



EP07.60 Preliminary Evaluation of 3D Lung Models for Spatial Understanding in Lung Cancer Surgery Education



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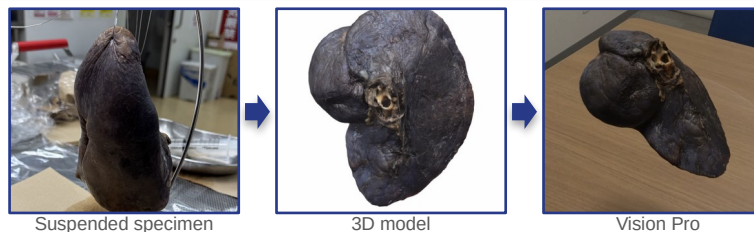
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INTRODUCTION

- Spatial understanding of lobar/hilar structures and lesion location is essential in lung cancer surgery education.
- 2D photographs of resected lungs may not convey depth and 3D relationships.
- New method: resected lung specimens digitized with smartphone-based Object Capture (LiDAR iPhone), observed on Apple Vision Pro.

AIM Evaluate usability and perceived educational utility among medical residents (pilot study, n = 7).

METHODS



1. Resected lungs were formalin-fixed overnight after lung cancer surgery.
2. Suspended specimens were digitized with Object Capture on a LiDAR-equipped iPhone 12 Pro (Apple Inc., USA) — no dedicated scanner.
3. Models were observed on Apple Vision Pro (Apple Inc., USA), followed by an anonymous questionnaire.

Primary: System Usability Scale (SUS, 10 items, 1–5).

Secondary: educational utility (6 items, 1–7); preference vs. photos (–3...+3); perceived effort & confusion (2 items, 1–7); free text. One participant did not complete the secondary items (analyzed in n = 6).

Ethics: approved by the Saiseikai Kumamoto Hospital Ethics Committee (No. 1420).

KEY RESULTS

72.1 Mean SUS score (/100),
n = 7 — acceptable usability among first-time users

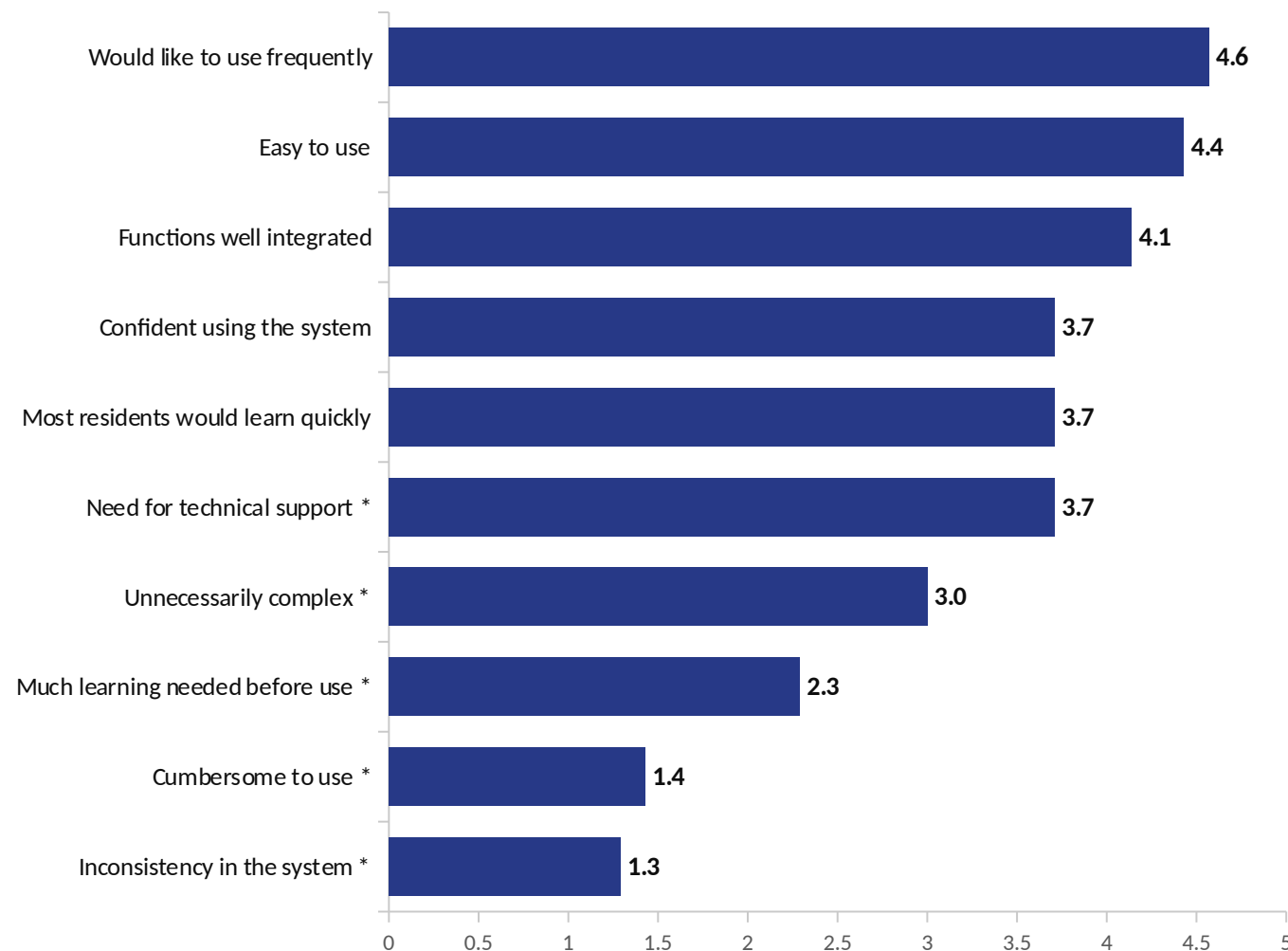
+2.33 Preference vs. photographs (–3...+3),
n = 6 — all favored the 3D model

Low perceived burden
Effort 2.67 / 7 · Confusion 2.50 / 7 (n = 6)

Participants: 7 residents (6 PGY-1, 1 PGY-2); all first-time Vision Pro users; No prior VR/AR experience: 4/7.

TAKE-HOME Smartphone-captured 3D models of resected lungs showed acceptable usability and high perceived value for spatial understanding — all respondents favored the 3D model over conventional photographs.

RESULTS 1 — USABILITY (SYSTEM USABILITY SCALE)



SUS 72.1

mean score /100

— acceptable usability among first-time users (n = 7)

- All participants were first-time Apple Vision Pro users.
- High ratings for willingness to use frequently (4.57), ease of use (4.43), and functional integration (4.14).
- Perceived need for technical support (3.71) — onboarding assistance may be helpful at initial implementation.

Figure 1. SUS item scores (mean, 1–5; n = 7). * reverse-worded items — lower is better.

RESULTS 2 — EDUCATIONAL UTILITY & COMPARISON WITH PHOTOGRAPHS

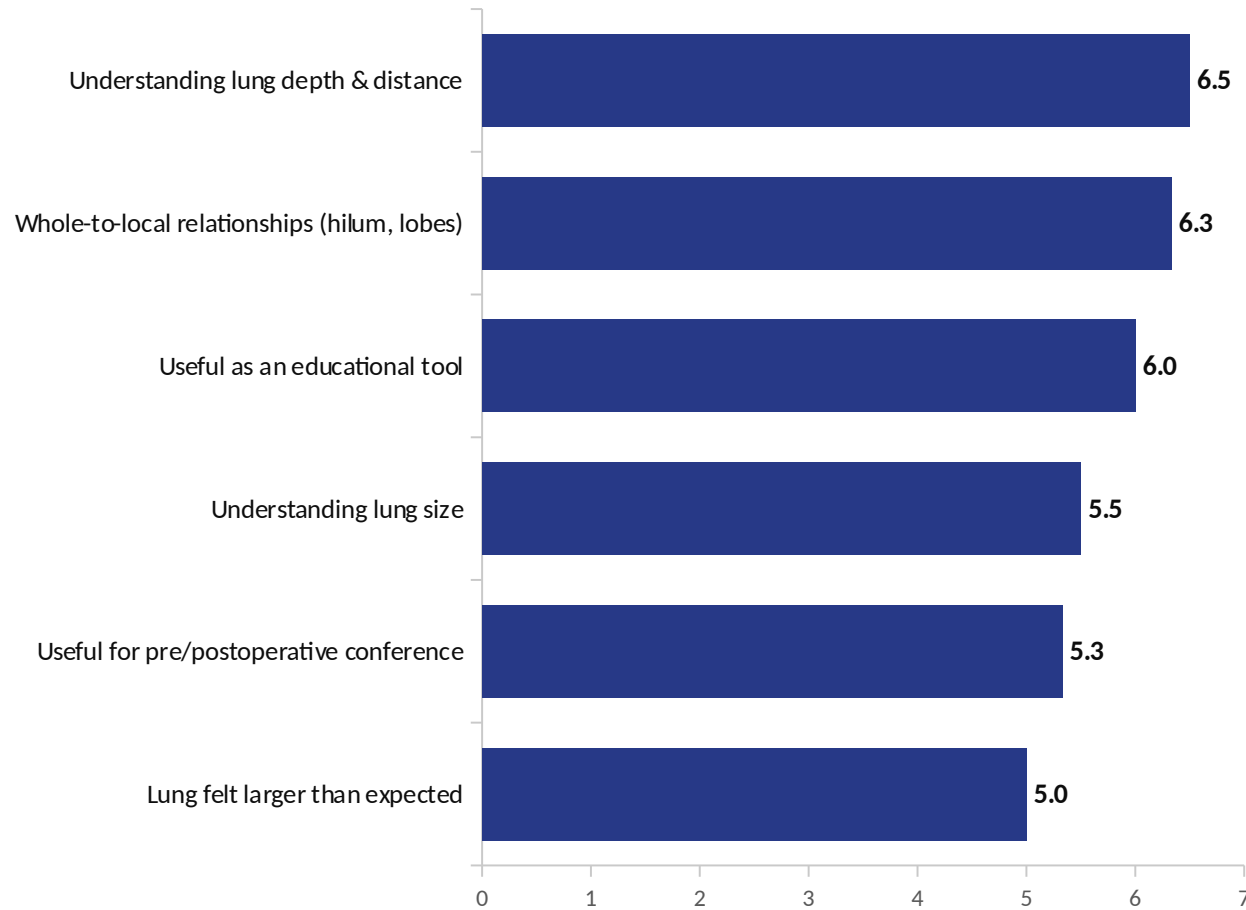


Figure 2. Educational utility (mean, 1–7; $n = 6$).

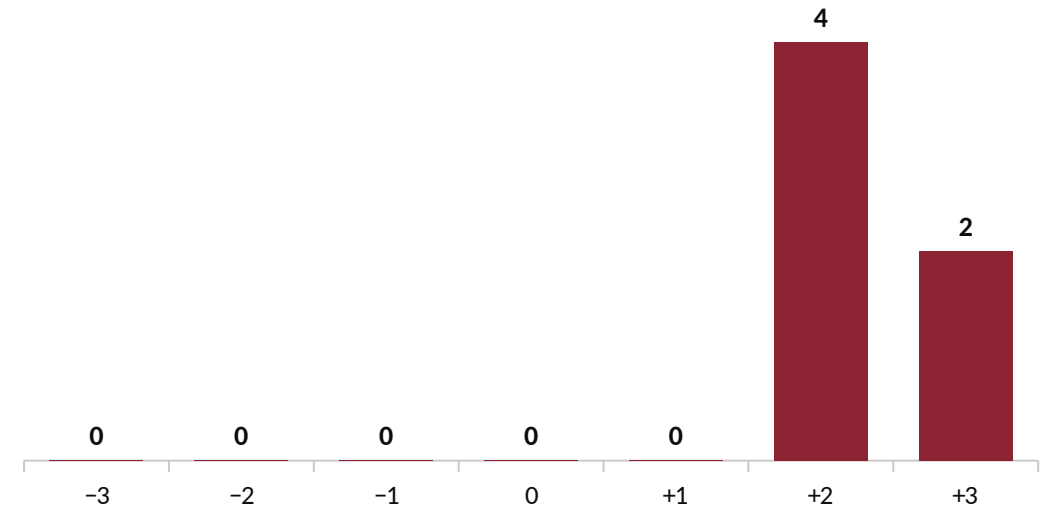


Figure 3. Visual preference: photographs (−3) vs. 3D model (+3), $n = 6$. All respondents favored the 3D model (mean +2.33).

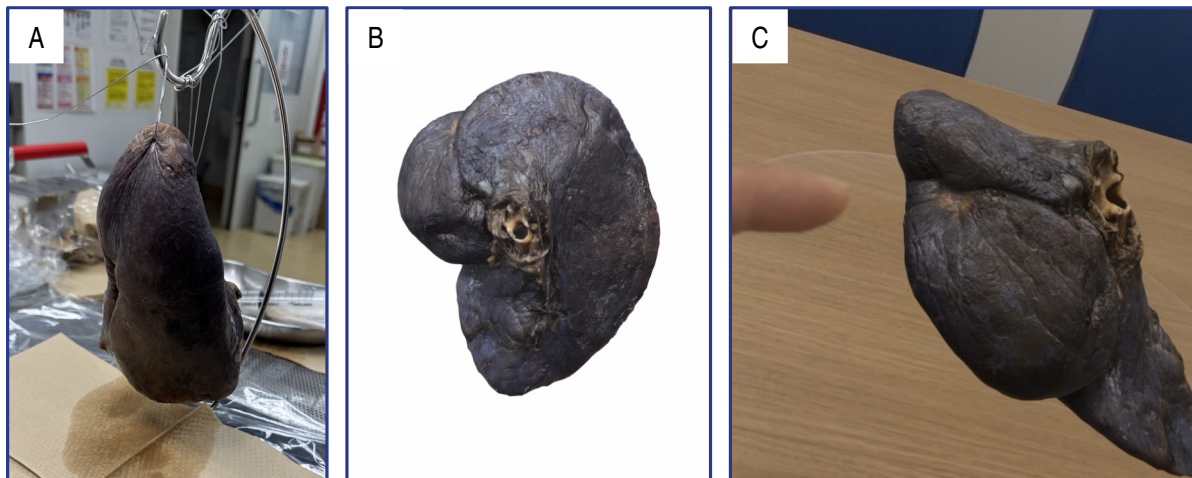
2.67 / 7

“effort required to understand”
($n = 6$)

2.50 / 7

“confused by excess information”
($n = 6$)

Participants reported relatively low effort and confusion.



A. Suspended specimen · B. 3D model (Object Capture) · C. Observation on Apple Vision Pro (first-person view)

Residents' comments (translated)

- *"The three-dimensional shape of the lung lobes and the location of the lesion were easy to grasp."*
- *"Surface irregularities, texture, and vascular anatomy were easy to grasp in 3D."*
- *"Could be applied to preoperative conferences and simulation of the intraoperative view."*

Conclusions

- Resected lung specimens can be digitized using smartphone-based Object Capture and reviewed on a spatial computing device, with acceptable usability even in first-time users.
- All six respondents preferred 3D models over photographs for spatial understanding, and reported relatively low effort and confusion.
- **Limitations:** small single-center pilot; subjective endpoints; no control group. Technical support may be needed initially.
- **Next steps:** controlled comparisons, objective learning metrics, use in pre/postoperative conferences and student education.

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Conflicts of interest

H. Osumi was an investigator on research funded by Johnson & Johnson MedTech (ended March 2025, at a previous institution) and received honoraria (lecture fees) from AstraZeneca. No commercial entity had any role in the study design, conduct, analysis, or reporting.

Funding / Equipment

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Ethics

This study was approved by the Saiseikai Kumamoto Hospital Ethics Committee (No. 1420).

Artificial Intelligence (AI) Use Disclosure

Generative AI tools (Claude, Anthropic; ChatGPT, OpenAI) were used to assist with language editing, figure preparation, and slide organization. All scientific content, data analysis, and interpretation were reviewed and verified by the authors.