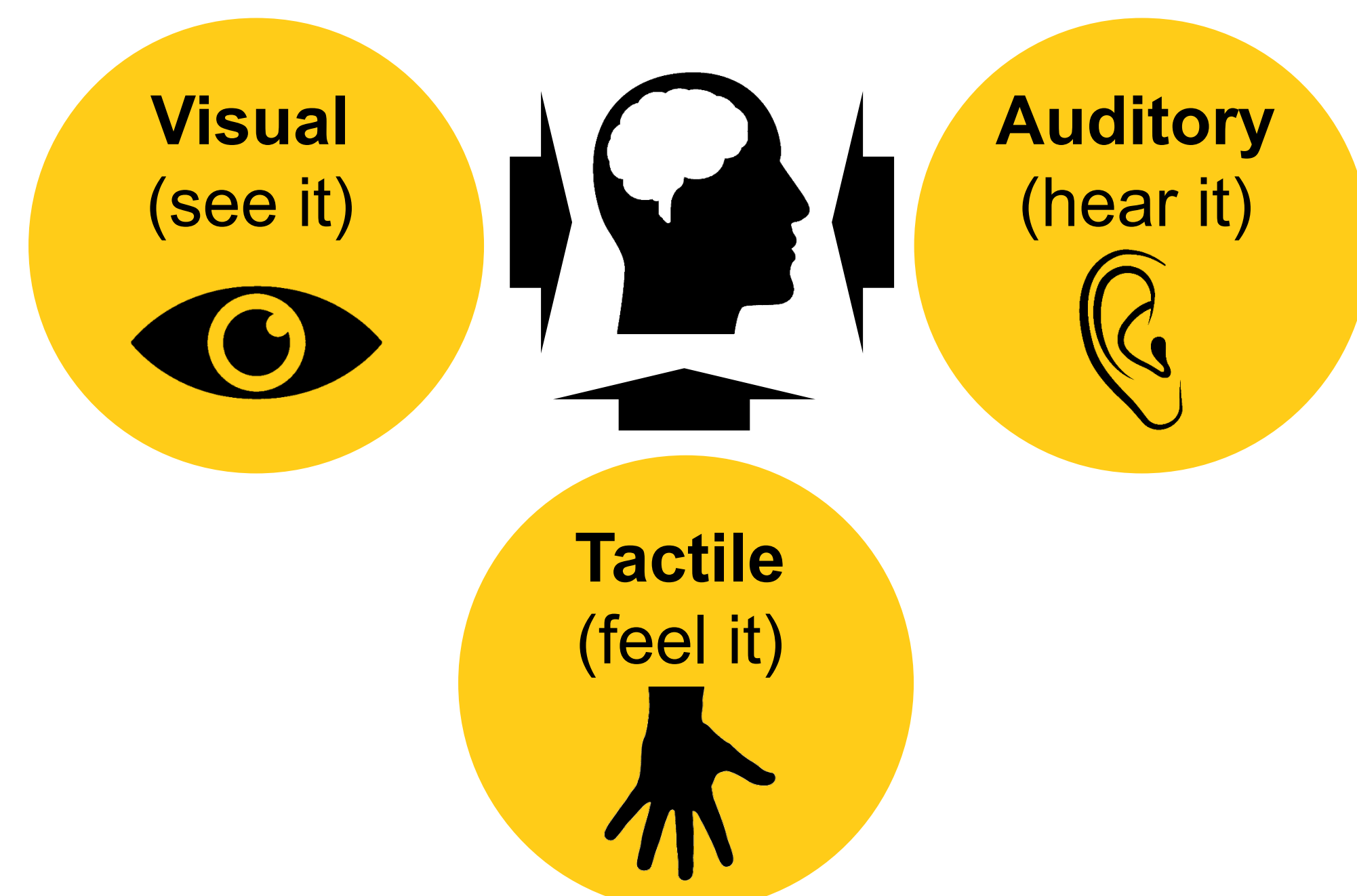


ABSTRACT

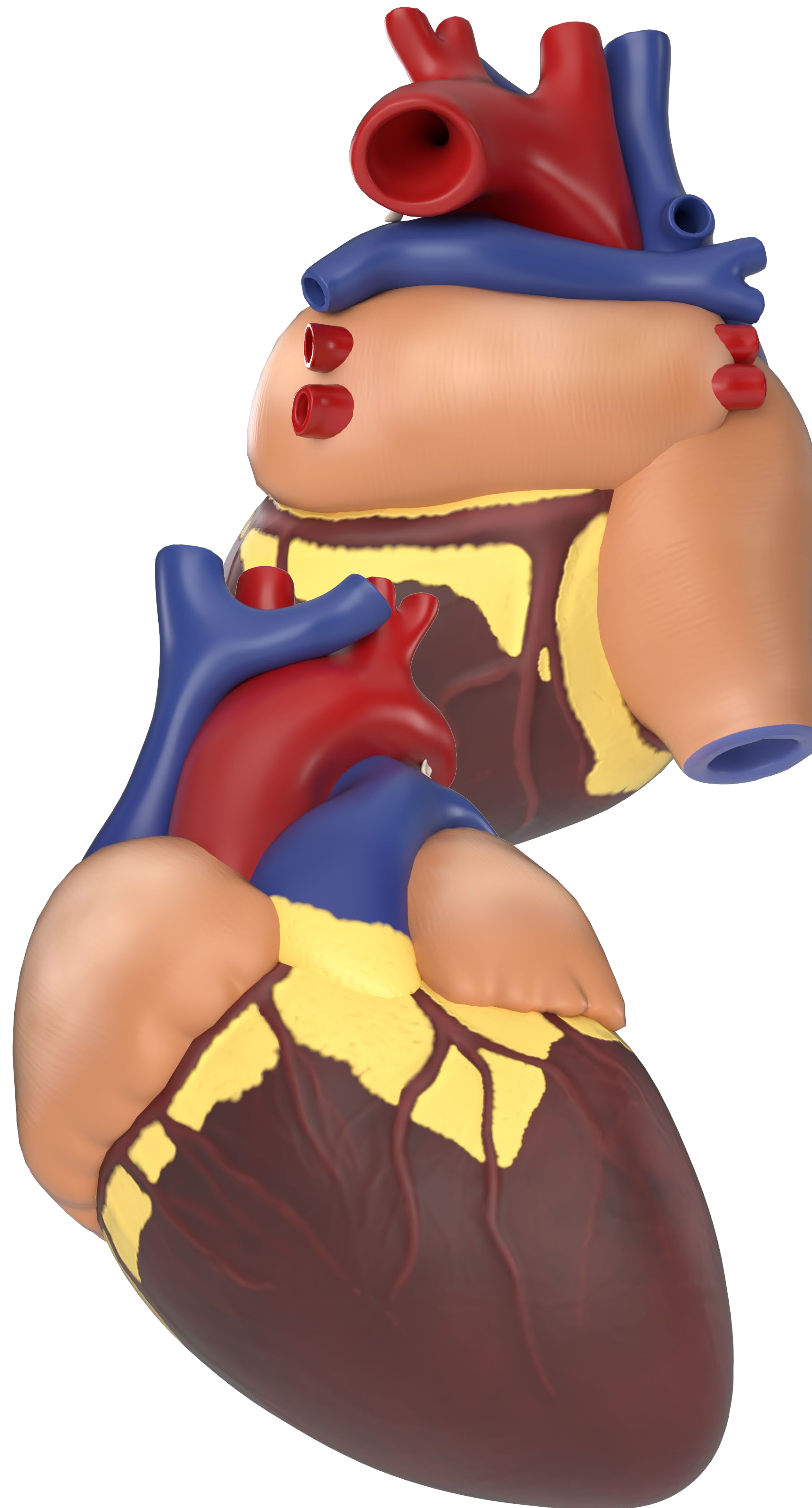
Traditional anatomical models and textbook depictions have long been fundamental to medical education, providing accurate representations of human anatomy. These tools effectively convey structural details and remain essential in foundational training. However, their static nature limits exploration of complex physiological processes and spatial relationships, particularly in dynamic systems like the human heart. This study aims to enhance medical education by developing an interactive 3D model of the human heart within a virtual reality (VR) environment through:

- **Creating a High-Fidelity, Interactive 3D Model of the Human Heart**
- **Enhancing Spatial and Anatomical Comprehension**
- **Simulating Dynamic Cardiac Functions and Physiological Processes**
- **Improving Learning Outcomes and Knowledge Retention**
- **Supporting Medical Diagnosis Training through Interactive Simulations**
- **Providing Interactive Learning Environments**

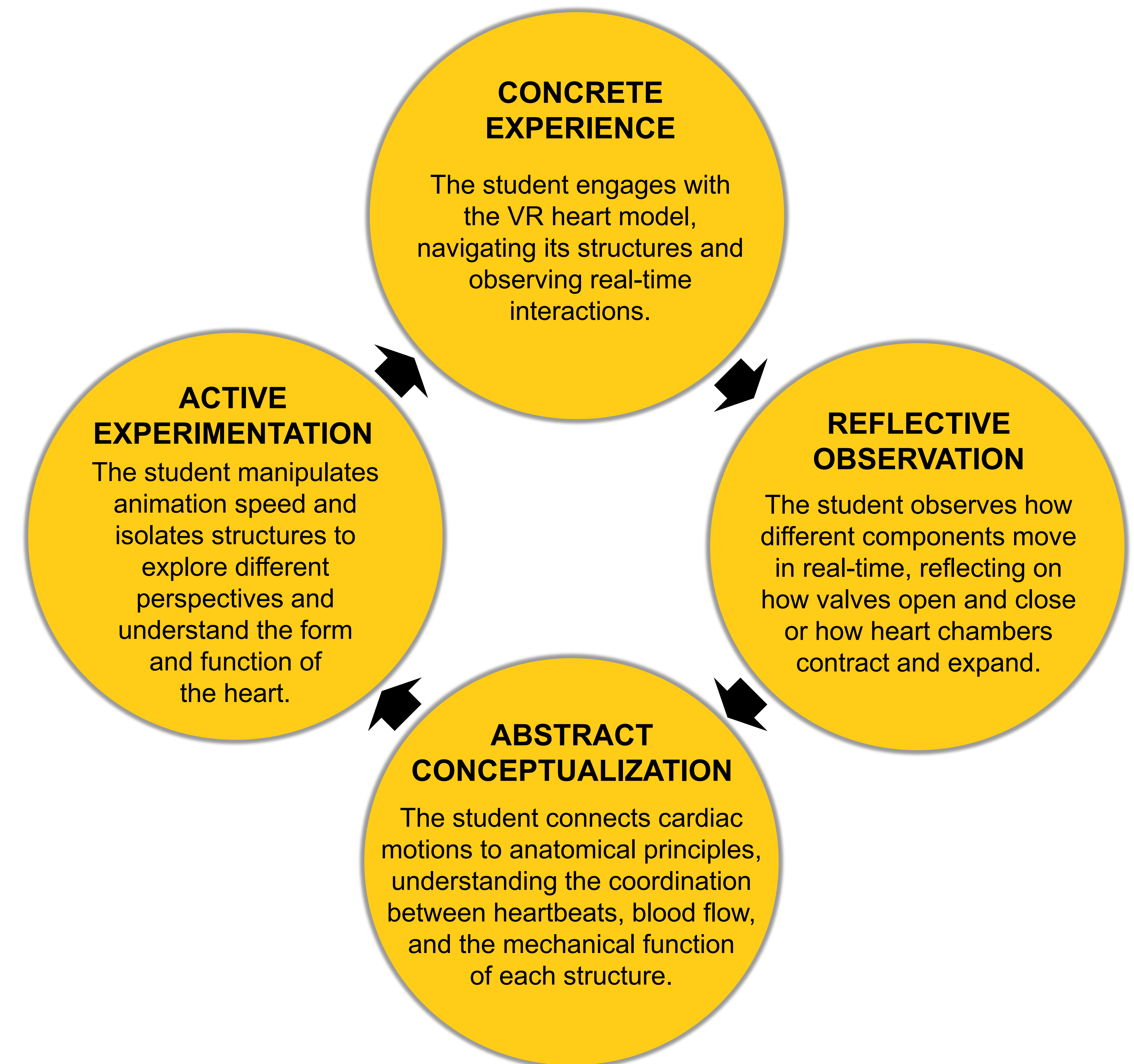
MULTI-SENSORY LEARNING IN VR



VISUALIZATION OF THE 3D VR HEART MODEL



APPLYING EXPERIENTIAL LEARNING IN VR-BASED ANATOMY EDUCATION



COMPARING PEDAGOGICAL APPROACHES IN MEDICAL EDUCATION

| METHODOLOGY | STRENGTHS | LIMITATIONS |
|--|---|---|
| Textbooks & 2D Visuals | Well-established, cost-effective, and easily accessible. Labeled. | Lacks depth perception and spatial awareness. Static. |
| 3D Physical Models | Provides hands-on, tactile experience, improving spatial understanding. | Fixed Views, no dynamic function (physiological interactions). Labels are often separate from model. |
| Cadaver Labs | Most realistic form of anatomical study. Allows students to experience true anatomical variation among individuals. | High costs, ethical concerns, and accessibility limitations. Cadavers deteriorate over time and cannot simulate live physiological functions. |
| Virtual Reality & Interactive Simulations | Enables real-time interaction, dynamic exploration, and adaptive learning. | Requires technological access. Eye strain/motion sickness. |