Evaluating The Effectiveness of Space Education Programs

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TOPICS

- Capacity Enhancement Initiatives in Space Technology for Egypt
- Middle School and High School Programs
- College and University Programs
- Advanced Education for Graduates – Innovation Programs
- International Space Training Program
- Lessons learned in building education and capacity-building opportunities
Capacity Enhancement Initiatives in Space Technology for Egypt

7 Programs
Egypt's Space Technology Capacity Building

Egyptian Space Agency (EgSA)

- **Int. Space Training Program**
  - 2019
  - 60 participants

- **Egyptian Space Educational System**
  - 2021
  - 2000 participants

- **Middle School “EgSA TICO”**
  - 2019
  - 1800 participants

- **High School “SPRINT”**
  - 2022
  - 2800 participants

- **Innovation Programs “SSH”**
  - 2022
  - 180 participants

- **University Projects “EUTS”**
  - 2016
  - 150 participants

- **University Summer Camp**
  - 2016
  - 2019

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In middle school, students can dive deeper into space education. They can explore topics like the history of space exploration, the International Space Station (ISS), and the basics of rocket science. Hands-on experiments, such as launching simple rockets or studying the phases of the moon, can foster a deeper understanding of space concepts.
Middle School Program “EgSA TICO”
High School Program “SPRINT”

SPRINT space science laboratories in Egypt's private schools. The initiative aims to integrate space sciences into the curriculum, with teachers designing age-appropriate content. Students will engage in competitions to create innovative space science models, incorporating space science and technology into teaching. Participants will learn from experts, engage in interactive activities, and enjoy space-themed events.
High School Program “SPRINT”

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Since 2016, the University Summer Camp has been an annual event welcoming students from diverse Egyptian universities. With an average attendance of 500 students each year, this camp is entirely free. The program encompasses a comprehensive three-week theoretical lecture series, complemented by a one-month practical training session in various aspects of space science and technology.
University Summer Camp

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Graduation project in most universities is one of the requirements for the completion of the graduation degree. It can be described as a research experience, where the problem is defined, a hypothesis is created, experiments are designed to test the hypothesis, and conclusions are drawn. In parallel with this methodology, this program was designed to be compatible with the space industry, so that graduation projects are directed to produce parts or systems related to the space or ground segment, under the technical supervision of the Egyptian Space Agency team.
Phase 1

Each university can participate in more than one team to implement a part or system, and more than one university can implement the same system.

Phase 2

The best designs are selected from various universities and qualified to produce the flight model.

Phase 3

All selected systems collect in the EGSA facility for functional testing and AIT process to an integrated satellite.

Phase Description

System Detail design / prototype / Modeling

System Engineering Model

Integrated Satellite 1U / 2U / 3U

2016

150 Project
Throughout the Space Innovation Lab (SIL), we want students to have a multidisciplinary experience. Our goals are not just to acquire high-tech engineering skills but also to understand the contemporary space industry's operation in terms of business. This makes the students more attractive to employers inside and outside of the space industry.
Our Products & Services

Unparalleled Learning Resources

Hands-On Learning by Our Educational Satellite Laboratory is equipped with cutting-edge technology and resources for

10 Engineering Courses
- Electric Circuits I & II
- Electronic Circuits I & II
- Digital Signal Processing
- Measurements and Instrumentation
- Microprocessors Based Systems
- Digital Communications
- Information and Coding Theory
- Electronics and Communications Engineering Project
- Electronic Systems Design
- Satellite Communication System

Full Satellite Systems and Ground Stations

1. Hands-On Learning
2. Exceptional Educational Resources
3. Networking Opportunities
4. Career Advancement

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Space Innovation Lab in 32 in the school of Engineering and Science

Space Innovation Lab (SIL)

Content

Complete Engineering Course Portfolio
- References
- Presentation
- Experimental Hands-On Assessment

For Instructor
- 10 Courses
- Lectures: 30 Credit Hours
- Tutorial: 5 Credit Hours
- Practical: 10 Credit Hours

8 x Full Satellite Systems and Ground Stations

Required Electronic Components

Required Instrumentation

High-performance Computing Facilities

Real-time data acquisition and analysis systems
Space Innovation Lab in 32 in the School of Engineering and Science

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International Space Training Program

2019

60 Int. Trainee

Comprehensive Space Technology and Testing Workshop

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Space Innovation Center Programs

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Skilled to Entrepreneur Program

Professional Qualification Program

Vocational Rehabilitation Program

The greatest challenges for each geographical area

Entrepreneurs tackling critical issues and Changemaking

50 Startup / Year

150 - 250 Job creation / Year

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Lessons Learned In Building Education and Capacity-building Opportunities
Lessons Learned In
During Middle School and High School Programs

Integrating space science and technology activities into the school curriculum enhances students' engagement and sustains their interest over time. When these subjects are seamlessly woven into various academic stages, we witness a remarkable surge in students' interest, participation, and interaction, often surpassing a 60% improvement. In contrast, when space science education activities are taught separately from the standard curriculum, students tend to initially struggle and then lose enthusiasm.
Initially, educational satellite laboratories were established with a specific focus on space science and technology, offering direct satellite experiments. However, their utilization by academic staff was minimal, at less than 5% annually. This low usage stemmed from a lack of direct relevance between the scientific experiments conducted in the educational satellite labs and the subject matter taught in one particular course, namely Communication Satellite Systems. Moreover, professors responsible for other courses failed to integrate satellite-related topics into their curricula.
Subsequently, significant enhancements were made to the content of these space innovation laboratories. Practical experiences were incorporated, aligning with ten different engineering courses. This comprehensive approach encompassed curriculum development, assessment and evaluation methods, teaching resources, student support mechanisms, assessment of learning outcomes, and an extensive question bank. As a result of these improvements, the teaching of space technology in the context of various engineering courses became feasible, leading to a remarkable increase in laboratory utilization. Usage rates exceeded 30% of the total credit hours for each linked course.
Lessons Learned In
During Advanced Education for Graduates – Innovation Programs

Following the introduction of training camps in both space technology and business skills, the Egyptian Space Agency witnessed a substantial surge in the acceptance rates of graduation projects and ideas submitted for incubation in their business incubator. Prior to the implementation of these training programs, the acceptance rate stood at 35% for graduation projects and a mere 10% for ideas approved for entry into the business incubator. Post-training, these figures saw a remarkable improvement, with the acceptance rate for graduation projects rising to 75% and the acceptance rate for incubated ideas reaching 65%.
Lessons Learned In

During International Space Training Program

Following the transition to a training program that emphasized 80% practical learning and 20% theoretical instruction, the Egyptian Space Agency experienced a substantial increase in applications from African countries. The number of specialist applicants from 37 African nations surged to 260. Prior to this change, when the training program was predominantly theoretical (70%) with a smaller practical component (30%), there were only 40 applicants from 8 countries.