A Call for Action from Young Academies and Young Associations: Reaffirming the Role of Fundamental Sciences in Achieving Sustainable Development through Enhanced and Equitable Support of Fundamental Research and Early- to Mid-Career Researchers

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We, as representatives of the Global Young Academy (GYA), along with the signatory National and Transnational Young Academies and Young Associations, reaffirm that fundamental sciences and the fundamental understanding of nature are crucial in the implementation of the Sustainable Development programme. In our capacity, we strive to amplify the voices of early- and mid-career researchers around the world, and to empower them to "lead international, interdisciplinary and intergenerational dialogue". [1]

We acknowledge the relentless efforts of the scientific community to address the pressing societal issues that are at the core of the Sustainable Development programme, and we firmly assert that such an objective can only be envisioned along with the fundamental research that addresses their root causes. These problems encompass critical areas such as climate change mitigation, access to safe water and food, high-quality education, adequate healthcare, clean energy, and fair innovation. It is crucial to acknowledge that research initiatives should be inclusive and not restricted to top-ranked universities and high-income countries, nor are they solely executed by renowned scientific figures, thereby underscoring the significance of this universal call for action.

Fundamental science has played a key role in advancing critical knowledge for the betterment of society. For example, the development of the lifesaving COVID-19 vaccine would not have been possible without fundamental science-driven discoveries of mRNA dating back to 1961 [2, 3] and followed by 60 years of curiosity-driven fundamental research developments. Another example is the development of digital technology, which affects all aspects of our life from medical imaging to accessing information. Digital technology has its roots in fundamental research initiated in the 19th century. [4] Current and emerging technologies such as smartphones, computers, and electric vehicles would not be possible without decades of fundamental research in materials, engineering, and computer science. Additionally, the continued global population growth and the overall increase in global nutrition quality owes itself to the countless number of researchers in plant and soil science, chemistry, and agriculture.

Despite the paramount importance of fundamental science in protecting and sustaining society, the appreciation of and investment in these fields is decreasing around the globe. A recent GYA report [5] based on an international online survey demonstrated that researchers worldwide perceive a decline in support for fundamental science, mainly driven by changes in available funds and priorities.

Sixty-nine percent of the survey respondents reported a shift in the focus of their research programmes toward applied research, pushing them away from fundamental research [5].

Furthermore, there is continued inequity within the research sector. Early- and mid-career researchers around the globe, and especially in low- to middle-income nations, are now at a significant disadvantage as compared to previous generations of researchers operating in high-income nations. While low- to middle-income economies have witnessed the largest increase (+36%) in researchers' density since 2014, they still account for only 0.2% of the world's researchers [6]. This lack of opportunity severely limits global access to the potentially life-changing research talent that may reside in these regions. Additionally, the issue of Open Access, while crucial for disseminating knowledge, requires careful consideration to prevent inadvertently deepening the divide between high-income and low- to middle-income nations. The World Academy of Sciences Young Affiliates Network (TYAN) and the Argentinian Young Academy organized an open statement [7] on this topic, which is supported by 17 Nobel laureates and over 30 international organizations and academies. Unequal access to Open Access publications could exacerbate existing inequalities in the scientific community, limiting the ability of researchers from developing countries to benefit from and contribute to global advancements [8].

Considering these trends and the urgency of connecting fundamental science with sustainable development, we propose the following actions:

- Support fundamental research in line with the sustainable development goals (SDGs) and Agenda 2030.
- Set government and academia national linkages, actions, and guidelines to achieve the SDGs and to measure sustainability parameters.
- Support interdisciplinary fundamental research through collaborative initiatives that are inclusive of partnerships between high-income and low- to middle-income nations and that actively invest in teams of scientists and evaluation mechanisms that ensure a fair assessment of large-scale interdisciplinary grant proposals.
- Develop instruments that enhance transitions from fundamental research to technological innovation, entrepreneurship, and implementation to shorten the gap between fundamental science and its application.
- Support the establishment of initiatives to increase research facilities and opportunities to empower scientists, especially early- and mid-career researchers and in resource-limited countries, in pursuing fundamental research to develop a skilled workforce that can drive technological and scientific innovation.
- Support initiatives with both global relevance and local impact and encourage the interaction and connection among early- and mid-career researchers.
- Harness the diversity of perspectives and knowledge systems, including indigenous knowledge systems and historically marginalized communities.
- Enhance literacy regarding global challenges (e.g., climate change, poverty alleviation, access to quality education and healthcare, migration, gender/racial equality, infectious

diseases with pandemic potential, and chronic diseases of aging populations, among others [9]) across different fields of practice and increase awareness of the connection between fundamental science and sustainable development.

- Form intergovernmental structures and platforms such as IPCC [10] or COVAX [11] to ensure equitable global knowledge, resource, and benefit sharing arising from fundamental science.
- Develop and implement action plans at national and regional levels with early reporting deadlines for a decadal plan to support fundamental research oriented by realistic goals to better understand causes and consequences of challenges towards achieving sustainable development.
- Enhance the training of early- and mid-career researchers with the aim of empowering them to effectively inform decisionmakers about the profound significance of fundamental research in achieving sustainable development.

We urge stakeholders to recognize the profound significance of fundamental science, including multi- and interdisciplinary research in the pursuit of sustainable development and technological innovation, and to empower and equitably support early- to mid-career researchers across the globe in their quest of groundbreaking research, as we collectively strive towards a sustainable future defined by innovation and global progress where no one is disregarded in the understanding of our most pressing problems and the design of their solutions.

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[5] Anina N. Rich, André Xuereb, Borys Wróbel, Jeremy Kerr, Kristina Tietjen, Binyam S. Mendisu, Vinicius F. Farjalla, Jie Xu, Martin Dominik, Gijs Wuite, Oded Hod, Julia K. Baum. Back to basics: Researchers' perception on the global state of funding for fundamental research. Global Young Academy (2022).

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Signed by the following Young Academies and Young Associations:

Global Young Academy, Young Academy of Argentina, Early- and Mid-Career Researcher (EMCR) Forum, Australia, Young Academy of the Austrian Academy of Sciences, Burundi Council of Young Scientists, The College of New Scholars, Artists, and Scientists of the Royal Society of Canada, Estonian Young Academy of Sciences, Young Academy Finland, Ghana Young Academy, Hungarian Young Academy, Indian National Young Academy of Science, Israel Yong Academy, National Young Academy of Côte d'Ivoire, Latvian Associations of Young Researchers, Lithuanian Young Academy of Sciences, Mexican Young Academy, National Young Academy of Nepal, Young Academy of Norway, Outstanding Young Scientists, Inc. (Philippine Academy of Young Scientists), Romanian Young Academy, Senegalese National Young Academy, South African Young Academy of Science, Young Academy of Spain, Sri Lankan Academy of Young Scientists, Swiss Young Academy, Young Academy of Europe, TWAS Young Affiliates Network, International Association of Physics Students (IAPS), International Younger Chemists Network (IYCN), World Young Scientist Summit. Signed by the German Young Academy (Die Junge Akademie) in March 2024.

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For more information: https://globalyoungacademy.net/


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