



TAL TECH

APPLICABILITY OF ROBOT ASSISTANTS IN HIGHER EDUCATION

Authors: **Fuad Budagov**, Prof. Tarmo Robal, Dr. Mohammad Tariq Meeran
IT College | School of Information Technologies, Tallinn University of Technology

International Symposium on Ambient Intelligence and Embedded Systems (AmiEs)-2025
Hamburg University of Applied Sciences, Germany

26.09.2025

AGENDA

- Introduction
- Research aim
- Research design
- Methodology
- Ongoing results
- Papers
- Research timeline

DEFINITIONS

- **Robot Assistant**
 - A robot designed to assist humans in various tasks, improving efficiency and effectiveness in both professional and personal contexts [24].
- **Semi-autonomous Robot Assistant**
 - A robot that operates with some degree of autonomy but still requires human intervention for complex tasks or decisions [25].



BACKGROUND

HE challenges due to changing educational needs and expectations:

- **Inefficiencies** in addressing diverse student **needs** and teacher **workloads** [4,5].
- **Teacher shortages** and demand for personalized instruction strain institutions [6-8].
- **Administrative tasks** overwhelm educators, reducing the focus on impactful teaching [9-12].
- **Lack of timely and individualized support** during class and practical sessions [14-16].

Digital transformation, including the use of robot assistants, can enhance efficiency, personalization, and support.

RESEARCH AIM

Applicability of robot assistants in HE:

- **investigate** how **semi-autonomous** robot assistants can **support** teachers and students in higher education (HE). (RQ1)
- **assess** how students and educators **perceive, accept, and interact** with robot assistants. (RQ2)
- **identify benefits and challenges** related to the integration of robot assistants in HE settings. (RQ2)
- **explore** the use of robot assistants as **in-class tutors**, providing **real-time support** and **evaluation** for students. (RQ3)
- **develop** a **conceptual framework** and **evidence-based recommendations** to guide the integration of robot assistants and promote **digital transformation** in HE. (RQ1-3)

RESEARCH QUESTIONS

- RQ1. How can semi-autonomous **robot assistants** be **effectively** utilized to **assist educators** and **students** in higher education settings?
- ***Method:** literature review, experiments*
- ***Outcome:** development of a conceptual framework*

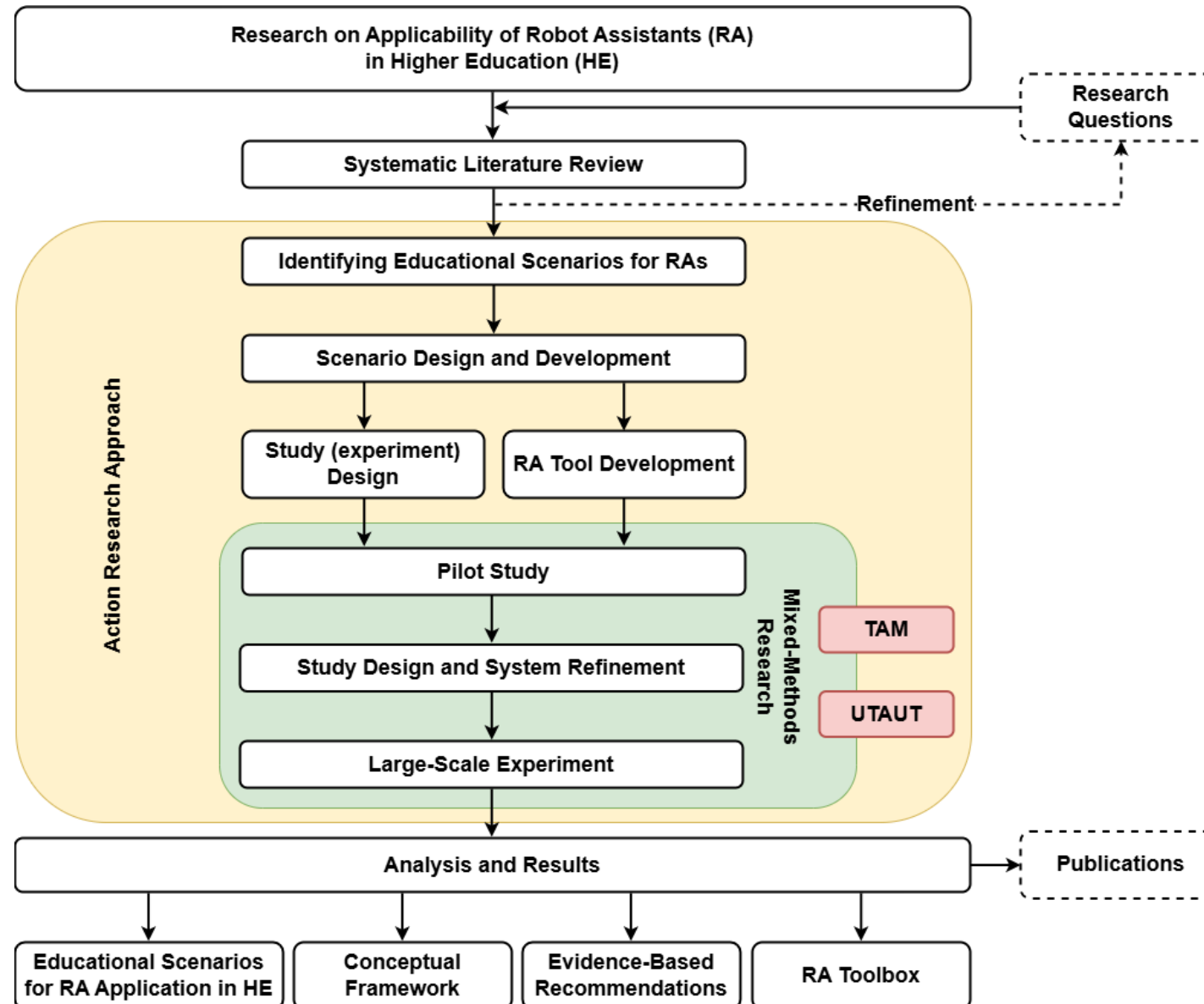
RESEARCH QUESTIONS

- RQ2. How do **students** and **educators** **perceive** and **interact** with **robot assistants** in higher education settings, and what are the potential **benefits** and **challenges** associated with their integration?
- **Method:** *literature review, scenario development, pilot study, experiments, surveys, interviews*

RESEARCH QUESTIONS

- RQ3. How can semi-autonomous robot assistants **assist students** and **educators** during daily classes as “**tutors**” in higher education?
- **Method:** *literature review, scenario development, pilot study, experiments, surveys, interviews*

RESEARCH DESIGN AND METHODOLOGICAL FRAMEWORK

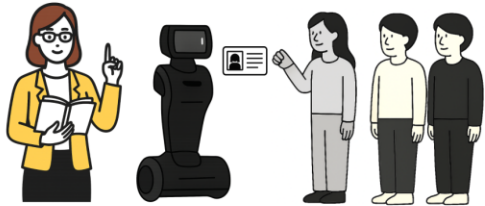


EDUCATIONAL SCENARIOS AND TOOLBOX FOR THE ROBOT ASSISTANTS

Robot Assistants in Higher Education

Pre-Class Support

Attendance Check of Students



Start of Class

In-Class Support

Robot as Teaching Assistant (Support - Q&A)



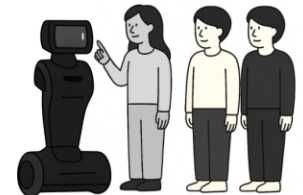
Robot as Teaching Assistant (Pre-Evaluation)



During Class

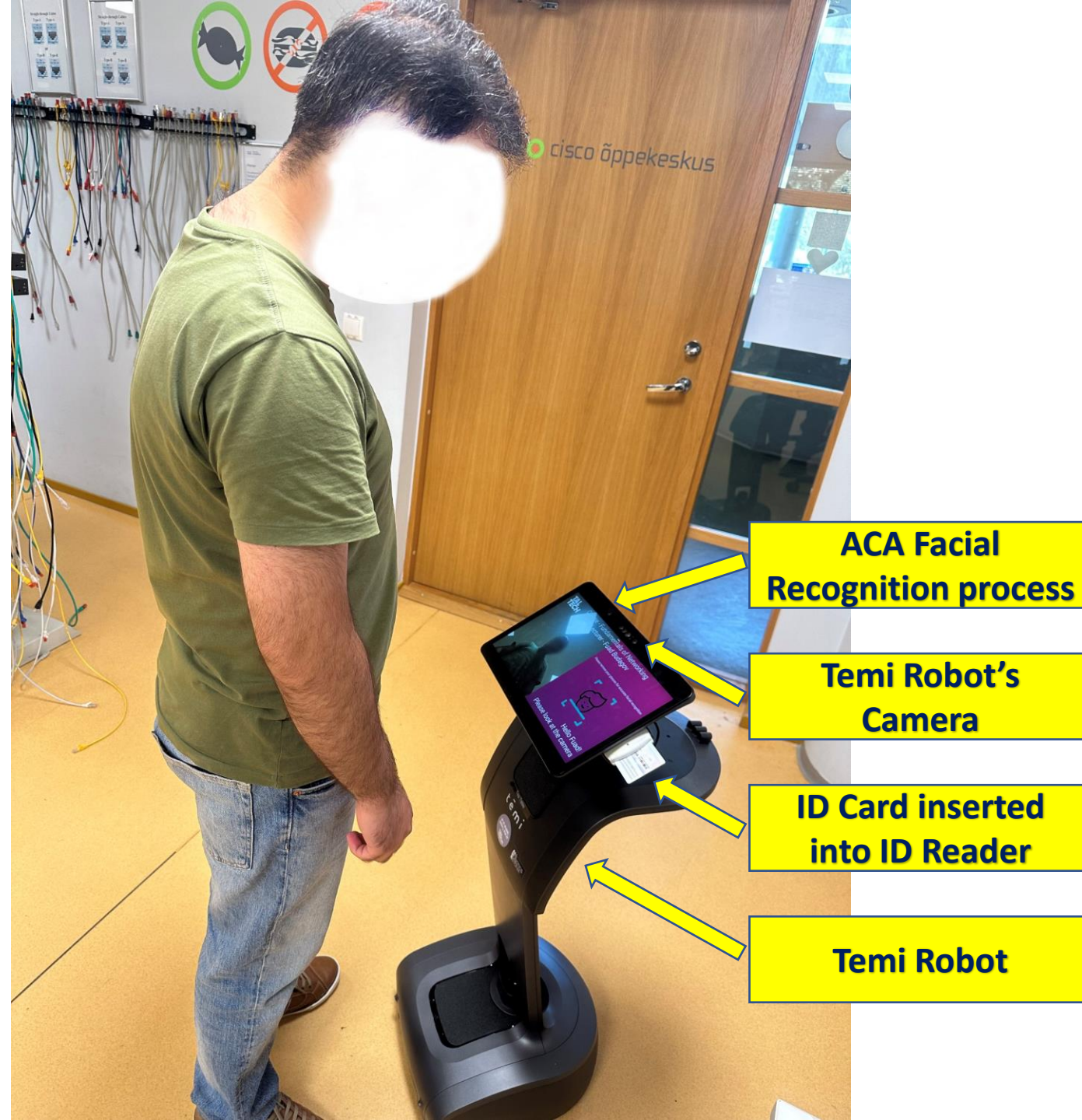
Post-Class Support

Frequent Feedback Collection



End of Class

ATTENDANCE CHECK OF STUDENTS - PILOT

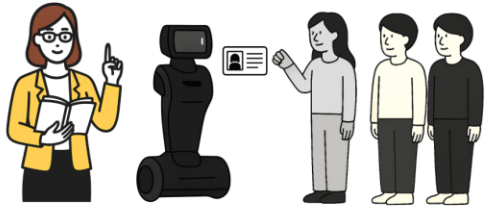


EDUCATIONAL SCENARIOS AND TOOLBOX FOR THE ROBOT ASSISTANTS

Robot Assistants in Higher Education

Pre-Class Support

Attendance Check of Students



Start of Class

In-Class Support

Robot as Teaching Assistant (Support - Q&A)



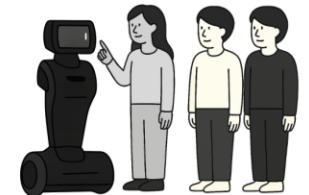
Robot as Teaching Assistant (Pre-Evaluation)



During Class

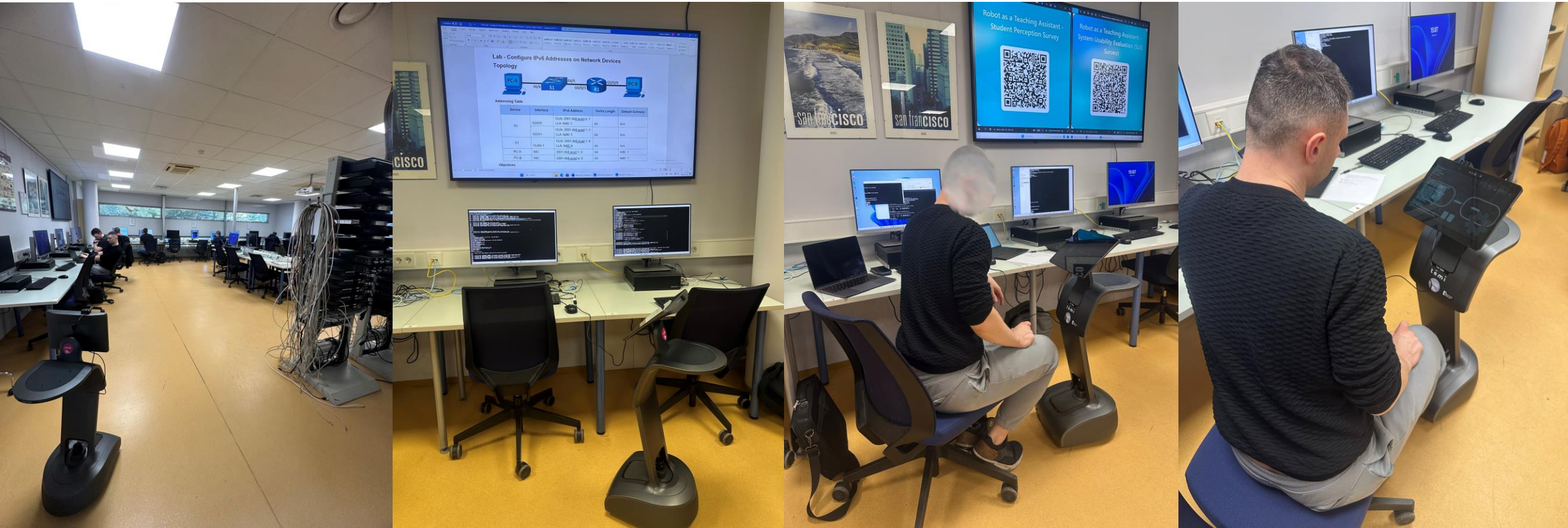
Post-Class Support

Frequent Feedback Collection



End of Class

ROBOT AS A TEACHING ASSISTANT - PILOT



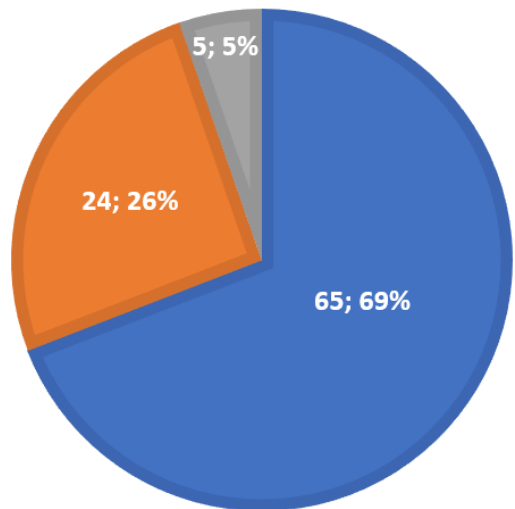


ID ATTENDANCE CHECK IN CLASS EXPERIMENT - UX SURVEY RESULT

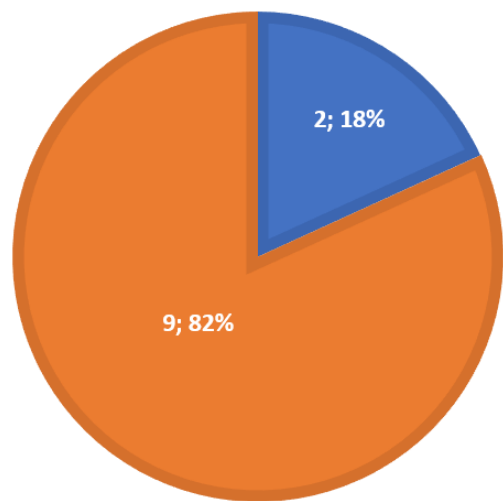
Students

Respondents – 97% (94/97)

Male Female Prefer not to say



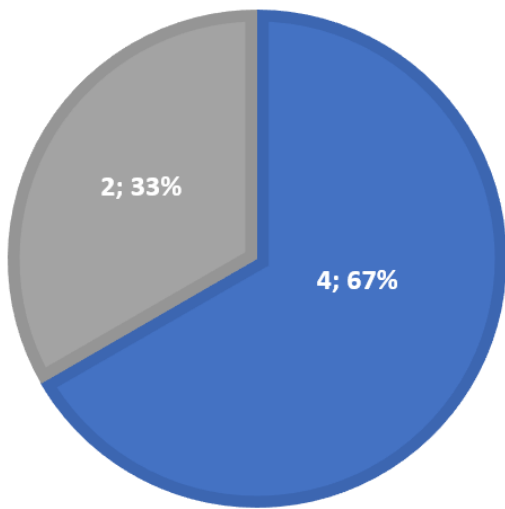
Under 18 18-24 25-34 35-44 45+



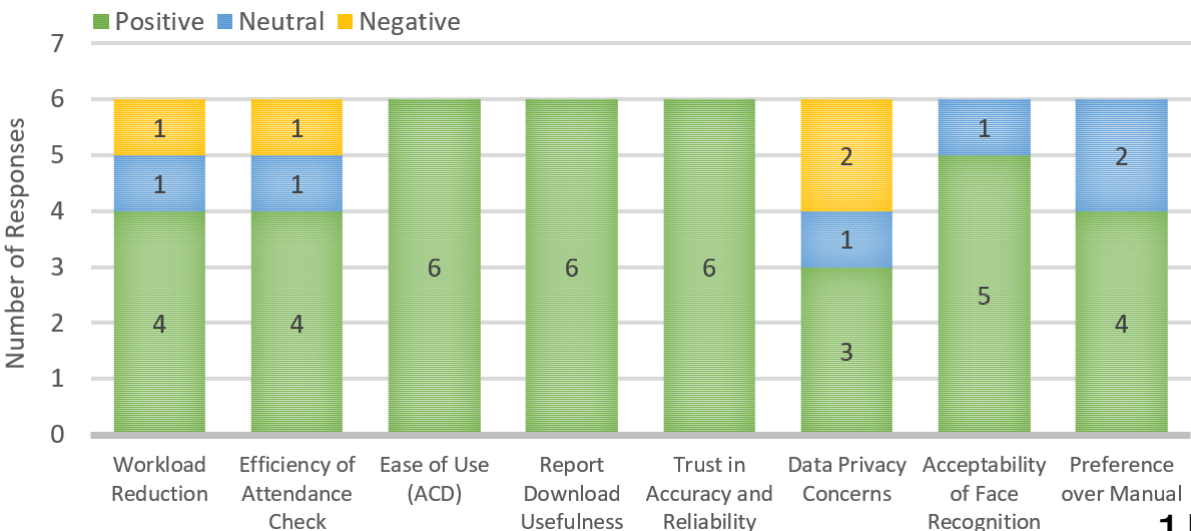
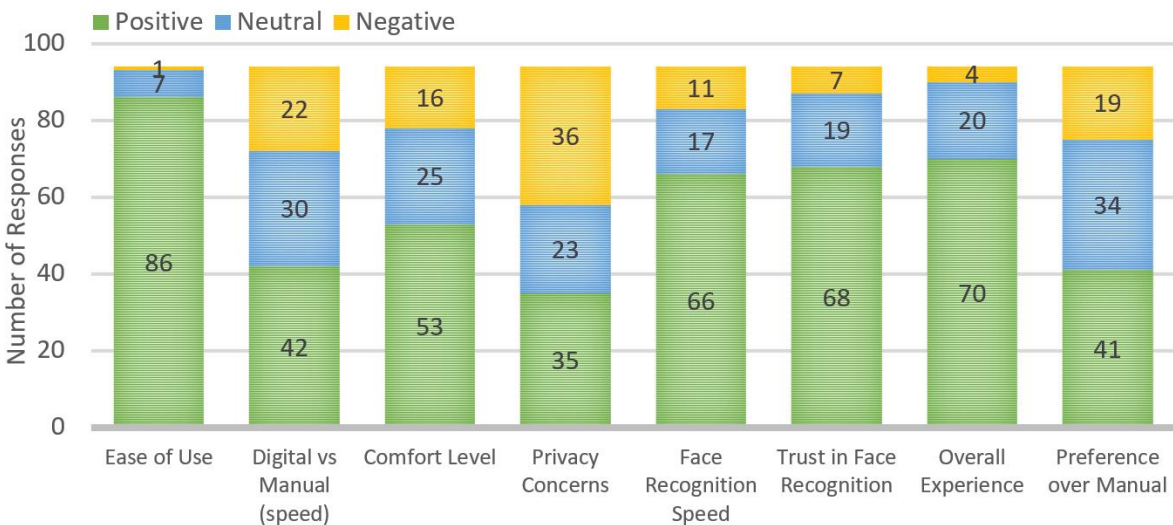
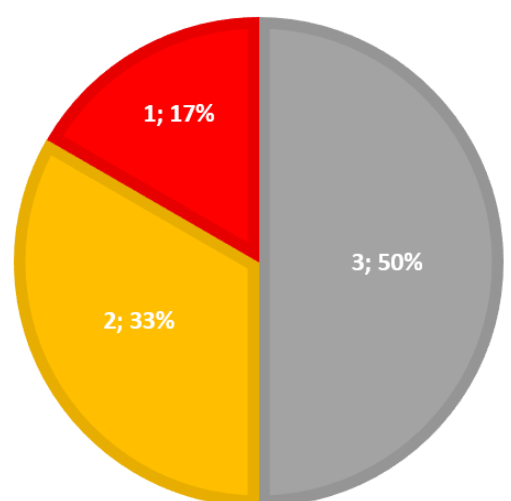
Lecturers

Respondents – 100% (6/6)

Male Female Prefer not to say



Under 24 25-34 35-44 45-54 55+

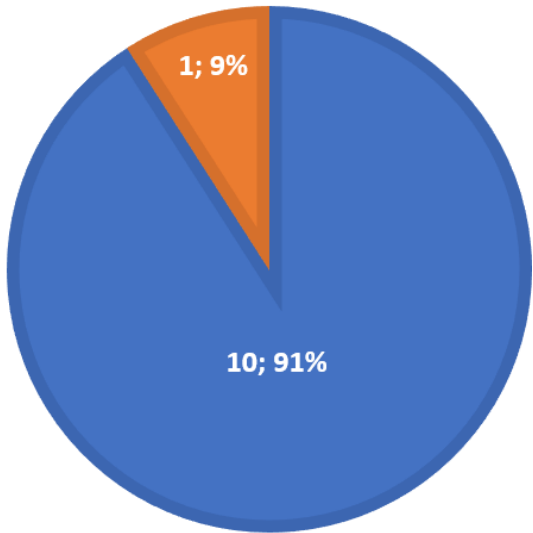


ID ATTENDANCE CHECK IN EXAM EXPERIMENT - UX SURVEY RESULT

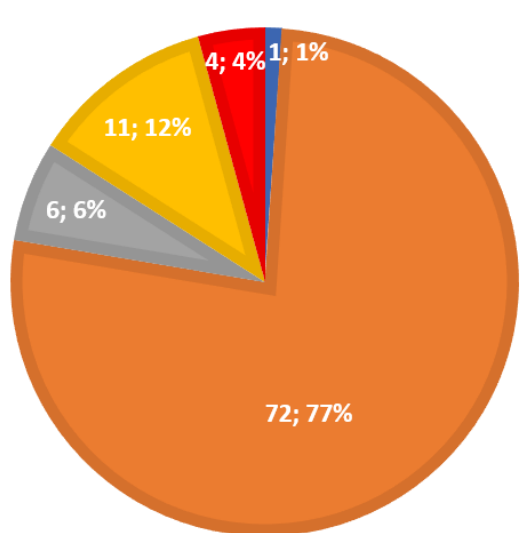
Trial Exam

Respondents – 100% (11/11)

Male Female Prefer not to say



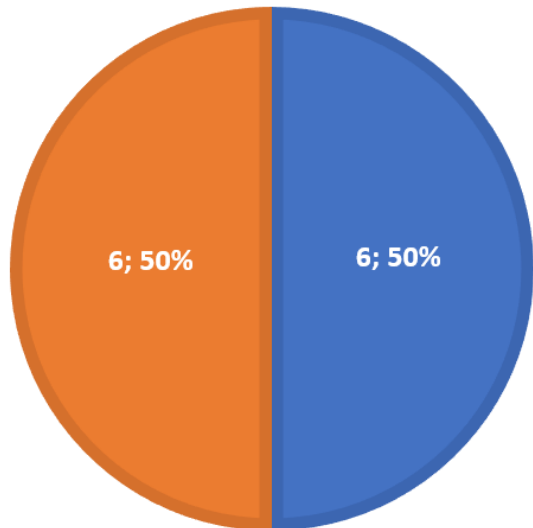
Under 18 18-24 25-34 35-44 45+



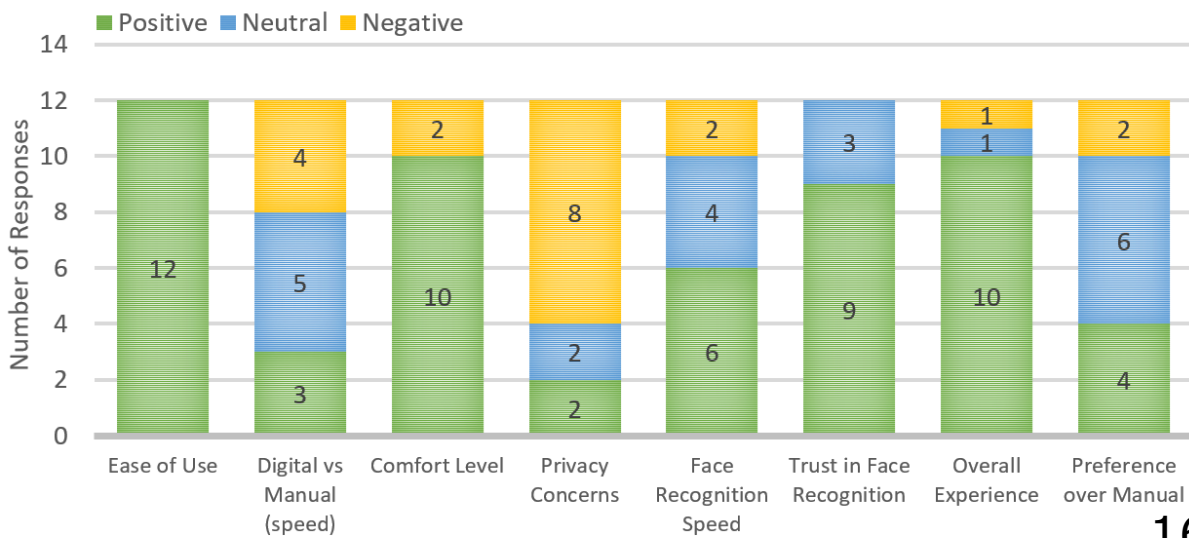
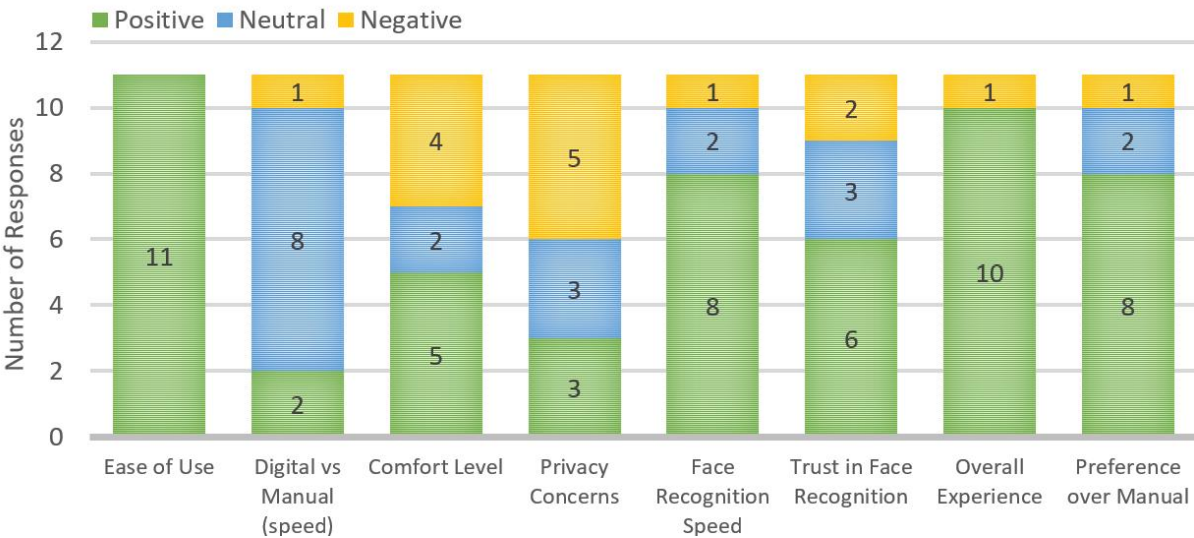
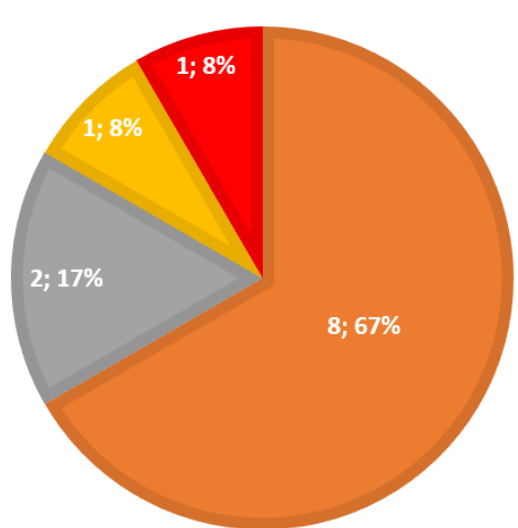
Real Exam

Respondents – 80% (12/15)

Male Female Prefer not to say



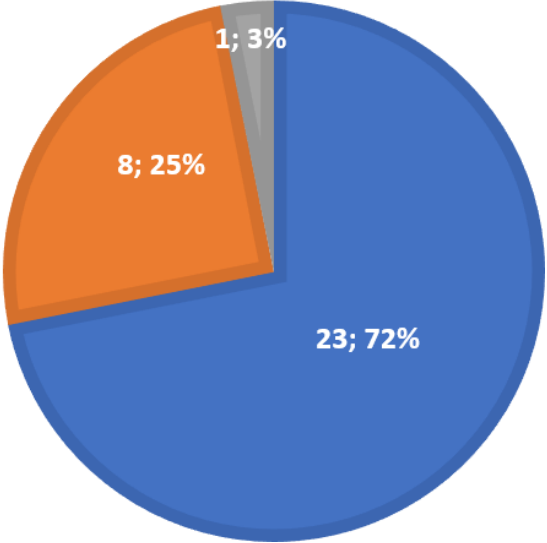
Under 18 18-24 25-34 35-44 45+



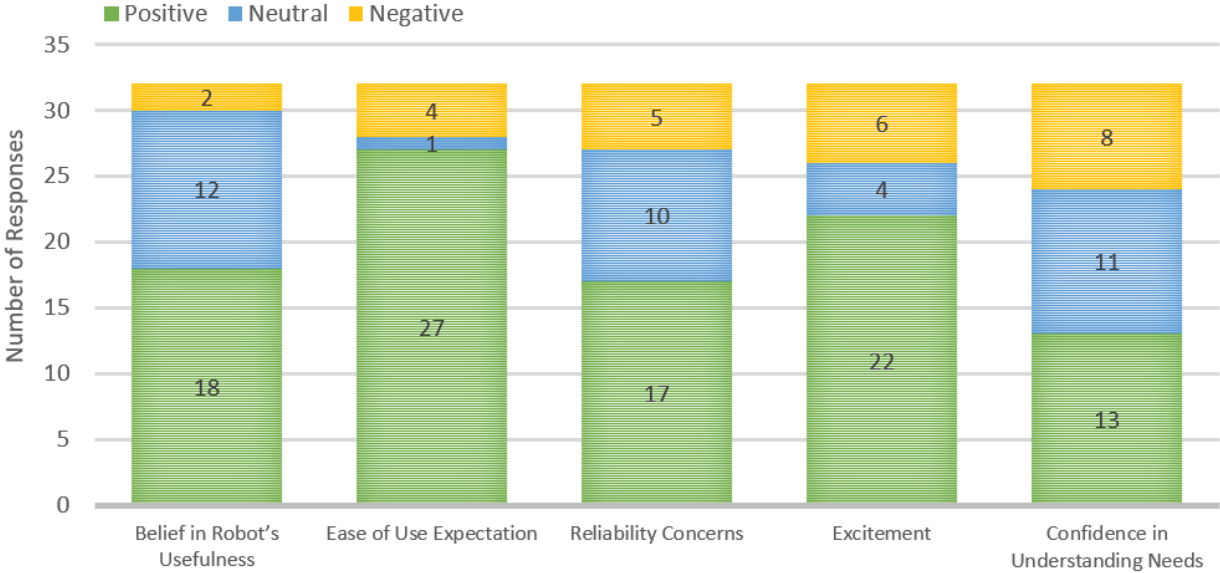
ROBOT AS TEACHING ASSISTANT PILOT - UX SURVEY RESULT

Respondents – 80% (32/40)

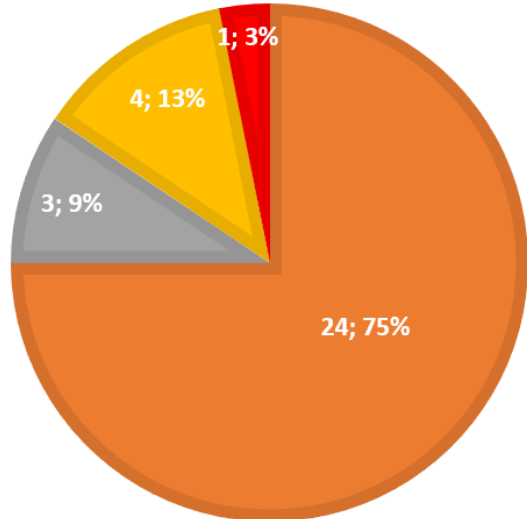
Male Female Prefer not to say



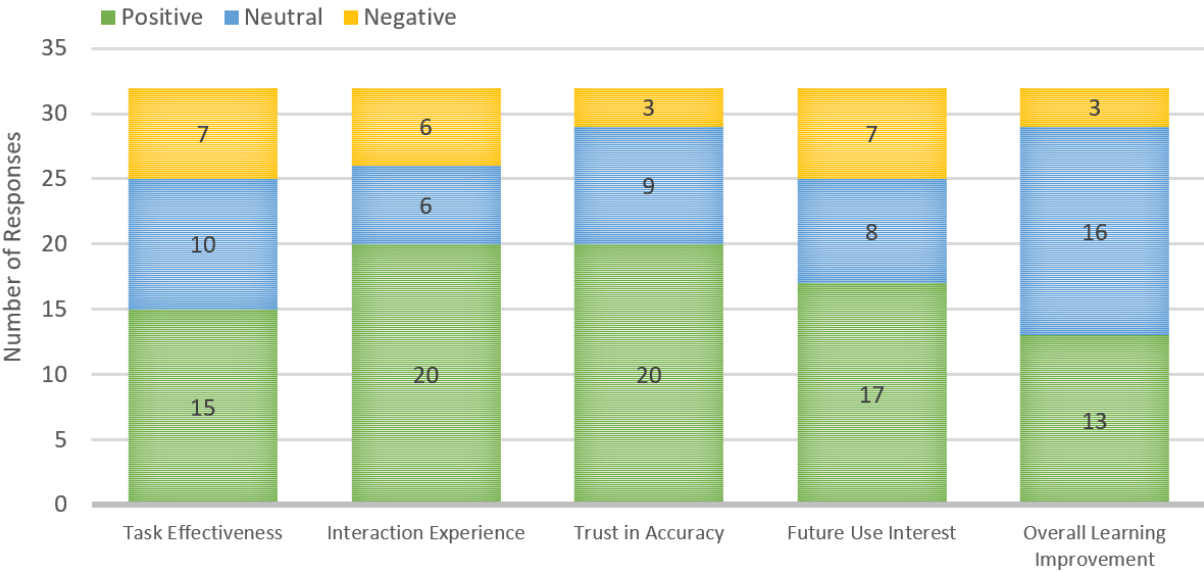
Pre-Pilot



Under 18 18-24 25-34 35-44 45+



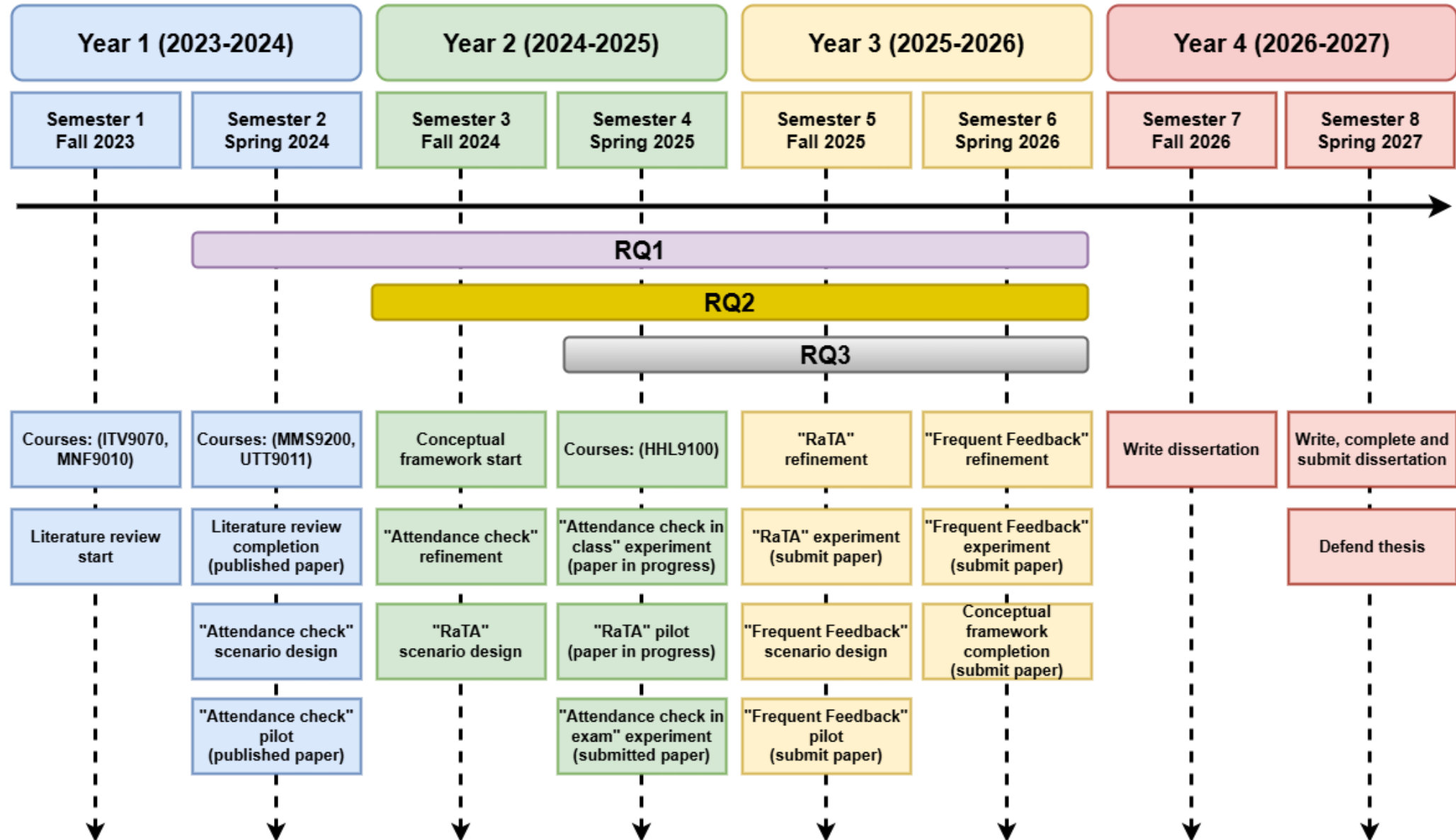
Post-Pilot



PAPERS

1. Budagov, F., Leoste, J., Meeran, M.T., Robal, T. (2024). **A Systematic Literature Review on Applicability of Robot Assistants in Higher Education**. In: Herodotou, C., et al. Methodologies and Intelligent Systems for Technology Enhanced Learning, 14th International Conference. MIS4TEL 2024. Lecture Notes in Networks and Systems, vol 1171. Springer, Cham. https://doi.org/10.1007/978-3-031-73538-7_3
2. Budagov, F., Leoste, J., Meeran, M.T., Robal, T., Leoste, L.B. (2025). **Attendance Check of Students via Robot Assistant in Higher Education Classes**. In: Auer, M.E., Rüttemann, T. (eds) Futureproofing Engineering Education for Global Responsibility. ICL 2024. Lecture Notes in Networks and Systems, vol 1260. Springer, Cham. https://doi.org/10.1007/978-3-031-85652-5_31

RESEARCH TIMELINE





**TAL
TECH**

THANK YOU!

taltech.ee/en