



The Impact of Conducting Youth Scientific Research Camps within the Academic Institute

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Abstract

Inspiring the next generation of scientists is one of the challenges that the scientific community is required to address. At the time of graduation, teenagers who have already proved themselves at school, are about to choose their academic path. While they may have profound confidence in their academic skills, many of them lack knowledge regarding science and research outside school. In this paper we will discuss the relevance and impact of integrating motivated and excellent science oriented youth, into the core of the academia, the scientific research and the additive value of a boarding-school atmosphere. For over 50 years high achieving high school students and graduates are integrated into research groups at the Weizmann Institute of Science. Hence, students ages 16-19 conduct a research project under the supervision and mentoring of scientists (graduate students, postdoctoral fellows, staff scientists or principle investigators). Participating students become members of the research groups for a period of two to four weeks. Research projects may be related to either experimental science or theoretical one and may combine multiple methodologies and disciplines. They are engaged in the various aspects of scientific research from designing their projects, through planning experiments or models, via analyzing data, drawing conclusions and publishing the outcomes. Thus, students submit a scientific mini paper and present their projects in short talks at the final program's conference. The intensive scientific demand is supported by social and cultural activities led by the counselors, strengthening the bonds within the peer group and providing a comfort zone for growth. What is the impact of such programs on participants? Alumni of these programs describe it as a life changing experience. They report that they became familiar with the various aspects of the scientific life and research, including overcoming challenges, demonstrating determination, creativity and comprehending that research is a long process necessitating perseverance and collaboration. All these enabled them to make well-established decisions regarding their future academic career. They gained friends for life, peers with similar interests and passions, and became a young community for personal and professional network sharing global responsibility.

Keywords: science, camps, research, academia, youth, excellence;

Introduction

In the early sixties, the Weizmann Institute of Science established a summer science camp for excellent youth. The rationale was to enable a direct interface between science-oriented youth and scientists, thus not only enhance their motivation to become scientists themselves but to adopt the scientific approach as a standard for life style. By ways of actively participating in cutting-edge research, side by side with the scientists in their labs, the program shapes the students' conceptions regarding science research and future academic career. Moreover, this intensive and collective experience leads to the formation of an interdisciplinary science community for professional and personal relationships.

The summer science camp for Israeli youth was initiated in 1964 and was followed by an international camp in 1969, with approximately 6000 graduates until today. In this paper we will refer to them as "the program". Over the years, the program continuously develops and progresses thus maintaining relevance and providing participants with a unique and additive value. Alumni refer to the unforgettable summer as a marking point that attributed to their future choices and taken path, leading many of them to high positions in academia and industry worldwide.

The Program

The program is geared towards talented, highly-motivated students who have demonstrated their self-ambition to gain deeper scientific knowledge above and beyond what is taught at school. Participating students are engaged in the on-going laboratory work at the Weizmann Institute, and are assigned to a specific research project that lasts between two to four weeks. Optimal matching to projects relays



on various criteria including academic background, previous experience, interest and skills. An important aspect of the scientific maturation is the ability to communicate and share research ideas, challenges and outcomes, with the scientific community, by publishing manuscripts, giving talks and experiencing critical review. Similarly, students practice scientific writing by summarizing the research in a report according to the criteria of academic papers. The final seminar day which is equivalent to an academic conference, provides the opportunity to orally present and share their projects with their peers.

Communication between students and mentors is established prior to their arrival. This fosters both personal acquaintance as well as laying the grounds for collaboration, where both parties discuss the required professional material. Subsequently, mentors provide students with relevant papers and related references. Despite previous high academic performances, most students lack the skills of reading scientific manuscripts. Therefore, we offer an on line course designed for this audience and purpose hence, providing a box of tools. These early steps are integral part of the program and are essential for smooth integration and a successful experience.

While the scientific projects are the core, the program is designated to be a mixture of scientific and cultural enrichment. Hence, participants are exposed to various scientific subjects outside their specific fields of interest, by meetings with senior scientists from diverse disciplines and discussing state of the art research. With the notion that scientific research becomes more multidisciplinary and collaborative, the projects are conducted in groups of 2-3 students, thus promoting teamwork. Students are constantly engaged in discussions regarding social, environmental, ethical and moral issue, which stimulate mutual and global awareness. The social and cultural activities held throughout the program further strengthen the bonding and belonging of participants.

Long-term impact

The unique experience enriches these prospective scientists, providing a nourishing environment for growth and a life-long impact. Alumni of recent and early years emphasize the substantial outcomes with respect to the program's goals and rational.

Quotes:

To create a significant personal impact: "The summer of 1983 was life-changing for me. " "Sometimes it is hard to foresee the importance of a month-long summer school, but now it is clear how crucial it was to give me a perspective of the academic realm."

To enable well-established academic career decisions: "The program not only enhanced my passion for science, but solidified my resolve that I wanted to perform scientific research as a profession and one day have my own lab."

"My experience contributed to my decision to pursue neuroscience research in college and ultimately to my career in clinical psychiatry and psychoanalysis."

To adopt the scientific approach as a standard for life style: "While I no longer do research, the creative and multidisciplinary thinking fostered by my time in the program remains an important part of me"

To promote scientific communication and collaboration skills: "As we conducted research and presented it to our peers, our expectations of ourselves and of each other were high. Yet the research process was always collaborative and never competitive, both among us and the scientists"

To form a peer group and establish a community: "Building a community of Alumni in has become an effort that is close to my heart. I am committed to helping others reconnect based on a shared love of science and our time at the Weizmann Institute."

"In the last 13 years, I have crossed paths with many fellow participants in college, graduate school, and, more recently, in international conferences."

To enhance global awareness and responsibilities: "Through the program, I became more aware of science's potential to make an impact on the world and draw people together around a single cause. The program shaped my goals not only wishing to become a scientist but also in terms of becoming a 'global citizen' "

Discussion

In this paper we described the impact of integrating motivated and excellent science oriented youth into the core of the academia, the scientific research and the additive value of a resident camp atmosphere. In light of the vast changes in social interactions, learning mechanisms and concepts as



well as technological progress, how does the program retain its relevance for over 50 years? In a world with endless opportunities, perhaps it is more relevant than ever. Thus, we are constantly required to evaluate, modify and optimize the program to the needs of the changing world.

Technological development enables new avenues which can be applied for communication and learning. Hence, with the intention of both putting the grounds for reading and writing scientific papers as well as initializing the group communication, we developed an online course. This pre-program interaction minimizes the unfamiliar zone both academically and socially. Scientific research is becoming more multidisciplinary and brings together scientists from various fields and disciplines. This is extensively manifested throughout the program, beginning in the pre-program online course via the research assignments to the supporting academic and cultural activities. The strength and effectiveness of the program resides in the synergistic effect of the various components. These include but not restricted to the multidisciplinary approach, intensiveness of the program, integration into research groups, application of techno-pedagogical concepts and academic requirements. The fine-tuning of every such aspect, lays the foundations of the community that provides the support system of the group and nourishes the social and professional relationships that continues through the course of life. Hence, our educational paradigm presented in this paper enables the impact that pushes the boundaries of personal, social and academic growth.

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