



ICSIVRse: The Virtual Training Platform for Embryologists Learning Intracytoplasmic Sperm Injection (ICSI)

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Background and Problem Statement



The evolution of the Intracytoplasmic Sperm Injection (ICSI) procedure in Artificial Reproductive Technology (ART) in 1996 has helped many couples faced with severe male factor issues to have a chance of having their own offspring. With more couples stepping forward to seek help for fertility, the IVF market has been growing in demand.

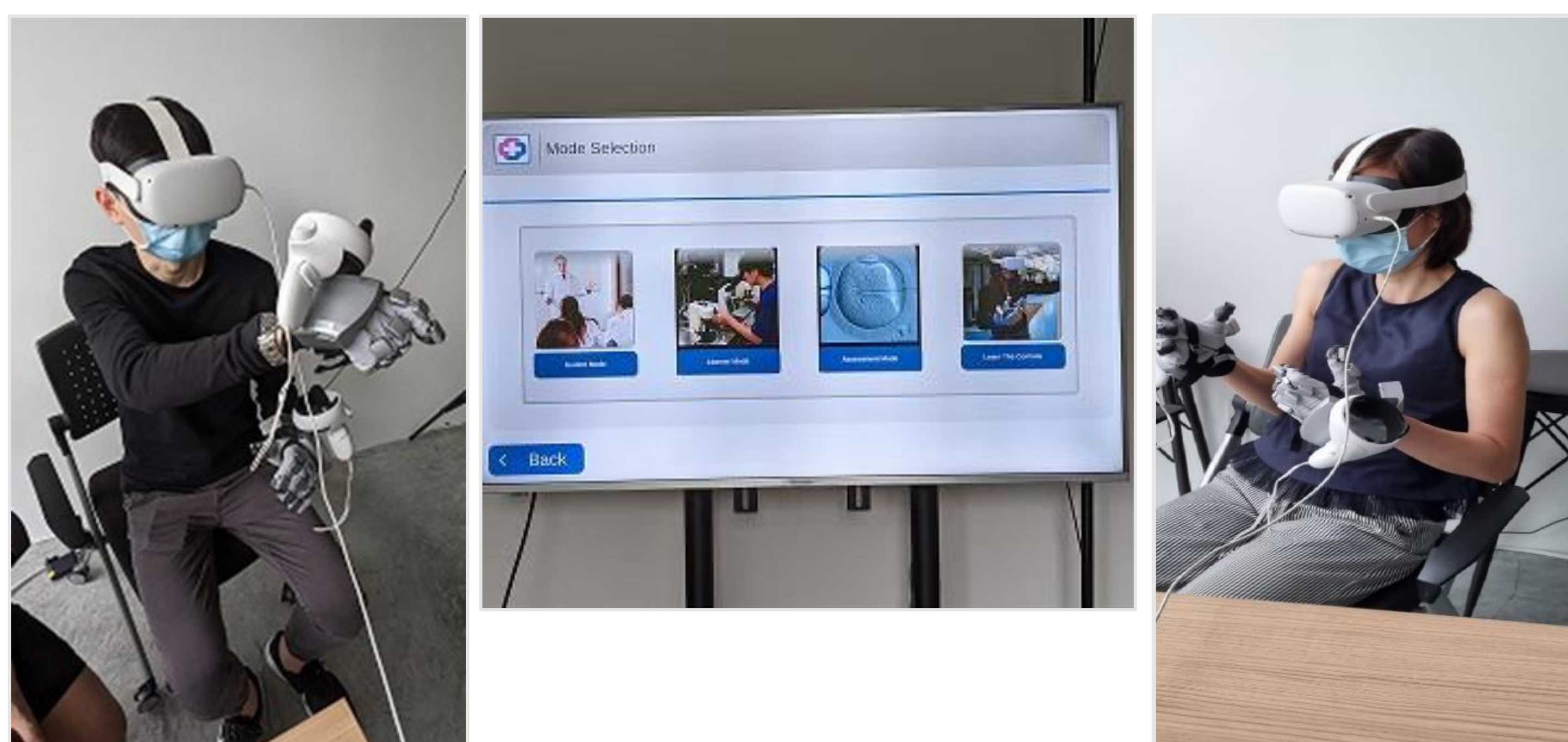
Embryology training takes about 5 years and hence need to be futureproofed and kept sustainable to remain ahead of demand.

Aims:

- **Improve senior embryologists' staff productivity**, and increase efficacy of training for the next generation of embryologists
- **Enable Independent training of ICSI by trainees**, in an efficient and risk-free environment, leveraging on Virtual Reality (VR) technology, motion tracking and data analytics
- **Eliminate the use of limited biological materials** and clinical equipment

Expected outcomes:

- Shorten ICSI training duration for a trainee embryologist **by at least 50%**
- Reduce the reliance of an actual trainer by **at least 80%**
- Improve learning outcomes



Methodology

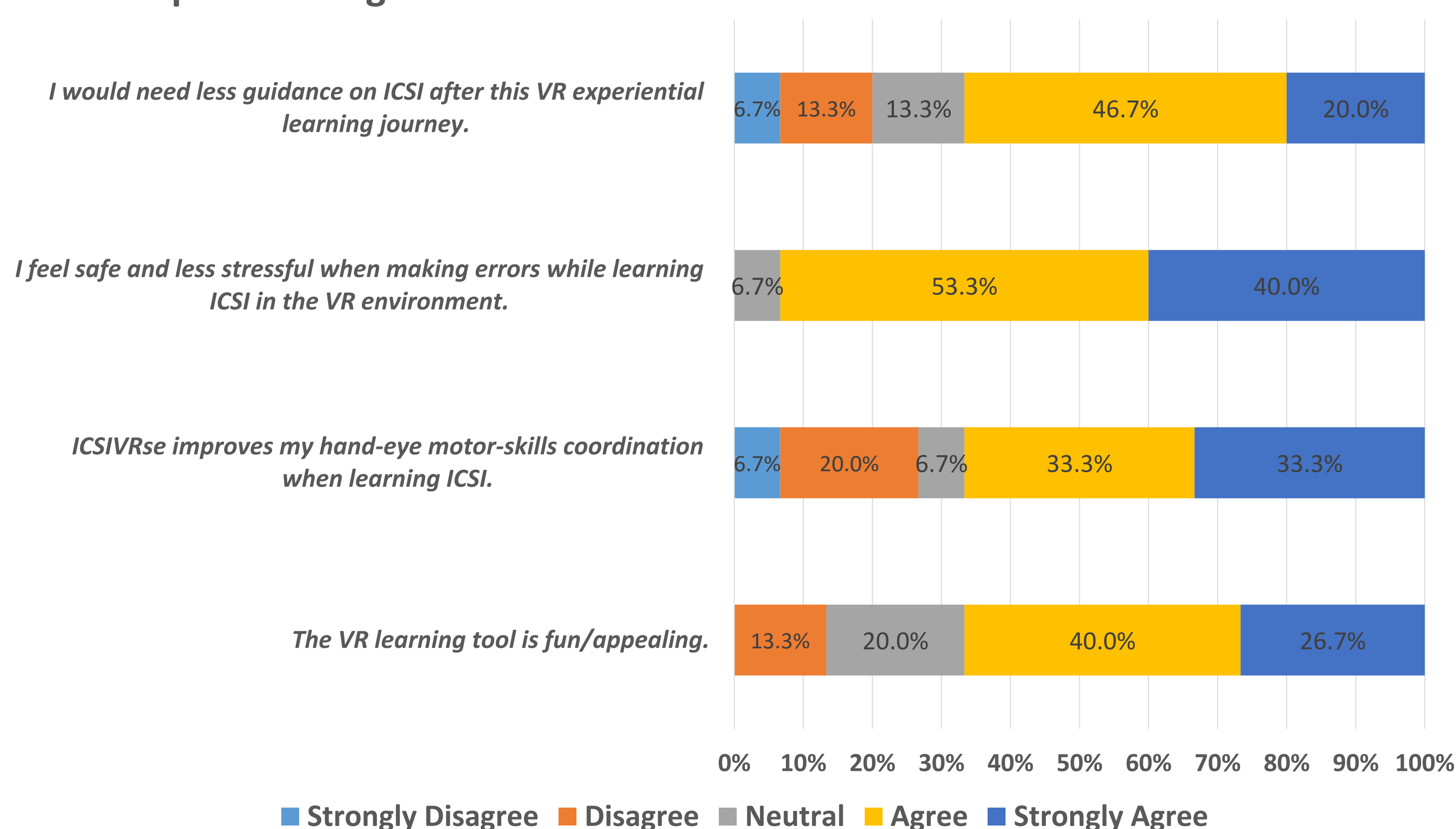
KKH embryologists were awarded the SUSS InnovPlus Grant to conceptualize, develop and pilot this project. An immersive VR training simulation environment was designed with gamification in mind, encompassing 3 modules: **Guided, Practice and Assessment**.

The key components are highly interactive, comprising of: **Hardware:** haptics gloves and VR headset, Desktop; **Software:** Desktop Application; and backend application for data analytics.

Prototype pilot testing was carried out on a sample size of 30, i.e. 15 embryologists, 2 rounds each.

Results

Responses from Survey Analysis following 2 rounds of ICSIVRse pilot-testing



The pilot testing survey shows **increased user satisfaction** with a given sense of fun and appeal, encouraging independent learning within a safe, virtual environment for learners. Technology provided a similar training outcome to **~80 hours of live master embryologist training**. Copyright protection of the source code and novel haptic glove use was filed.

Conclusion and Future Works

ICSIVRse is **effective and efficient** as learners show improvement in learning outcomes, and more trainees can be **trained concurrently**. Trainers can **use their time more effectively** on clinical matters. **Shortened duration of training** can be achieved for competency in the earlier domains of learning i.e. cognitive and psychomotor skills in carrying out ICSI technique. **Biological material is not required**. Further studies will be carried out to evaluate the productivity savings leading to cost effectiveness of this solution.