Immersive Learning Experiences

NecoVerse final seminar – 17 Nov 2025

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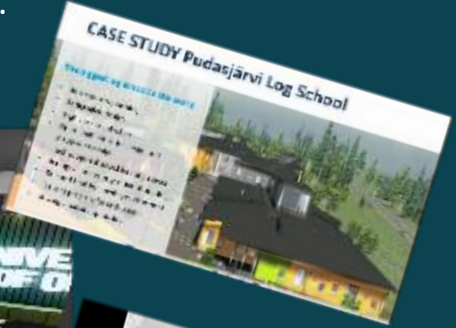
TURKU AMK
TURKU UNIVERSITY OF APPLIED SCIENCES

finpeda virtual space
IMMERSIVE LEARNING EXPERIENCE

TUTEKA
1946

Finpeda background

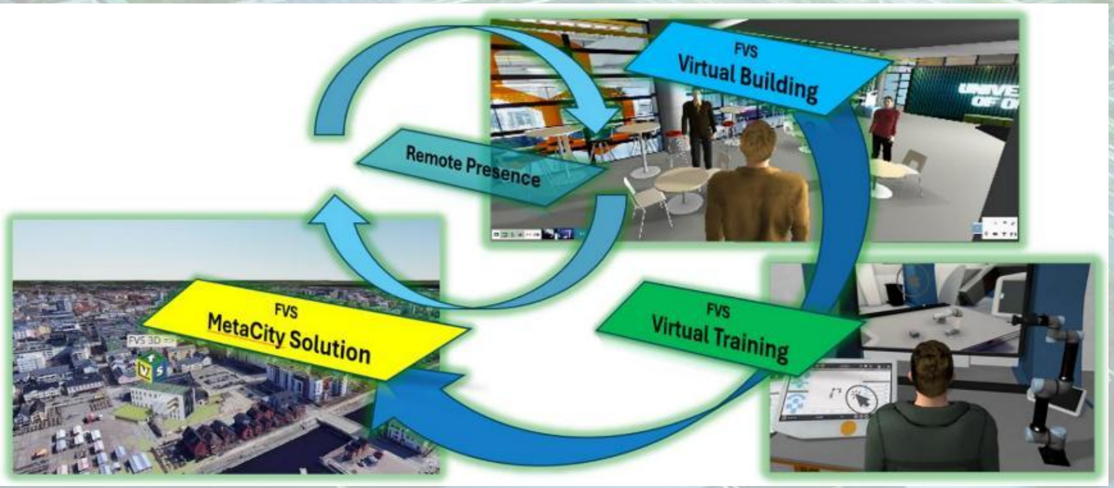
- **Pedagogy Factory:** to train teachers from old school culture into the new working culture including teacher in-service training and strategic leadership (vision building)
- **Architecture New School building:** to design school of the Future or transform existing schools towards 21st century learning and develop FINNS education brand.
- **Study Tours:** to organize Finnish Education Study Tour (FEST)-visit to Finland
- **3D-Technology:** to develop multiuser browser based virtual 3D-learning and training environment Finpeda Virtual Space (FVS) for active phenomenon, inquiry and project-based learning and students research projects.
- finpeda virtual space
  IMMERSIVE LEARNING EXPERIENCE

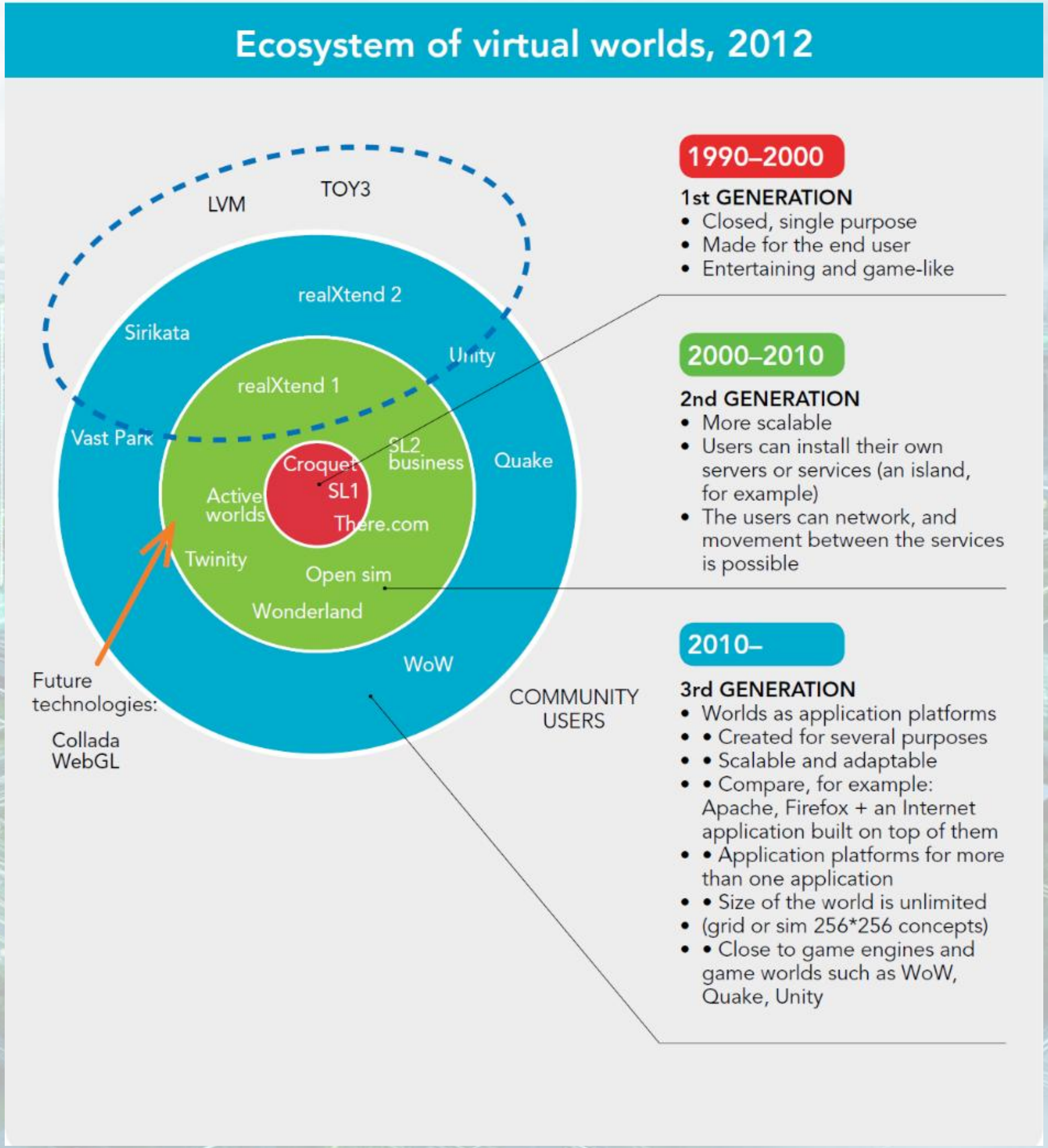


Page 117: Figure 2. Leading virtual worlds and their development.

4th GENERATION 2020-
2021 Epic Games: Fortnite
2021 South Korea AR/VR platform
2021 Facebook => META (28.10.2021)
From native to browser-based technologies

5th GENERATION 2030-
National Metaverse strategies
AI driven development
3D City models
Universal avatars
Smart City operations
IoT data analyses
Digital Twins
Smart Translation services





finpeda
Innovations in education

HOMEPAGE = HOMESPACE

.. What you used to know as a 2D homepage, today we have it as a 3D homespace ..

Finpeda Virtual Space (FVS) is a browser-based 3D Virtual Multi-user Environment:

- Company showroom
- Project meeting room
- Distance learning and training solution

Excellent tool for social communication and project work!

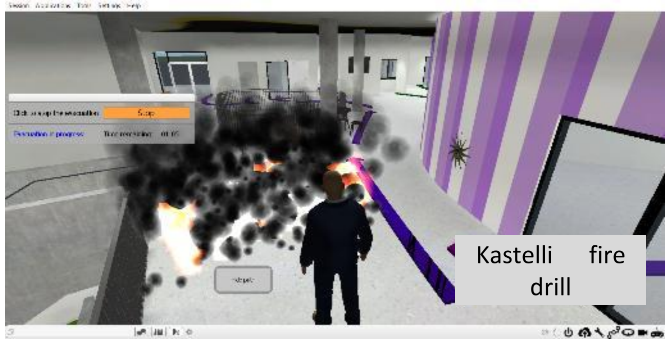
Other use cases:

- Corporate training e.g. legal language skills
- Vocational education in-service training
- Safety trainings and simulations

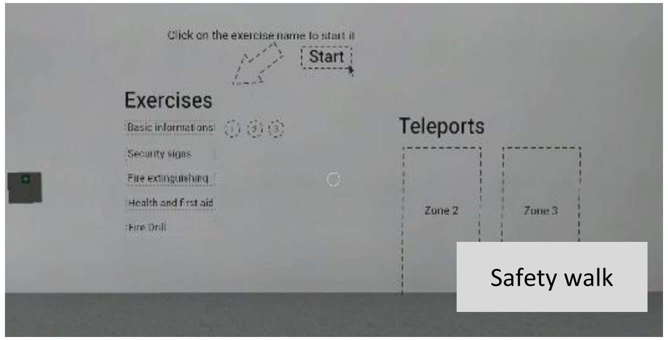
Avatars represent real users in Virtual Space or 3D City Model!

CASE STUDY
Vocational and industry learning environment development projects

HAMK harvester


Kastelli fire drill

Virtual Classroom

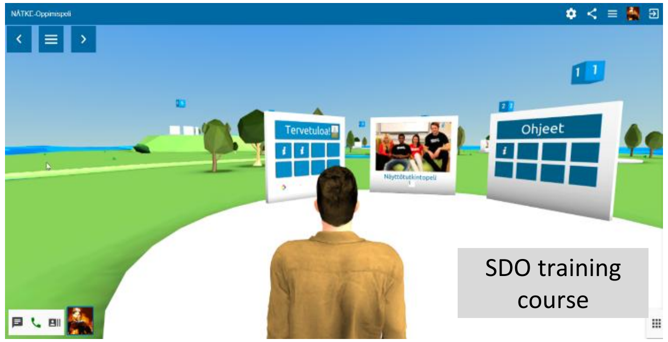


Safety walk


OSAO kitchen

Safety training

Hotel lobby training



SDO training course


Virtual School

Immersive learning research

Use case: Universal robot programming

The demand for universal or collaborative robot implementations is growing rapidly across all use cases, but is particularly apparent in the welding industry

Research context

Pick & place

Palletizing

Welding

Assembly

Finishing

Universal robots need to be programmed

- This requires training

Assigning robots exclusively for training is

- Costly
- Space consuming

AIM

To build an effective and relatively low-cost training environment that prepares students and industry workers for programming and operating universal robots

OBJECTIVES

- Make a learning platform that provides both theoretical and practical exposure to universal robot programming
- Test the effectiveness of the learning platform
- Understand the experience that users have with the platform

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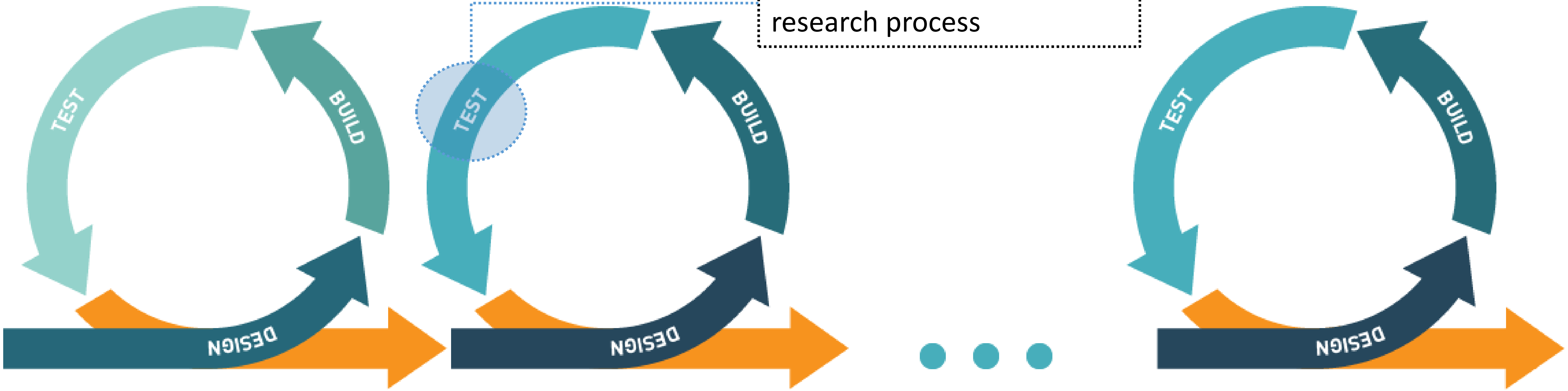
Research methodology

We are currently here in the research process



ITERATION 1

ITERATION 2

ITERATION 3

Research questions:
1. Which is more effective for our platform, group or solo learning?
2. What level of UX do each of the platforms have?

Research questions:
1. What is the learning impact of longer-term engagement with our learning environment?
2. How do the results compare with iteration 1 research?

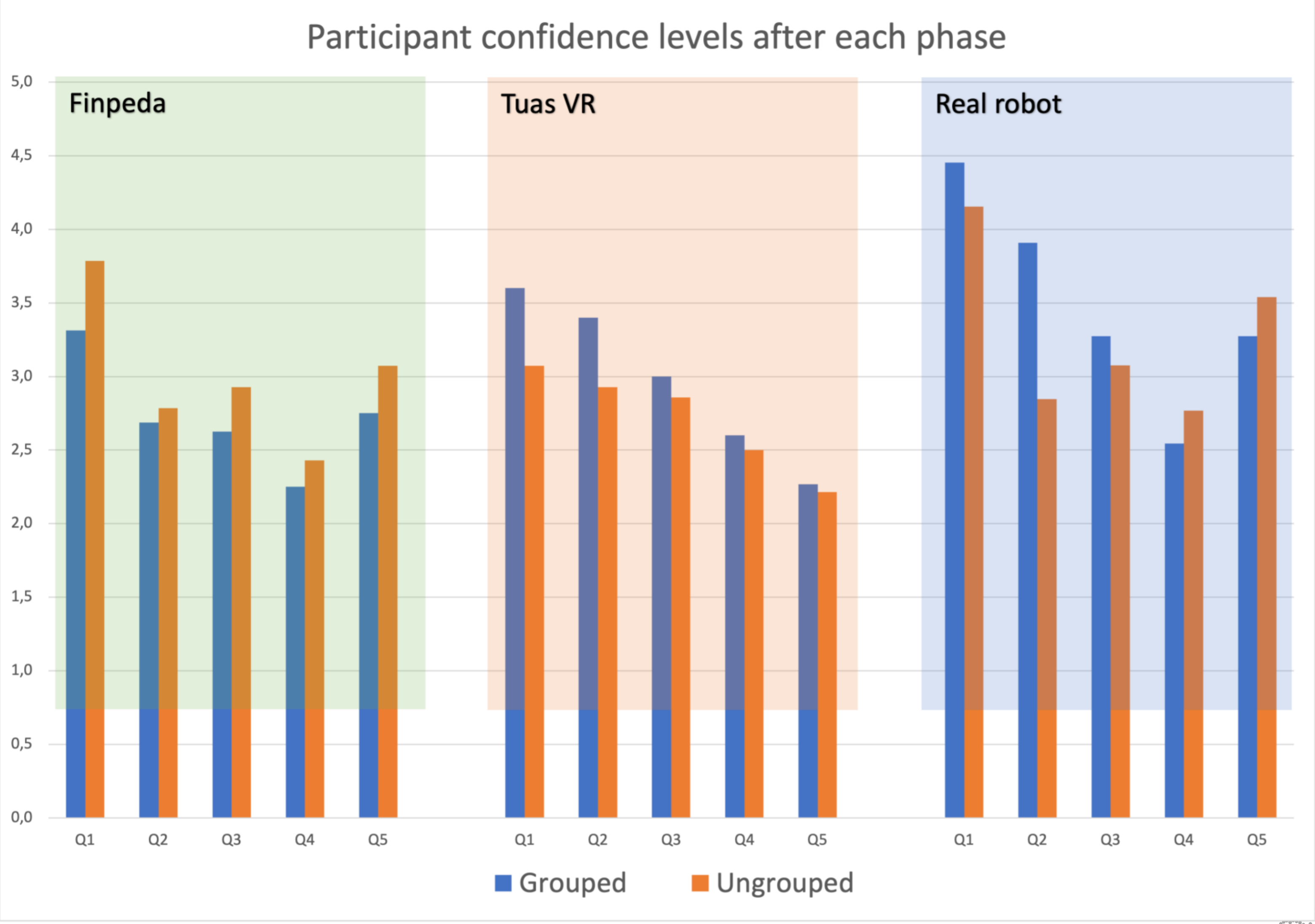
Participants:

Iteration 1 – ICT students with no robot programming experience … n = 25

Iteration 2 – Mech Eng students with no robot programming experience … n = 14

Iteration 3 – ?? students + industry workers ?? … n = ??

Research results



Keep in mind:

- The participants knew nothing about robot programming (many of them didn't know what a universal robot was)
- The time spent in training was merely:
  - ±15 minutes of theory
  - ±25 minutes of VR practice

Areas in which confidence levels were assessed:

Q1: Turning the robot on
Q2: Moving the robot to the home position
Q3: Controlling the individual robot joints
Q4: Precisely positioning the individual robot joints
Q5: Moving the robot between two points

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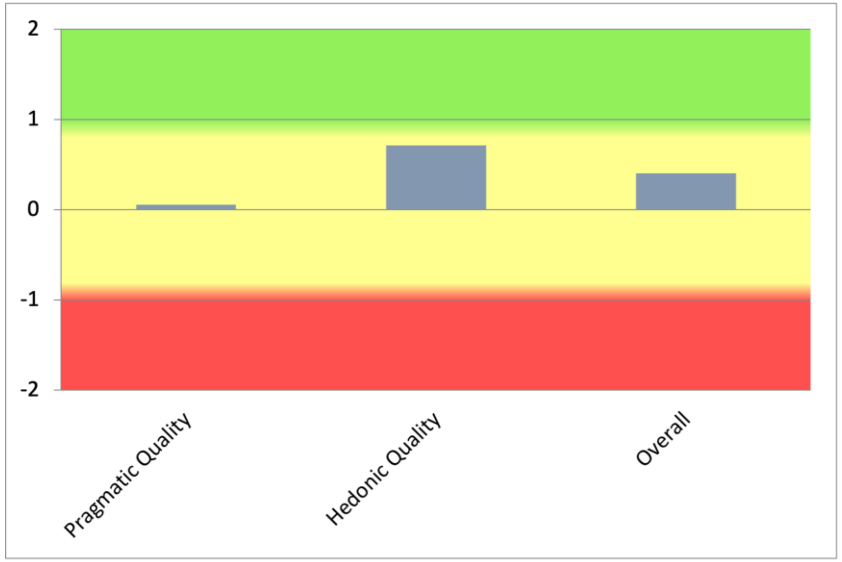
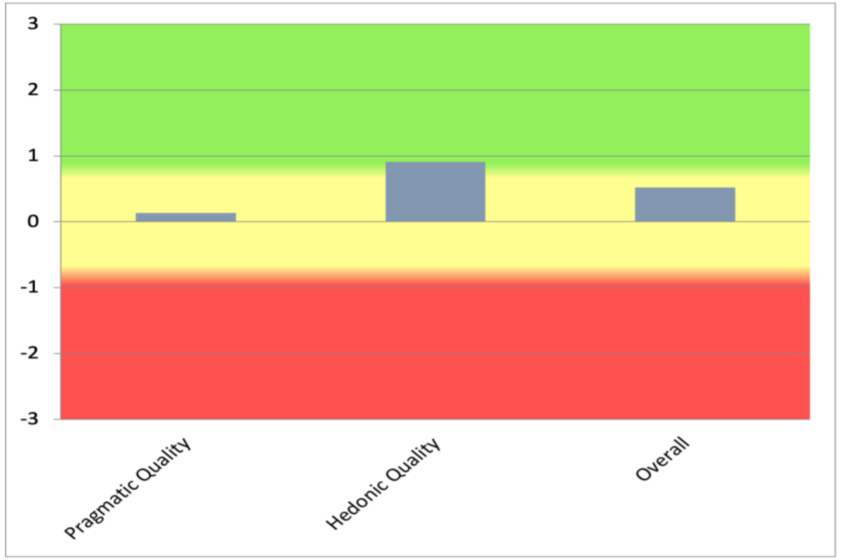
FinPeda user experience

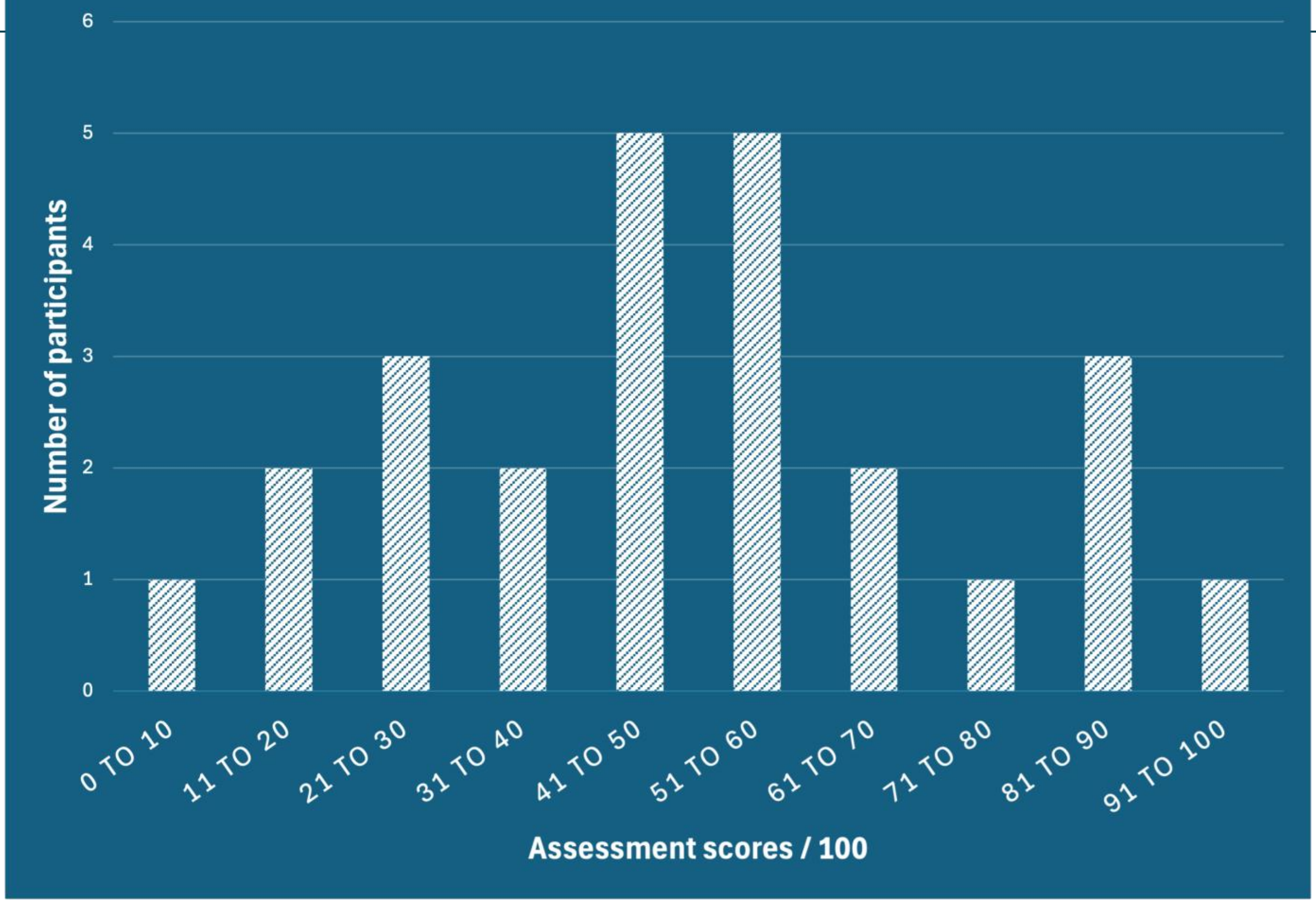


VR user experience



Metaverse environment in shipbuilding

FREQUENCY DISTRIBUTION OF REAL ROBOT PROGRAMMING ASSESSMENT



Assessed tasks:

- Robot initialization
- Manual positioning of the robot
- Programming the robot (triangle & straight line between 2 points)
- Returning robot to the home position
- Safety and time management

Conclusions

- Our remote universal robot programming training in a dual-mode platform…
  - Instils confidence among novice users to program a real robot
    - Particularly with a peer-to-peer learning approach
  - Appears to be an effective metaverse training solution for programming robots

- To fully facilitate multi-user training on an international scale, **streaming language services** will be needed
  - **Lingsoft** has provided this, and it will be integrated into iteration 3 research

Current and future development of the environment

Focused on integrating Lingsoft natural **multi-language** processing

Iteration 2 – Talk-out-loud feature

- Allows participants, through natural speech, to …
  - Express their learning progress for deferred feedback sessions
  - Point out any usability issues they encounter

Iteration 3 – Real-time language translation streaming

- Allows participants to communicate in real time
  - Within the learning environment
  - Without language barriers

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Ongoing research (27.10 to 28.11 2025)

Basic log of your engagement with the platform:
Date; amount of time; what was done

Informed consent + Profiling + research IDs

27.10

Web-based phase

27.10 – 06.11

PCS
UEQ
SUS
CAP

Questionnaires

VR phase with web-based environment available

06.11 – 20.11

3 sessions per participant

1 hour per session

PCS
UEQ
SUS
CAP

Questionnaires

Mock welding task with real robot

24.11 – 28.11

1 session per participant

30-45 minutes per session

Short interview

5 – 10 min

Questionnaires (explained on slides 3 & 4):
PCS: Perceived competence
UEQ: User experience
SUS: System usability scale
CAP: Perceived learning

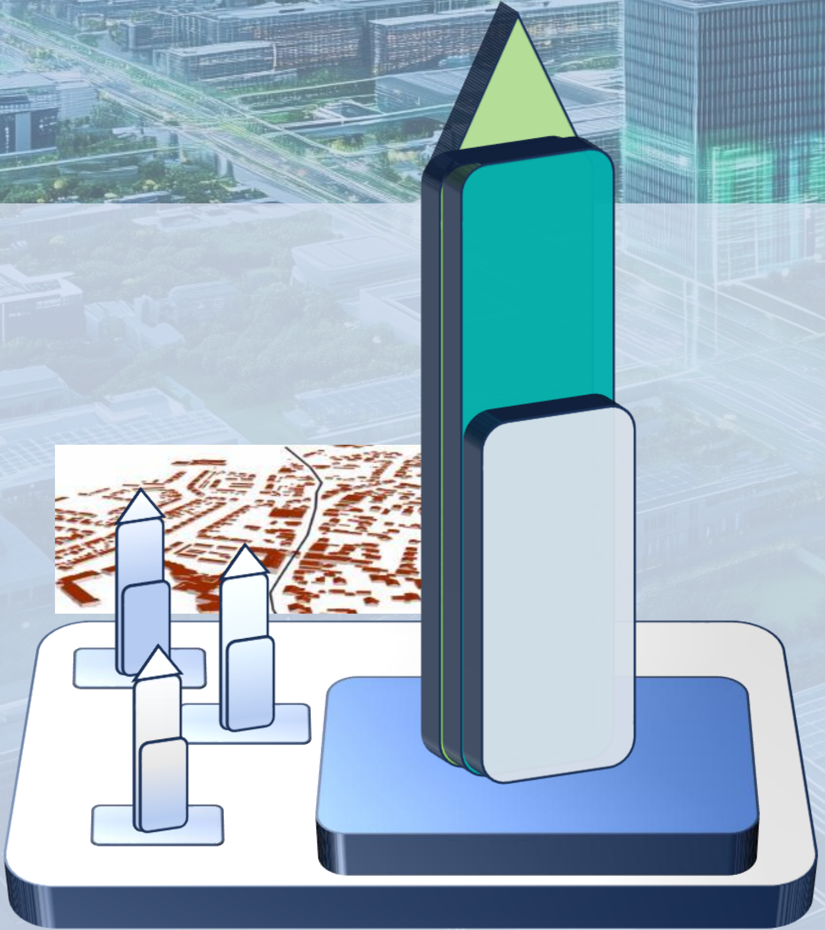
Immersive learning

Back to the future

sensurban

Empowering Schools, Institutes and Industry with 3D Digital Twin Technology

Digital Transition



Roadmap to Smart Education Solutions

- ❑ Creating the model / models
- ❑ Bringing in learning content
- ❑ Developing simulations
- ❑ Build-in collaboration
- ❑ Work in 3D

From 3D models << ==== >> to Immersive Learning Environments

[Meshmoon Meeting](https://fvs.attracs.com/?id=11bfaf0ded1dcce845c9f708e8de039b) - https://fvs.attracs.com/?id=11bfaf0ded1dcce845c9f708e8de039b

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Thank you

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