is delivered in bite-sized sessions that can be conveniently accessed from multiple devices, including cell phones, tablets, and computers.

Additionally, the toolkit offers a unique system of data analytics that provides valuable insights regarding performance and confidence level determined from the training experience. eTrain can offer services to build eMicro-Sims for any organization or enable the use of the self-authoring toolkit as well.

Background

During the early stages of the COVID-19 pandemic, there was tremendous concern in the medical community regarding the proper donning and doffing of personal protective equipment (PPE). Improper donning and doffing threatened the safety of healthcare workers, and it wasted vital supplies that were in high demand and short supply. Early in 2020, eTrainetc was contacted by Eastern Virginia Medical School with these concerns, and the two teams collaborated on the development of an eMicro-Sim that provided a training solution for healthcare providers. The eMicro-Sim they developed provided free training to healthcare professionals on the correct way to don and doff PPE. The goal of this collaboration was to create a video learners could watch which showed the specific steps required in donning and doffing PPE. Learners could then demonstrate their knowledge by applying what they had learned through a virtual provider in a simulated scenario. Fueled by the urgent need to rapidly launch a training solution, this eMicro-Sim was developed and able to go “live” in less than two weeks.



Figures. Donning and Doffing PPE for Emergency Room and Emergency Response.

"This project was critical since we were seeing countless care givers making significant mistakes in donning and doffing PPE. We knew we needed to not just provide learners information; we needed a training strategy that asked learners to perform the key steps and demonstrate their knowledge. The team at eTrain has developed a unique toolkit that delivers brief simulations in days. My biggest surprise was how easy eTrain's authoring tools are. This enabled us to deliver this eMicro-Sim quickly and with incredible data analytics." says Bob Armstrong, Assistant Professor, SOHP, EVMS, Executive Director, SCSIL, Director, NCCMMS, Director of Corporate Relations, EVMS, Immediate Past President, Society for Simulation in Healthcare.

"This was a great opportunity for eTrain to leverage our technology and help", said Bill Cornelius, President & CEO of eTrainetc, LLC. "While we are happy to create these solutions for our clients quickly and inexpensively, we can also offer a licensed toolkit for organizations to build these solutions themselves." "There were several partners involved with the release of the donning and doffing module, as well as with the updated releases during the pandemic. There were also other organizations that helped post the link and introduce the simulation. Thank you to everyone who helped."

Case summary: How the eMicro-Sim taught and confirmed knowledge of PPE.

With the goal of protecting healthcare workers, this project leveraged the eMicro-Sim - a new educational toolkit focused on applying learned knowledge – to raise skill levels for the correct donning and doffing of PPE. Healthcare workers constituted a perfect target audience for this project because:

- ✓ Their PPE donning & doffing skills required strengthening to meet the new challenge.
- ✓ They needed easily accessible and user-friendly training.
- ✓ Their hectic schedules necessitated a brief, visually oriented learning experience.

At the beginning of the eMicro-Sim, steps for the proper donning and doffing of PPE were identified, and expectations were outlined.

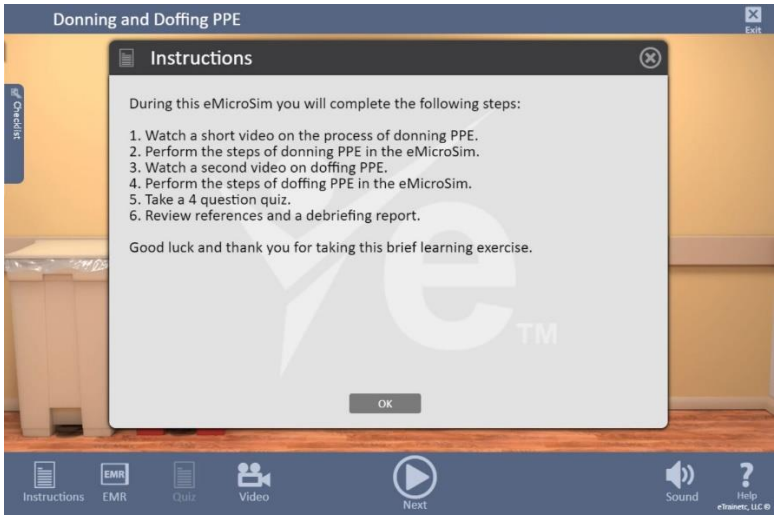
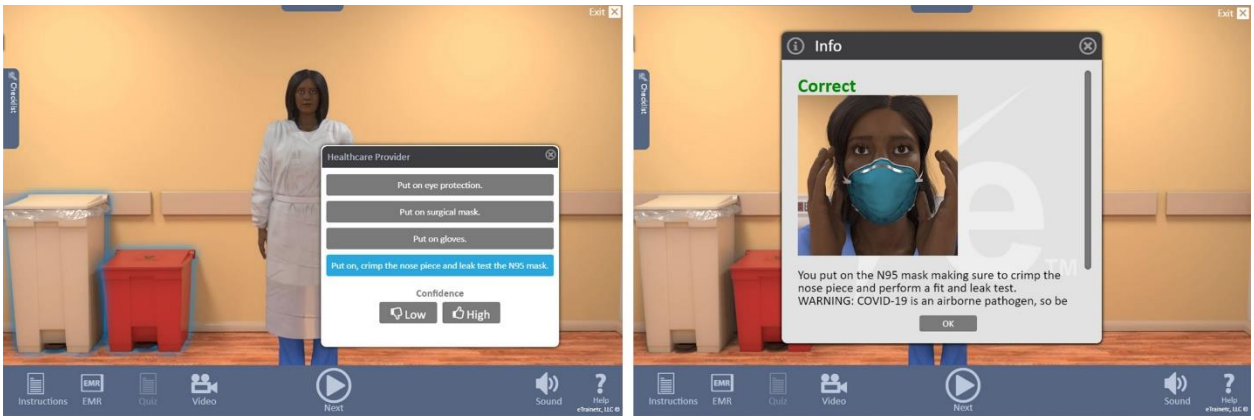


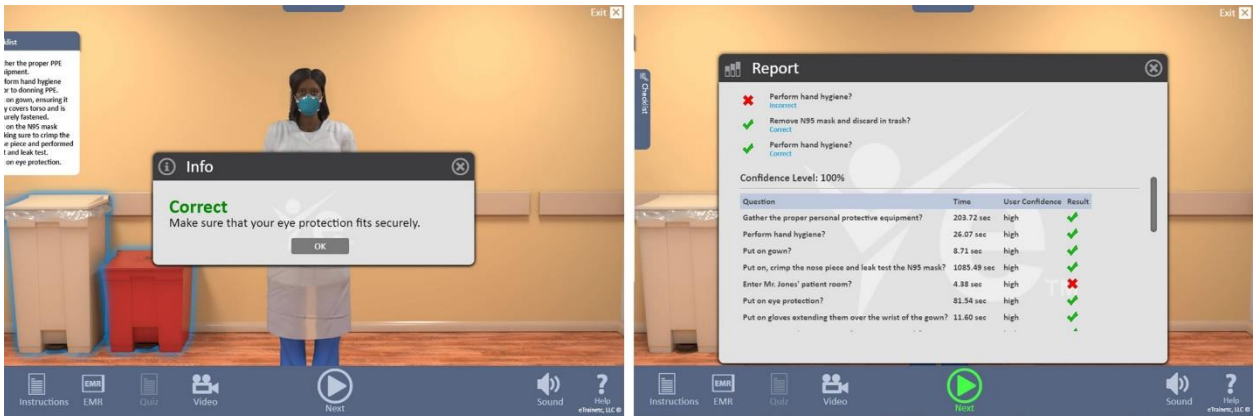
Figure. Initial screen of eMicro-Simulation for Donning and Doffing of PPE

After viewing a video and animation, learners were asked to perform key steps of the procedure in a simulated scenario. Throughout the simulation, the video remained accessible for reference.



Figures. Examples of eMicro-Sim decisions and animated step

Learners were required to make decisions as they progressed through the simulation steps, some of which included supporting animation and videos to demonstrate proper techniques. As the learner progressed through the simulation, a checklist helped identify the steps completed, and a debrief report was generated. At the conclusion of the eMicro-Sim, a short quiz was administered to confirm the learner's knowledge.

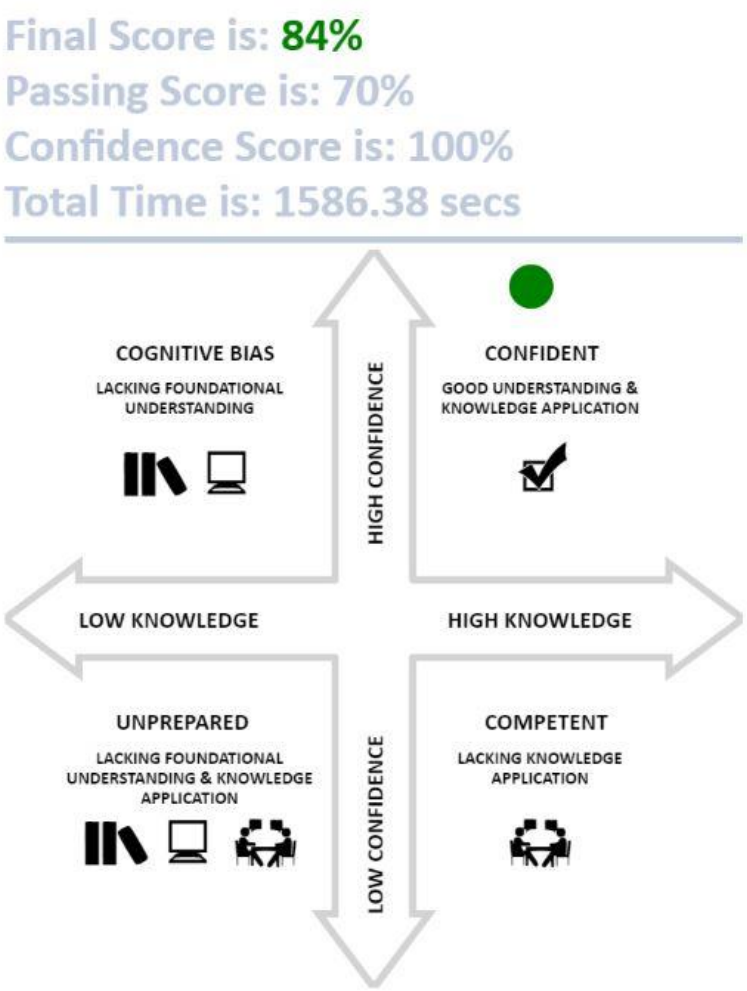


Figures of eMicro-Sims checklists, feedback on decisions and debrief report

The Value Delivered by eMicro-Sim Technology

One of the eMicro-Sim's differentiating functionalities is the ability to identify not only a participant's level of competence through application of the knowledge they've learned, but also their level of confidence in their decisions or actions.

The ability to accurately stratify participants' competence and confidence – and to identify instances of unconscious bias (high levels of confidence with lower levels of competence) – provides immediate feedback on areas of needed remedial training.



Additionally, the eMicro-Sim toolkit provides post-training debrief reporting capabilities, giving participants a recap of their responses, a tally of their score, and a graph of their learning quadrant placement. Also included in the debrief are links to remedial learning, mentors, and additional resources.

The administrative reporting functionality provides educators with data analytics on individual participants' performances, as well as meta-analysis on topics missed by significant numbers of participants. This feedback allows educators to focus additional training efforts into specifically defined areas for maximum ROI of training budgets.

Figure. Debrief report that presents score, confidence graph and drill down into decisions.

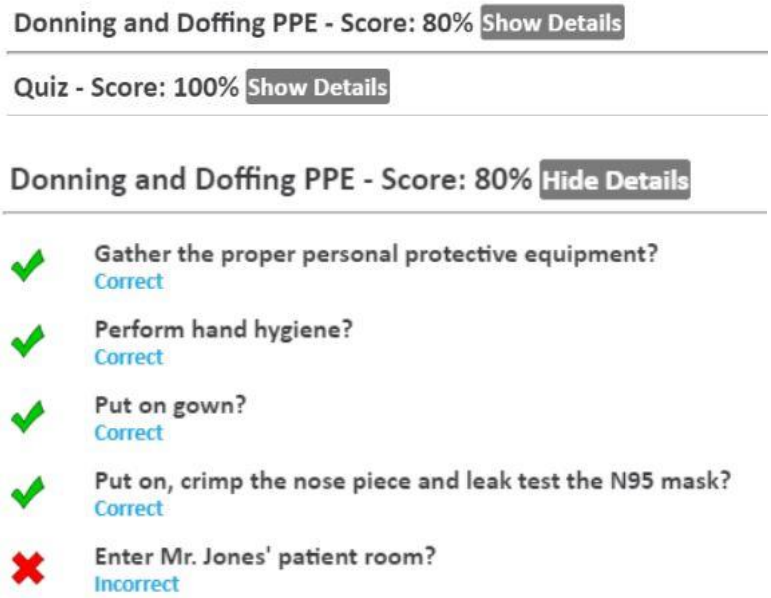


Figure. Example of drill down functions on decisions in eMicro-Sim.

Confidence Level: 100%

Question	Time	User Confidence	Result
Gather the proper personal protective equipment?	203.72 sec	high	✓
Perform hand hygiene?	26.07 sec	high	✓
Put on gown?	8.71 sec	high	✓
Put on, crimp the nose piece and leak test the N95 mask?	1085.49 sec	high	✓
Enter Mr. Jones' patient room?	4.38 sec	high	✗
Put on eye protection?	81.54 sec	high	✓
Put on gloves extending them over the wrist of the gown?	11.60 sec	high	✓
Enter Mr. Jones' patient room for morning rounds?	13.78 sec	high	✓
Remove gown and gloves by the exit of the patient room?	83.02 sec	high	✓
Exit Mr. Jones' patient room?	9.72 sec	high	✗
Remove eye protection and discard in trash?	6.52 sec	high	✓
Exit the patient room?	9.73 sec	high	✓
Perform hand hygiene?	6.99 sec	high	✗
Remove N95 mask and discard in trash?	6.10 sec	high	✓
Perform hand hygiene?	7.18 sec	high	✓
Total time taken	1564.54 secs		

Figure. Example of drill down functions on decisions in eMicro-Sim with time to completion and confidence level.

How the PPE eMicro-Sim was developed:

The PPE eMicro-Sim was developed in just days as an easy-to-use training tool, using the eTrainetc toolkit. The team behind this application has many years of custom software development experience and healthcare simulation design & support.

Traditionally, the development process of a micro-simulation can be very complex. eTrain's toolkit, on the other hand, provides step-by-step support to course designers, enabling quick and easy creation of custom eMicro-Sims. This simple, flexible process is summarized below:

- ✓ Identify the content and create a storyboard (templates are available from eTrain).
- ✓ Finalize the storyboard, training/education material, and other assets.
- ✓ Build the simulation using eTrain's authoring tools.
- ✓ Test the simulation, making any needed changes or adjustments.
- ✓ Publish the simulation for SCORM, xAPI, and many other formats.
- ✓ Analyze the data and update the simulation as needed.

The eTrain toolkit was designed for non-technical users. The application enables users to follow an intuitive step-by-step process to create customized eMicro-Sims, supported by an online training program with video-based, instructor-led tutorials and materials.

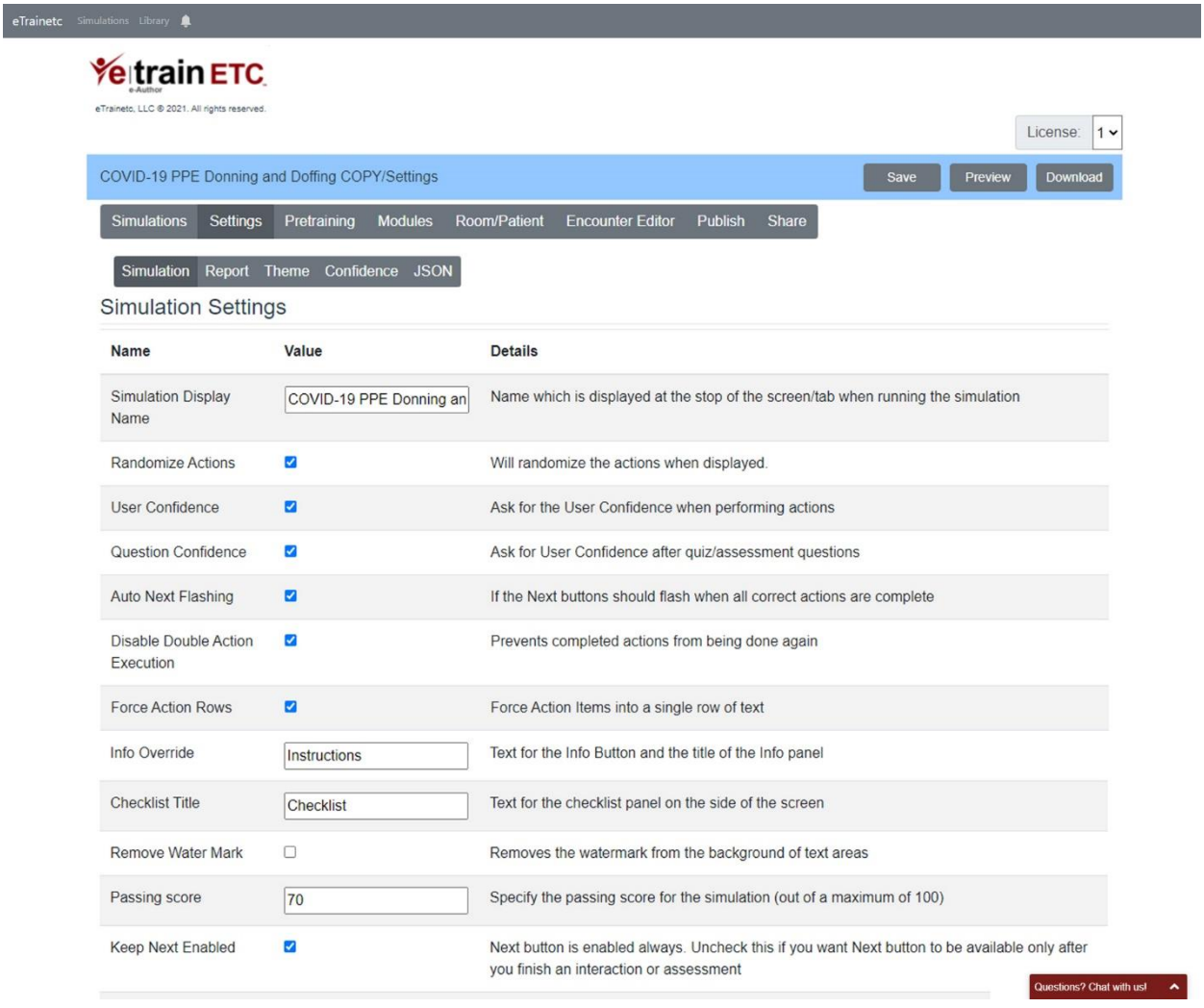


Figure. Settings screen for developing and eMicro-Sim with authoring tools.

The course designer simply cuts and pastes their storyboard content into pre-made templates, and then answers questions in the authoring tool to create their eMicro-Sim. The authoring toolkit includes built-

in features to automatically write the code and format the simulation, as well as advanced features to enable custom interfaces and specialized interactions for specific audiences.

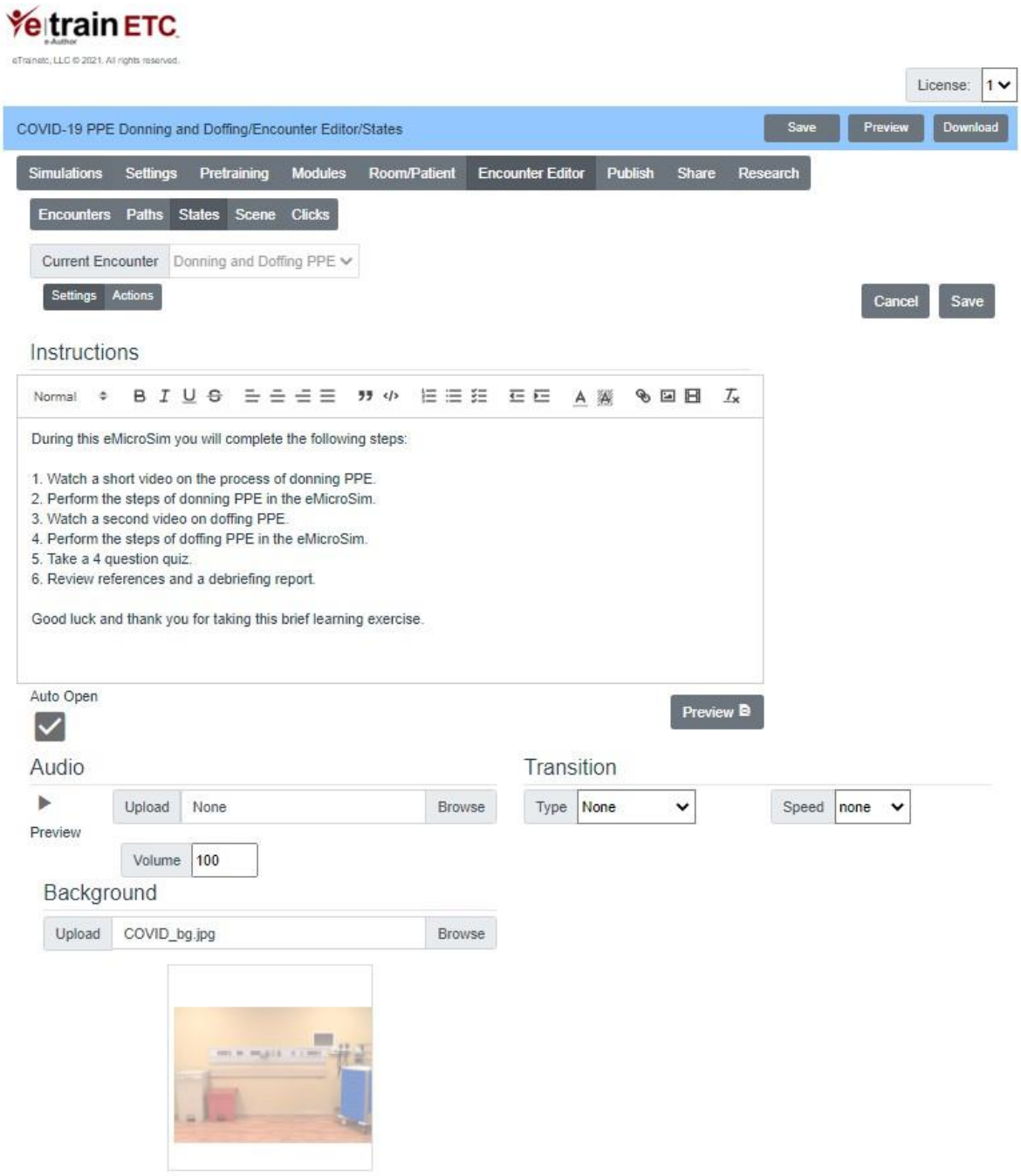


Figure. Screen caption of editing the first step of the eMicro-Sim for PPE

The toolkit includes libraries of instruments, patients, rooms, and interactions to save time and limit the need for software development resources.

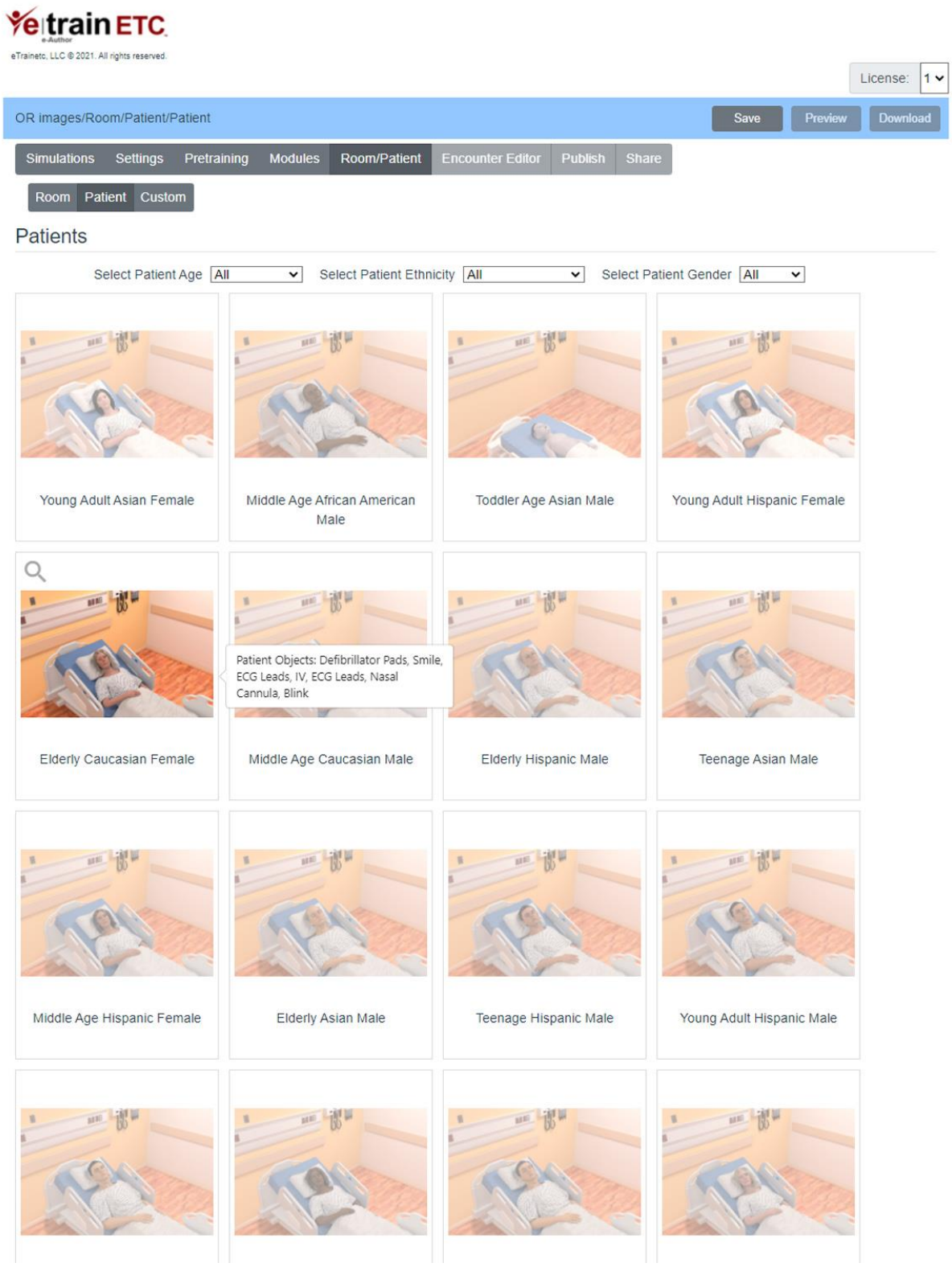


Figure. Screen caption of editing patient library in authoring

Data Analytics

The toolkit offers reporting analytics that provide important and powerful insight and feedback for individual learners, as well as the ability to identify trends across learning groups. Reporting allows the review of all learners' performances and the graphing of knowledge application confidence levels.

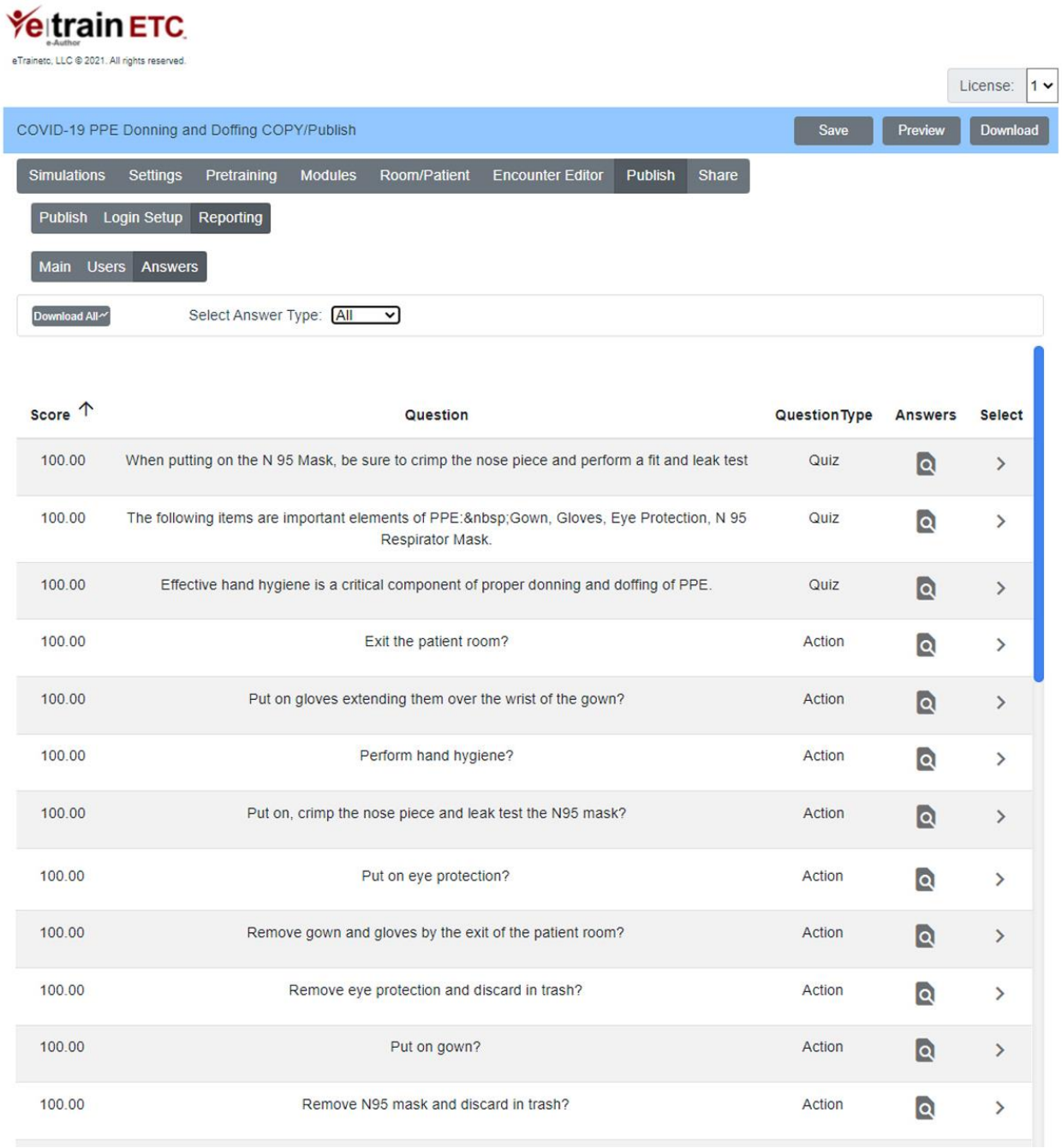


Figure. Reporting choice for drilling down into adaptive learning questions

The included analytical capability provides a detailed list of learners who missed key concepts or steps within the eMicro-Sim. The base analytics and reporting functionalities offer a general overview of the module as it relates to average scores, average confidence, total users, and much more.

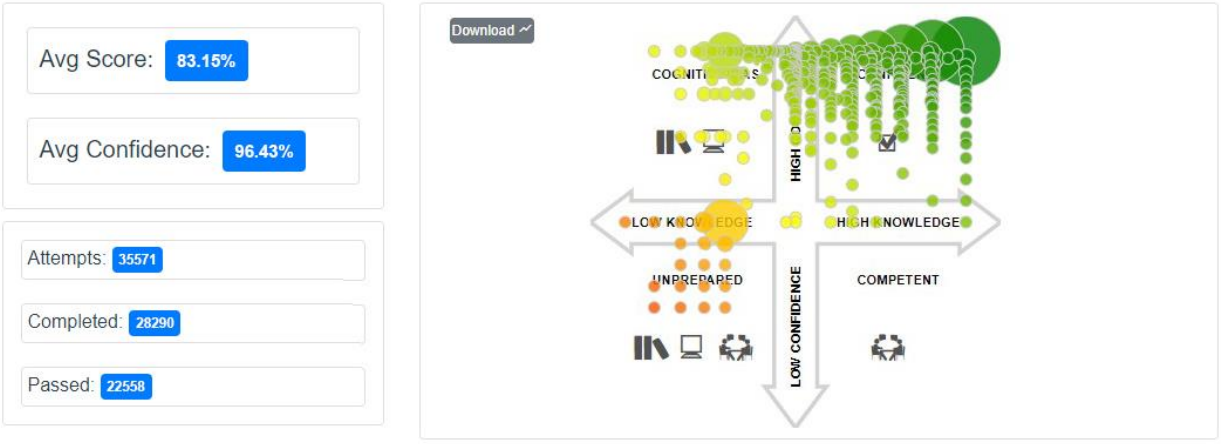


Figure. High level reporting offered for PPE module in authoring tools.

Conclusion of PPE case summary:

The *Donning and Doffing PPE eMicro-Sim* has already been completed by over 30,000 users. In the early months of the COVID-19 pandemic, improper use of PPE increased the risk of exposure to healthcare providers and created unnecessary waste of scarce supplies; and these issues necessitated that an effective training regimen be quickly delivered to a large number of healthcare providers on proper PPE donning and doffing. The innovative technology of eMicro-Sims came along just in time to bridge the COVID 19/healthcare provider safety training gap!

eTrainetc received immensely positive feedback from the healthcare community during the pandemic, and this case shows a clear example of how eMicro-Sims provided an easy-to-use, effective training solution to a real-world problem. It furthermore illustrates the tremendous value of eTrain's technology to training and education professionals.

Current trends indicate that impactful educational solutions be brief, interactive, and accessible online and by phone. Solutions should allow any training professional, including those with limited technical skills, to create meaningful and effective training tools. eTrain's ability to deliver knowledge in short, effective simulated modules, paired with strong data analytics, has forged an innovative and accessible new way of training and learning.

Comments from users of the PPE module:

“The simulation after the video was a good reinforcement of the information!”

“The interactive component: this will be perfect for fundamentals for students before clinical experiences!”

“Very nice module of teaching - very exciting.”

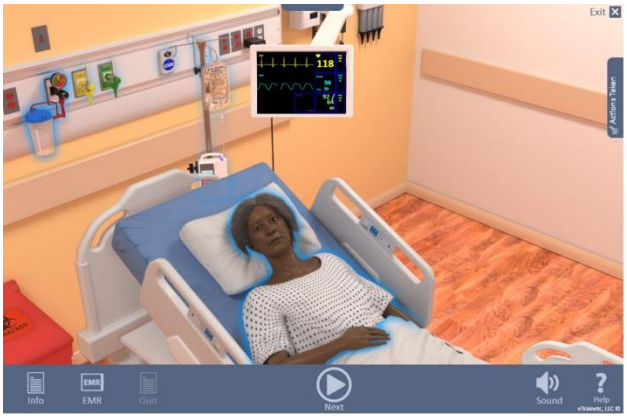
“A very good explanation of the procedure.”

“I enjoyed the interactivity with objects and people in the simulation, as well as the dynamic quiz system.”

“We chose to license the platform to edit several simulations offered in the eTrain library, as well as continuing our commitment to designing more topics specific to our needs at UAB," says Andres Viles MSN, RN, CNS, CHSE, Simulation Coordinator Senior, Director of Immersive Simulation UAB Clinical Simulation Office of Interprofessional Simulation for Innovative Clinical Practice, The University of Alabama at Birmingham.

Other examples created with this toolkit:

Today, organizations are finding ways to improve safety and their team’s knowledge application. The following are more examples of the unique opportunities this toolkit can offer:

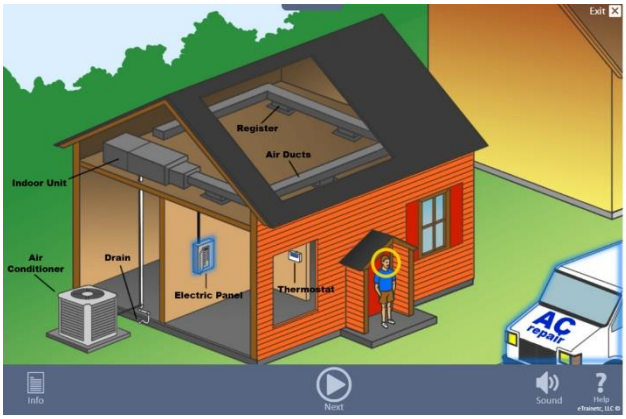


Clinical Decision Making – Sepsis Case

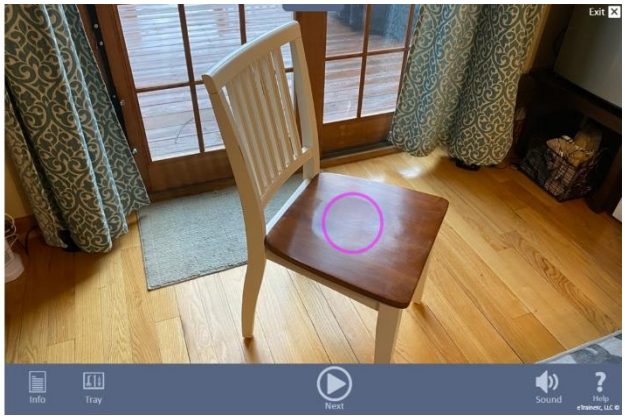
Conflict Resolution – Security Concern

Procedural – Vaccination

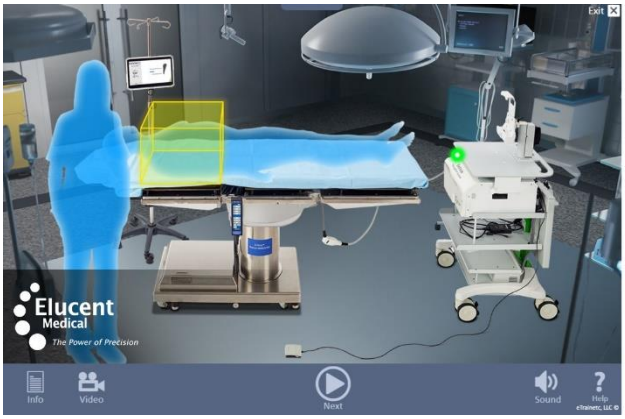
Procedural – Surgery



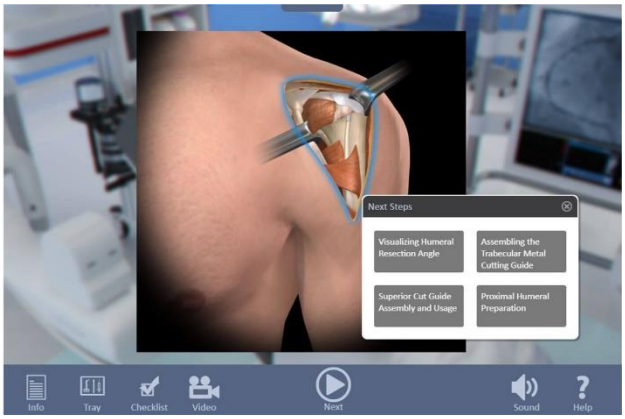
Service Call – AC Repair



Procedural – Chair Repair



Procedural – Equipment Setup and Takedown



Procedural – Shoulder Surgery

About eTrainetc, LLC

eTrainetc, LLC (https://www.etrainetc.com) is a Florida-based company providing software-as-a-service (SaaS) cloud solutions for learning and development activities. The company also has a custom development division that specializes in creating unique solutions for any organization.

eTrain has been working with medical schools, healthcare training companies, and medical device manufacturers in implementing these innovative solutions. eTrain has launched an initiative to leverage this toolkit for audiences outside of healthcare. To learn more about the self-authoring toolkit or custom solutions, please request contact at: www.etrainetc.com/contactus.

eTrainHealthcare, LLC (https://www.etrainhealthcare.com) is a healthcare-specific site with a library of eMicro-Sims, self-authoring tools with a library of scenes, patients, and assets specific to healthcare training and education.