

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
Ignition - Primary Space Education (1)

Author: Prof. Max Louwerse  
Spacebuzz, The Netherlands, m.m.louwerse@uvt.nl

Dr. Marie Postma  
Tilburg University, The Netherlands, marie.postma@tilburguniversity.edu  
Mrs. Anna van Limpt - Broers  
The Netherlands, H.A.T.Broers@tilburguniversity.edu  
Mrs. Willemijn Weterings  
The Netherlands, W.J.M.Weterings@tilburguniversity.edu

MAKING AN ASTRONAUT TEACHER: INTELLIGENT TUTORING SYSTEMS FOR STEAM  
EDUCATION

**Abstract**

Intelligent tutoring systems can teach students on a variety of topics providing a personalized learning experience. These systems can adapt to the learner by helping the learning process in real-time. In one instantiation of these systems a virtual human teacher can have conversations with students in natural language. The agent can ask and answer questions or can support the student in the learning process. Past research, including our own, has demonstrated the potential of these systems in the educational system both in their development and in their educational success.

In an innovative educational program that currently includes over 400 schools in Europe, we train primary school children in a pre-flight program to become young ambassadors of planet Earth. Following this program, a rocket ship arrives in front of their school and children are launched into space using a virtual reality experience. Guided by an astronaut, they are told about the wonders of planet Earth, its fragility, and opportunities for sustainability. Our experiments have already shown learning gains of the SpaceBuzz program.

In the current version of the SpaceBuzz program, an astronaut — the national hero of the child in the virtual reality journey — is primarily pre-recorded. Our latest techniques, however, allow for scanning an astronaut and generating his/her facial expressions and gestures, as well as his/her speech. Using photogrammetry and rigging techniques combined with speech synthesis, an actual virtual human can be developed. This has already been done for ESA astronaut André Kuipers, and we are currently extending these techniques to others.

These techniques from game development, computational linguistics and artificial intelligence allow for building an intelligent tutoring system, in which a virtual astronaut provides a personalized learning experience for children. The user can interact with the system as if it were a real human, whereby the system can adjust to the individual needs.

In this presentation we will discuss our past and current research on intelligent tutoring systems and how it applies to an interactive and immersive learning environment to show how new techniques in artificial intelligence can pave the way for the (near) future of STEAM education.