IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Enabling the Future - Developing the Space Workforce (5)

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DEVELOPMENT OF A COMPETENCE ECOSYSTEM FOR THE FUTURE SPACE WORKFORCE: STRATEGIES, PRACTICES AND RECOMMENDATIONS FROM INTERNATIONAL MASTER PROGRAMS IN NORTHERN SWEDEN

Abstract

Requirements from the global labor market have substantially changed in recent years. Graduate and post-graduate students with excellent subject knowledge, deep understanding of modern working methods, technical and higher-order thinking, engineering intuition and problem-solving skills are in great demand. They should also have professional skills such as well-developed abilities in communication and teamwork, usually in an international work environment. Modern space projects involve solving complex professional challenges and demand a global perspective – requiring not only academic expertise, but often experience in a broad international cooperation. This includes understanding of intergroup contacts that shape and promote positive attitudes in a social context and therefore increases effectiveness.

Student-oriented teaching in combination with project-based learning, hands-on experience, implementation of active learning techniques and Conceiving – Designing – Implementing - Operating (CDIO) initiatives appear to provide effective pedagogical tools for fostering the future generation of space experts and leaders. The importance of complementarity between formal, informal and non-formal learning has been widely discussed in recent years. Connections to the world of work, through active industry involvement in the education in a systematic way, was recognised as a key success factor for professional training of engineering students. A structural combination of pedagogical tools, strategic partnership with industry and business entities, and up-to-date laboratories creates the conceptual framework for a Competence Ecosystem for effective implementation of national and international master programs at Luleå University of Technology (LTU) in Northern Sweden.

This review examines educational strategies, implemented best practices, study environments and study results from the qualitative and quantitative data, observations and interviews among academic staff and students from the international Master Program in Spacecraft Design and the Joint Master Program in Space Science and Technology – SpaceMaster – in the following areas:

- design of program curriculum in a multidisciplinary environment; implementation of novel pedagogical models and techniques;
- development of entrepreneurial skills via close collaboration with industry;
- hands-on experience and its applicability to a "real-world" setting;
- strategic partnership with space industry and space-related institutions;

- enabling diversity and multicultural awareness to enhance learning.

The review analyzes problems and lessons learned from each area and provides practical recommendations for educators.