

Embedding Digital Product Twins Across the Surgical Education Continuum

This case study highlights how a digital twin of an intraoperative planning tool became a curriculum-wide enabler for medical education.

- Improving surgical understanding and early confidence through repeatable interaction
- Increasing flexibility by removing dependence on physical systems and travel
- Enabling scalable, high-quality content and more consistent training experiences

The Challenge

Medical device organizations face increasing pressure to deliver consistent, high-quality education across a diverse learner base while navigating constraints related to access, logistics, and variability in training environments. Traditional models rely on in-person sessions and physical systems, limiting scalability and flexibility, while surgeons require a more experiential understanding of system workflows and decision-making early in the learning curve.

In the operating room, trust is built through repetition, but access to that repetition is inherently limited, creating barriers to confidence and adoption.

A Curriculum-Wide Approach

Monarch Learning Labs developed a digital twin of an intraoperative planning tool, enabling surgeons and clinical teams to interact with the same interface and workflows in a browser-based environment. By extending access beyond the physical system, users could build familiarity through repetition before entering the operating room.

Embedded across the learning curriculum, the platform supported both foundational understanding and advanced case discussions, reinforcing that value comes from enabling meaningful, repeatable learning, not just the technology itself.

How Digital Twin Technology Enhances Surgical Education Across the Learning Continuum



One Platform

Every Stage of Learning

Supports learners at all stages of education



See the Impact Before the OR

Visualizes planning decisions and intraoperative impact



Reducing the Learning Curve

Builds confidence through repeatable interaction



Education Without Boundaries

Enables flexible, on-demand training without reliance on physical systems



Expert Insights, Shared Easily

Creates reusable educational content

Enhancing education through greater access and repetition



Visualization That Accelerates Understanding

Dynamic visualization proved to be a critical differentiator, allowing learners to explore how planning decisions, such as alignment, positioning, and balance, translate into intraoperative outcomes. This strengthened foundational understanding for residents and enabled more nuanced case discussions for experienced surgeons. Combined with repeatable interaction, it helped shorten the learning curve and build confidence earlier in adoption. In practice, this led to more prepared conversations in the operating room and greater familiarity with system workflows at the point of use.

Flexibility Without Compromise

The platform introduced a new level of accessibility by removing dependence on physical systems. Surgeons and sales teams could engage with real planning workflows without traveling or waiting for access to a robotic unit. This enabled more frequent, on-demand interaction, supporting repetition and familiarity. Access extended beyond the primary operator to clinical teams and OR teams, improving alignment and shared understanding. As familiarity increased across roles, confidence improved, helping reduce variability and support smoother procedural adoption.

Scalable Impact Today, Structured Growth Ahead

These enhancements build naturally on the strong foundation already in place, reinforcing virtual planning as a long-term enabler of consistent, high-impact surgical education. By creating a digital twin of an intraoperative planning tool, the organization established a more accessible and scalable foundation for modern medical education.

By reducing reliance on physical systems, the platform enabled earlier and more frequent interaction, helping users build familiarity through repetition before entering the operating room. The approach also unlocked efficiencies in content development, with faculty-led sessions captured and reused to create standardized, high-value educational assets.



The platform **enhanced understanding** and built confidence during early adoption



Standardized learning across audiences, roles, and geographies

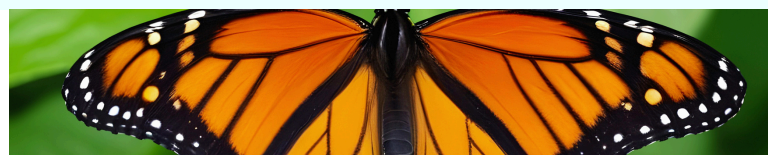


Expanded access to high-quality training without reliance on physical systems or in-person access

Looking Ahead

The organization recognizes that sustained gains in advanced proficiency will require additional structure. The next phase of evolution focuses on developing more formalized learning scenarios, assessment frameworks, and feedback mechanisms to support deeper skill development.

These enhancements build on the strong foundation already in place, reinforcing this approach as a long-term enabler of consistent, high-impact surgical education.



About Monarch Learning Labs

Monarch Learning Labs delivers browser-based, screen-enabled training powered by digital product twins and expert medical device knowledge.

Designed for modern learners, Monarch's approach makes complex clinical concepts accessible, visual, and scalable enabling users to build experience before use and supporting education from early exposure through advanced proficiency.