

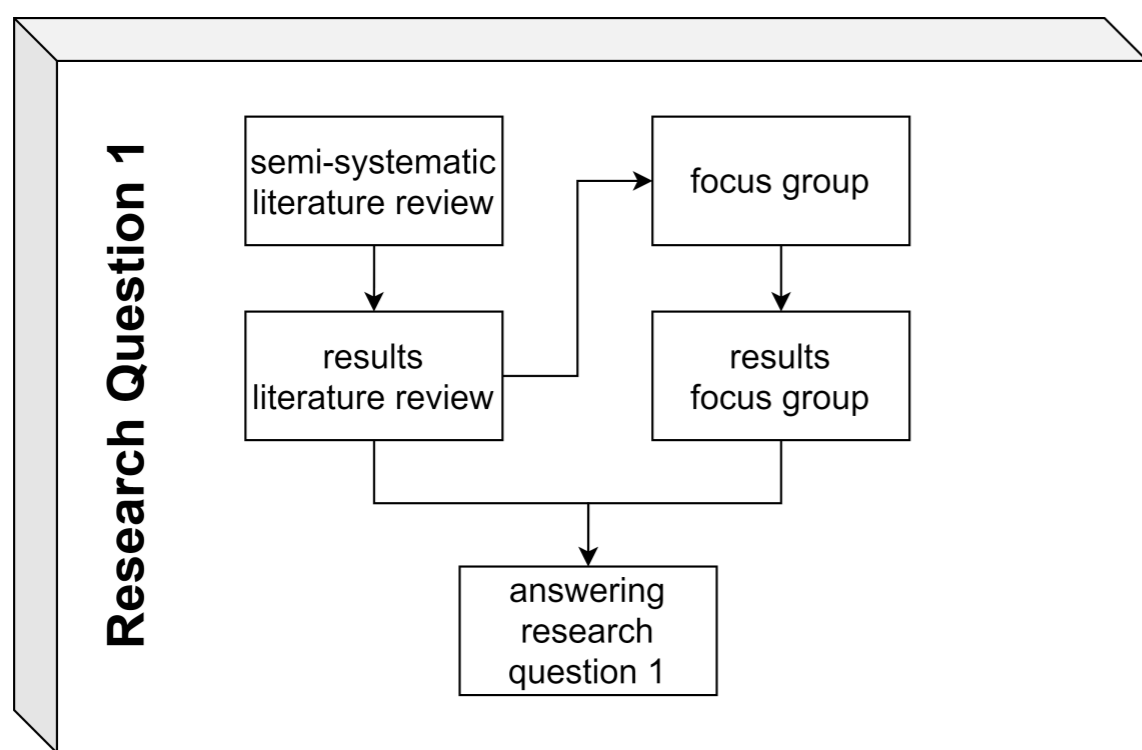
Abstraction, development, and evaluation

of a Work Assistance System for Teaching and Learning within the field of Industry 4.0

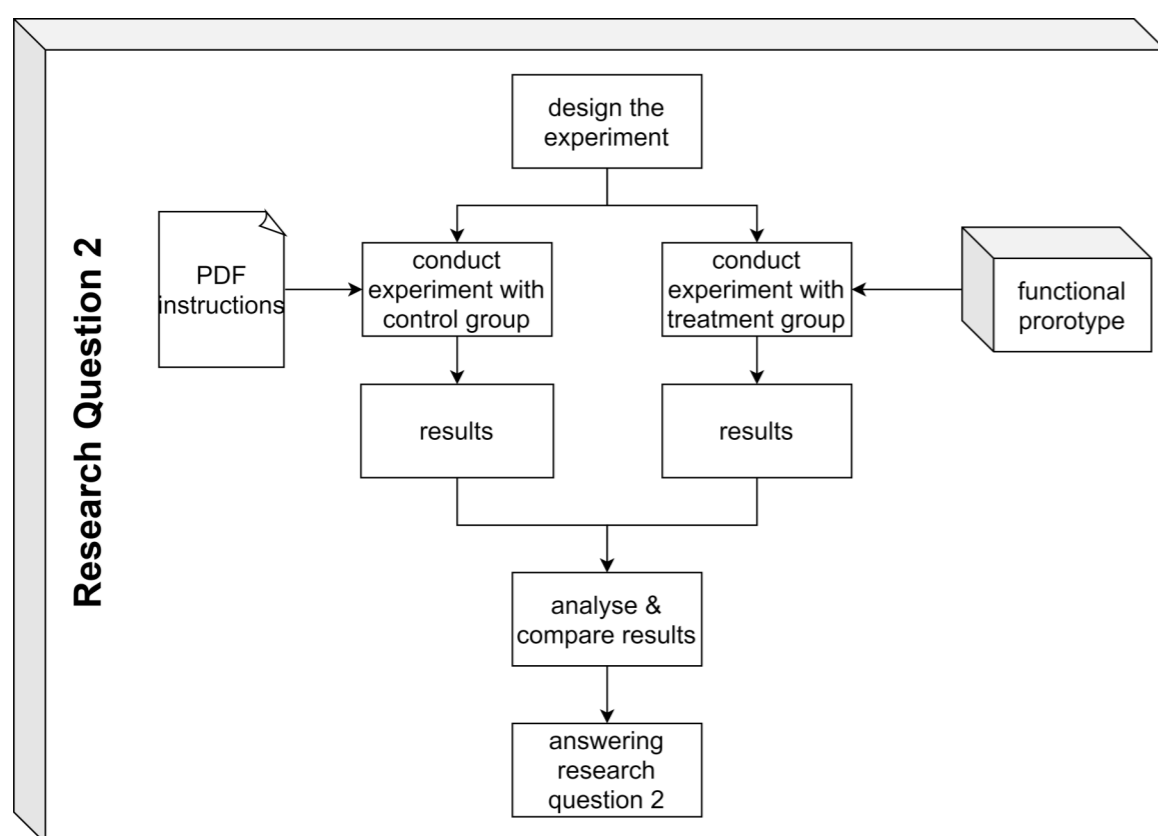
Education is one of the central topics in the context of Industry 4.0 and digitisation and is one of the main goals within academia. Integrating learning into the workplace is important in Industry 4.0 and can be used in academia to assist students especially during times of online classes. This thesis aimed to develop a work assistance system to assist students while performing exercises in the electronics laboratory to evaluate in which way such a system alters the performance of students in comparison to conventional teaching methods to prove the potential of such a system.

RESEARCH QUESTIONS AND METHODOLOGY

What are didactic aspects – regarding information that is projected on the user’s worktop – current state-of-the-art work assistance systems have implemented that can be implemented in a concept for the existing setup of the I4.0 workstations?

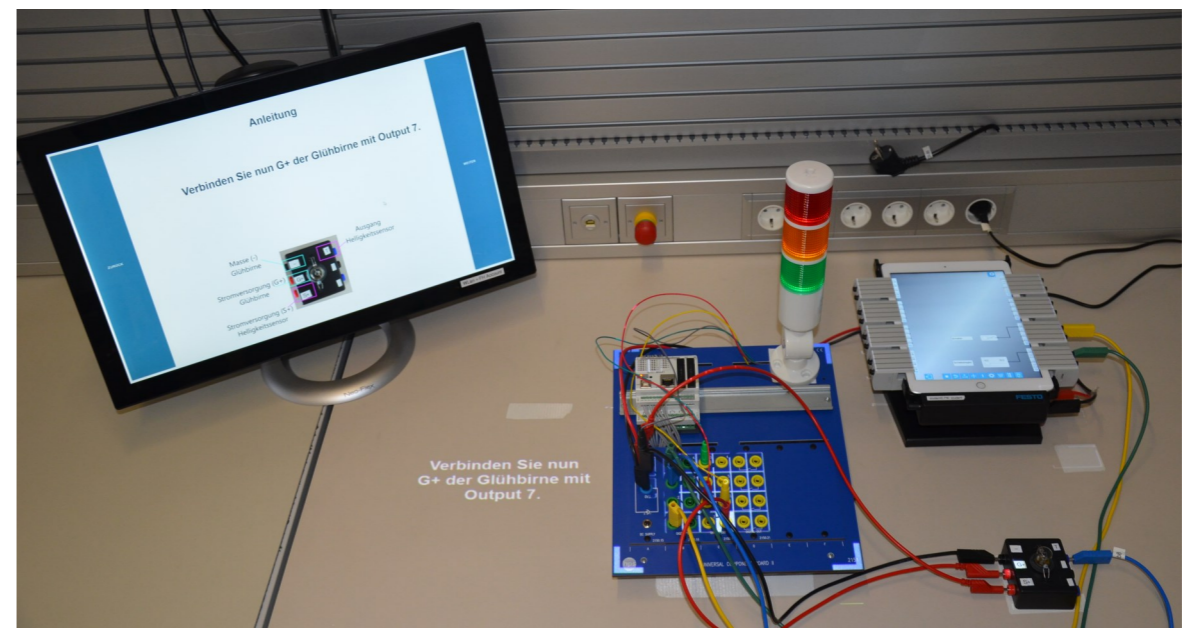


In which way can the developed work assistance system alter the learning process in terms of time taken for the exercises and mistake frequency during the exercises within the St. Pölten UAS in comparison to conventional teaching methods?



RESULTS

The developed prototype guides students step-by-step through an exercise and projects the most important information directly onto the worktop (see the figure below).

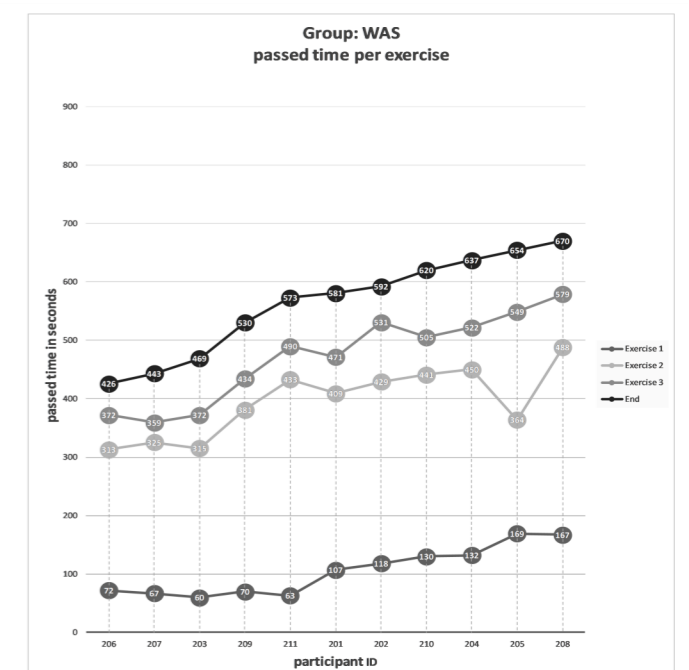
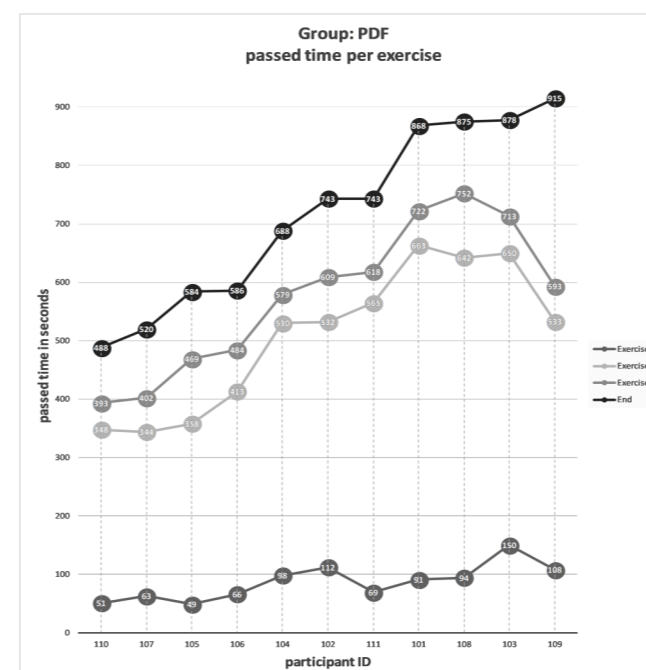


Research Question 1

The results of the literature review in combination with the results of the focus group interview helped to identify requirements for the specific usecase of the UAS St. Pölten. In addition to that the results also helped to propose a general guideline to follow when developing work assistance systems for teaching and learning scenarios by integrating the specific needs of users in academia with the current state-of-the-art that is used in the industry.

Research Question 2

Results of a between group experiment showed that the developed prototype significantly reduces the amount of time students need. The figure below shows the time taken between the students of the control group (left) and the treatment group (right). It can be seen that the functional prototype lead to a significant saving of time.



CONCLUSION

A Work Assistance System for Teaching and Learning (W.A.S.T.L.) offers great potential to assist first year engineering students with conducting exercises. It reduced the time that students need to conduct these exercises in comparison to conventional PDF instructions and can also lead to a reduction in mistakes. This thesis aimed to quantify this potential by developing a first functional prototype of such a system and evaluating it in a first pilot experiment. By doing so this thesis was able to scientifically prove the just stated points.