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Connecting local and global solutions: an analysis of capillary approaches to science and development

Conectando soluciones locales y globales: un análisis de enfoques capilares para la ciencia y el desarrollo

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CONNECTING LOCAL AND GLOBAL SOLUTIONS: AN ANALYSIS OF CAPILLARY APPROACHES TO SCIENCE AND DEVELOPMENT

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ABSTRACT

International organizations such as UNESCO can play a pivotal role in promoting peace, eradicating poverty, and fostering sustainable development through their multifaceted approach, which encompasses education, science, culture, communication and information. This paper examines UNESCO's Category 2 Centers as catalysts for global and local development, focusing on a case study of a center in Mashhad, Iran. These centers, established by member states under UNESCO's auspices, play a vital role in addressing socioeconomic challenges, particularly in regions like the Global South. By promoting partnership, skills development, and science communication, they translate strategic goals into tangible actions and foster STEM education and research, particularly in Africa. Leveraging the soft power of science, UNESCO aims to bridge knowledge-sharing gaps, empower youth, and advance the Sustainable Development Goals (SDGs) outlined in the UN Agenda 2030. Ultimately, these centers contribute to inclusive, sustainable development by connecting local and global solutions and fostering constructive dialogues among diverse stakeholders.

KEYWORDS: development - UNESCO - capacity building - policies - culture

CONECTANDO SOLUCIONES LOCALES Y GLOBALES: UN ANÁLISIS DE ENFOQUES CAPILARES PARA LA CIENCIA Y EL DESARROLLO

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RESUMEN

Las organizaciones internacionales como la UNESCO pueden desempeñar un papel fundamental en la promoción de la paz, la erradicación de la pobreza y el fomento del desarrollo sostenible mediante su enfoque multifacético, que abarca la educación, la ciencia, la cultura, la comunicación y la información. Este documento examina los Centros de Categoría 2 de la UNESCO como catalizadores del desarrollo global y local, centrándose en el estudio de caso de un centro en Mashhad, Irán. Estos centros, establecidos por los Estados miembros bajo los auspicios de la UNESCO, desempeñan un papel vital para abordar los desafíos socioeconómicos, especialmente en regiones como el Sur Global. Al promover la colaboración, el desarrollo de competencias y la comunicación científica traducen los objetivos estratégicos en acciones tangibles y fomentan la educación y la investigación en STEM, especialmente en África. Aprovechando el poder de la ciencia, la UNESCO busca reducir la brecha en el intercambio de conocimientos, empoderar a la juventud e impulsar los Objetivos de Desarrollo Sostenible (ODS) de la Agenda 2030 de las Naciones Unidas. En definitiva, estos centros contribuyen al desarrollo inclusivo y sostenible conectando soluciones locales y globales y fomentando diálogos constructivos entre diversas partes interesadas.

PALABRAS CLAVE: desarrollo - UNESCO - desarrollo de capacidades - políticas - cultura

Connecting local and global solutions: an analysis of capillary approaches to science and development

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I. Introduction

Investigating pathways to build capacities for global and local development: an analysis of UNESCO's Category 2 Centers

"COVID-19 has demonstrated the importance of science & global cooperation".

This is what António Guterres, Secretary-General of the United Nations, stated while sharing the latest UNESCO Science Report. The report highlights that

1 Associate researcher at LCSP (Laboratoire de Changement Social et Politique), Université Paris Cité. Doctor in Social Sciences with expertise in sociology, gender studies, international relations, organizational studies, and human capital management. Has worked with various international organizations, including at the UN level, and held managerial roles in major consulting firms on people & change topics. Extensive cross-sectoral field experience.

2 Engineer by training and expert at the United Nations level (e.g., UNESCO), with a focus on engineering development programmes for women in STEM, education policy, and capacity building. Extensive global field experience; currently based in Zimbabwe.

3 Independent consultant and former director in major industries. President and administrator of non-profit organizations in areas such as urban development and sport. Extensive experience in local governance as a former elected official and mayor, with a focus on strategy, policy, and public service delivery.

4 Medical doctor with international experience, having received academic and professional training across several countries - particularly Italy, Switzerland, and France - and practiced in both the public and private sectors, with fieldwork experience including in the Global South, notably Africa.

international scientific collaboration is growing; cooperation produces positive externalities on global challenges, such as the climate crisis, biodiversity loss, and disease.

The importance of responding and reacting to global challenges reflect the spirit and the goals of UNESCO, the 73-year-old UN Agency with the mission of building peace, eradicating poverty, promoting sustainable development and intercultural dialogue through education, the (natural, social and human) sciences, culture, communication and information. Implementing its actions through a capillary approach allows UNESCO to cover several geographic and thematic areas. The Organization is constituted and can cyclically constitute new Institutes, Centres and Chairs5 that – along with UNESCO's Regional/ Field Offices – can be effective in supporting numerous regions of the world and various fields of expertise. Centres are differentiated into two categories: Category 1 and Category 2.

Category 1 Centres (often referred to as Institutes) are an integral part of UNESCO. These Institutes benefit from autonomy; at the same time, their programmes are integrated with the strategy and missions of the relevant Sector.[6]

Category 2 Centers under UNESCO are established and funded by member states and operate under the auspices of UNESCO but are independent

5 A UNESCO Chair is a university department or research institute designated by UNESCO to promote international research, education, and knowledge sharing on a particular theme.

6 UNESCO Education Institutes / Cat. 1 Centres are : UNESCO International Institute for Educational Planning (IIEP) in Paris, France, and Buenos Aires, Argentina ; UNESCO International Bureau of Education (IBE), Geneva, Switzerland ; UNESCO Institute for Lifelong Learning (UIL), Hamburg, Germany ; UNESCO Institute for Information Technologies in Education (IITE), Moscow, Russian Federation ; UNESCO International Institute for Capacity-Building in Africa (IICBA), Addis Ababa, Ethiopia ; UNESCO International Institute for Higher Education in Latin America and the Caribbean, IESALC, Caracas, Venezuela ; UNESCO International Centre for Technical and Vocational Education and Training (UNEVOC), Bonn, Germany. UNESCO Natural Sciences Sector Institutes / Centres : UNESCO-IHE Institute for Water Education, Delft, Netherlands ; International Centre for Theoretical Physics (ICTP), Trieste, Italy ; UNESCO Institute for Statistics (UIS), Montreal, Canada.

of the organization.[7] This allows member states to have greater control over the centers' focus and activities and a greater sense of investment in their success. Indeed, the concept of ownership in international development is an increasing trend; it refers to the extent to which a country or community takes responsibility for and drives its own development agenda. It involves developing and implementing policies and programs that are locally driven, based on local priorities, and are sustainable over the long term.[8] By using a combination of top-down and bottom-up approaches, the objective is to create networks of collaborators, promote innovation, and establish dialogue and peacebuilding platforms at the international and regional levels leveraging on the soft power of science, in the spirit of the Sustainable Development Goals (with particular focus on SDG 17 – Partnership for the goals).

Capacity building initiatives serve as accelerators and ad hoc solutions to translate the strategic goals, guidelines, and principles of science policies into tangible actions.[9]

Particularly in the Global South, studies show difficulties in research and knowledge translation (KT)[10] because of a series of barriers at individual and institutional level, limiting translation capacities.[11] A study assessing 35

7 Category 2 Centres are created under the auspices of the UNESCO, but are independent of the Organization; they benefit from a formal arrangement/agreement approved by the General Conference every two years.

8 According to the Paris Declaration on Aid Effectiveness (2005), "ownership, alignment, harmonisation, results, and mutual accountability" are the five fundamental principles for making aid more effective. To understand the opportunities and challenges provided by these principles, it is interesting to consider the evaluation of the Paris Declaration's implementation undertaken by the OECD. With regards to the "ownership" principle, debates continue on who owns it and how to measure it. While progress has been made, such as aid reforms improving health systems, failures also exist, such as neglecting the needs of the poorest and women. This means that these demographic segments are not yet owners of their countries' development and cannot fully benefit from aid reforms.

9 Geoffrey Bloomfield et al., "Capacity Building to Advance the United Nations Sustainable Development Goals: An Overview of Tools and Approaches Related to Sustainable Land Management," *Journal of Sustainable Forestry* 37, no. 2 (2018): 157–77.

10 Faisal Siregar et al., "Bridging Text with Context: Knowledge Translation in the Global South," *On Think Tanks*, 2023, https://onthinktanks.org/publication/bridging-text-with-context-knowledgetranslation-in-the-globalsouth

11 Alejandro Quiroga-Garza et al., "Research Barriers in the Global South: Mexico," *Journal of*

countries in the WHO African Region found that only 43% had mechanisms for evidence collation and synthesis, and just 46% had KT platforms.[12] Even where such platforms existed, their functionality was often compromised by inadequate funding, lack of dedicated personnel, and poor integration into policy processes. More in general, these barriers are related to: *"inadequate skills, particularly for communicating research and interacting with research end-users, insufficient funding, inadequate institutional guidelines, and structures and incentives promoting research translation practices"*.[13] Capacity building, especially through initiatives like Category 2 Centers, can play a vital role in addressing the challenges faced by the Global South, if properly managed. It offers a comprehensive approach that promotes partnership, skills development (both hard and soft, such as communication), and government investments. Furthermore, it supports the creation of institutional guidelines and structures that facilitate research translation practices, ultimately contributing to the overall development of the region. The pandemic has also underscored the crucial role of effective science communication, both within the scientific community and to the public, in disseminating information on best practices and approaches.

On October 2016, UNESCO defined a set of principles underpinning the prominent role of science for translating the Sustainable Development Goals into concrete actions, and recognizing science as a universal public good empowering people to constitute the basis for a sustainable world. The UN Agenda 2030 places people and the planet at its core, representing not just an extension of the Millennium Development Goals (MDGs) but a fresh approach

Global Health 12 (2022): 03032, https://doi.org/10.7189/jogh.12.03032

12 Juliet Nabyonga-Orem et al., "A Rapid Review of Evidence on Knowledge Translation Platforms in Low- and Middle-Income Countries," *Implementation Science Communications* 2, no. 1 (2021): 1–15.

13 Vincent I. Murunga et al., "Review of Published Evidence on Knowledge Translation Capacity, Practice and Support among Researchers and Research Institutions in Low- and Middle-Income Countries," *Health Research Policy and Systems* 18 (2020): 1–21.

to address the evolving challenges of our changing world. It emphasizes resilience for the population and promotes responsible life cycles, acknowledging the need for a new perspective and heightened awareness.[14]

As emphasized by the previous statement of Antonio Guterres, the COVID-19 pandemic has highlighted the importance of anticipating people's needs, including the need for stronger infrastructure and preparedness planning. These lessons provide valuable insights for addressing current and future global challenges through collaborative efforts, while ensuring that no one is left behind, including those in the Global South.

II. Methodology

This research uses a qualitative approach to examine the impact of UNESCO's Category 2 Centres on global and local development. It begins with a literature review on UNESCO's role in capacity building and then focuses on a case study of a centre in Mashhad, Iran, drawing on official documents and the authors' personal experiences within UNESCO's Natural Sciences Sector. The centre was chosen due to the authors' involvement in its 2017 establishment and direct presence in Iran. A preliminary quantitative analysis was attempted through a questionnaire to assess return on investment (ROI) and impact, but the Centre did not complete the survey. This highlighted the need for better ROI assessment methods, a point discussed in the article's conclusion. By combining these elements and insights, the study evaluates the effectiveness of Category 2 Centres in promoting development and identifies areas for improvement, including in measuring and monitoring their impact.

14 David Griggs, "Sustainable Development Goals for People and Planet," *Nature* 495, no. 7441 (2013): 305–07, https://www.nature.com/articles/495305a

III. How UNESCO's capacity building supports socioeconomic development

The casework of a C2C in Mashhad

The UNESCO General Conference (39th Session, Paris, 2017) put forth a draft agreement that was evaluated - and positively voted - to establish new centers under the auspices of UNESCO. This case focuses on establishment of a Category 2 Center in Iran, a country facing endogenous and exogenous instability since the death of Mahsa Amini on 2022, demonstrating the need to explore new strategies for peace keeping and peace building in the region.

In 2017, the Islamic Republic of Iran and UNESCO signed an agreement establishing the international centre for health-related basic sciences and human nutrition. The agreement indicated that the Centre's objectives shall be holistic. The creation of a Centre focused on basic sciences and human nutrition was in response to demonstrated need in Iran, specific to diet-related non-communicable disease (NCD). Almost 35.5% of adult (aged 18 years and over) women and 22.3% of adult men are obese, higher than the regional average of 10.3% (women) and 7.5% (men).[15]

The Centre is expected to promote research on hard sciences, while also producing positive externalities on socio-economical aspects,[16] such as new spillover effects for local industries' economy, gender equality in

15 *2022 Global Nutrition Report: Stronger Commitments for Greater Action.* (Bristol, UK: Development Initiatives Poverty Research Ltd., 2022), https://globalnutritionreport.org/reports/2022-global-nutrition-report

16 *"To promote research activities in the basic sciences and health including: biochemistry, medical genetics, biophysics, medical physiology, human anatomy, microbiology, pathology, immunology, molecular biology (bio cellular and molecular sciences) in the Asia and Pacific region; to provide high quality advisory services on Science, Technology and Innovation to higher research institutions in the Asian and Pacific region; to strengthen human and institutional capacities and cooperation in the region for documenting and studying Basic Sciences and Human Nutrition; to develop linkages, through collaborative research programmes in the areas of the Basic Science and Human Nutrition within the Asia and Pacific region and internationally; to provide world-class and internationally accepted analytical services to the interested industries in the Mashhad, Iranian and Middle-Eastern region."*

representation of the Centre's board members and international cooperation and networking opportunities. Together with scientific advancement, through the creation of these synergies and partnerships, UNESCO historically[17] aims to leverage on the soft power[18] of science to create a platform for scientific cooperation and peacebuilding, enhancing interactions even with researchers coming from other regions of the world.[19]

For this reason, the key parts of this Centre, as intended by UNESCO, the Member States and its partners, are:

- *understanding and responding to the needs of the population* of the region, using empirical data from the Mashhad University of Medical Sciences (MUMS) and others.
- *involving fresh and international actors in a development engineering[20] strategy*. The dialogue and cooperation to establish this Center included government institutions (e.g., Ministry of Health) and universities in Iran and elsewhere (e.g., University of Tufts in the United States…). Furthermore, to have a neutral and objective feasibility study, the evaluation was based on the opinion of an external consultant from a French university. Furthermore, the Category 2 Centre in Mashhad was proposed with the spirit of opening a new door to international collaborations in the Region in the field of health, life and basic sciences, and the creation of an international network of collaborators where investigators from several areas of the world could find new opportunity to discuss or propose their ideas and findings.

17 Cassandra Vizzini, "The Human Variome Project: Global Coordination in Data Sharing," *Science & Diplomacy* 4, no. 1 (2015).

18 Joseph S. Nye, "Soft Power: The Evolution of a Concept," *Journal of Political Power* 14, no. 1 (2021): 196–208.

19 Johan Galtung, *Theories of Peace: A Synthetic Approach to Peace Thinking* (Oslo: International Peace Research Institute, 1967).

20 Arvind Agnihotri et al., "Introduction to Development Engineering," in *Introduction to Development Engineering, ed. Theresa Madon, Ashok J. Gadgil, Robert Anderson, Lorenzo Casaburi, Karen Lee, and Ali Rezaee (Cham: Springer, 2023).*

- *responding to new challenges and navigating the evolution of higher education and basic and applied research.* For example, to translate into social and economic outcomes scientific research, it is crucial to improve strategic cooperation with the private sector. This approach can both support capacity building of human skills[21] (e.g., through traineeships opportunities in industry for young investigators) and local and regional private companies by creating a synergy with public research facilities. Indeed, particular attention in the feasibility study has been dedicated to the potential of the industrial clusters in the city of Mashhad, such as in agribusiness.
- *Raising awareness of the importance of respecting and giving value to differences.* Article 7 of the agreement describes the composition of the Governing Board of the Centre, and highlights the importance of tackling geographical and gender criteria in the composition of the Board.

21 See Ashtarian, K. (2015) Iran. In: UNESCO Science Report: towards 2030; full chapter on Iran - for a clear spectrum on this casework and on the importance of identifying concrete needs before to proceed with capacity building initiatives. The study highlights that, even if the Iranian economy experienced a positive growth in 2016 (about 6.4%), this overcome is related as well to the return to near-capacity oil exports (before the sanctions occurred on July 2015 due to the United Nations' Security Council endorsement about nuclear agreement). However, the country experienced a low flow of Foreign Direct Investments (FDI) that, according to the World Bank, is caused also by a slow integration of Iran's banking sector within the global banking system. However, in order to have an economic development, it is crucial also to receive FDI in non-oil sectors, which creates the need of investing on human capital and knowledge that could be translated into new market opportunities. The UNESCO Science Report highlights the efforts of the government to shift from a resource-based economy to a knowledge-based economy, through the Vision 2025 plan that has been adopted on 2005 and. This "transitioning" plan is supported by a US$ 3.7 trillion investment by 2025 - it intended to be supported by one-third of this amount by FDI but, by 2015, this strategy of financing development was marginal (it contributed less than 1% of GDP since 2006 and 0.5% of GDP in 2014). The majority of the US$ 3.7 trillion investment was oriented to support research and development of knowledge-based firms and commercialization of research outcomes. Moreover, the Fifth Five-Year Economic Development Plan (2010-2015) aimed to ensure that 50% of academic research was rooted to problem-solving and to cope with socio-economic needs.

IV. SUBSTANTIVE ISSUES: Supporting STEM: a long journey characterized by strong challenges and opportunities

For customized and people-oriented strategies, a community-based approach is preferable. The vision behind the Category 2 Centre in Mashhad embodies this spirit, where the Centre is conceived to respond to a local need (e.g. nutrition and obesity-related problems), fostering economic growth and employment opportunities in the region, including in the process various population segments (e.g. *"giving value to differences"*) and leveraging on a network of North-South and South-South collaborations through the soft power of science.[22] Community Capacity Building (CCB), indeed, strives to enhance the skills and competencies of every member of a community, particularly those who are underprivileged, to enable them to take charge of their lives and contribute to local development. This can result in communities being more united, resilient, and better equipped to face economic and social difficulties. National and local governments can help achieve these objectives by promoting effective CCB.[23]

Governments play a vital role in creating an enabling environment for STEM education and research by providing resources, funding, policies, and infrastructure. International STEM cooperation is significantly more successful when governments are actively involved, as shown by OECD and World Bank findings indicating up to 30% higher impact rates and twice the success in countries with formal strategies,[24] as well as Africa's STISA-2024 highlighting

22 Shunguya Chandiwana and Niels Ørnbjerg, "Review of North-South and South-South Cooperation and Conditions Necessary to Sustain Research Capability in Developing Countries," *Journal of Health, Population and Nutrition* 21, no. 3 (2003): 288–297.

23 Antonella Noya and Edgar Clarence, *Community Capacity Building: Fostering Economic and Social Resilience. Project Outline and Proposed Methodology,* working document CFE/LEED (Paris: OECD, 2009).

24 Giulio Cimini, Andrea Zaccaria, and Andrea Gabrielli, "Investigating the Interplay between Fundamentals of National Research Systems: Performance, Investments and International Collaborations," *Journal of Informetrics* 10, no. 1 (2016): 200–211; Caroline S. Wagner, Travis

the role of state support in effective collaboration.[25] Governments can support the development of STEM skills and competencies through investment in education and training programs, as well as through partnerships with academic institutions, industry, and civil society organizations. Additionally, governments can promote STEM careers and opportunities, especially for underrepresented groups, by creating inclusive policies and programs that address equity and diversity in STEM fields.

Supporting youth in STEM careers and converging demand for a new generation of experts trained in hard sciences fields, with the necessity of promoting interdisciplinary research, is one of the main missions of several public and private institutions.[26] UNESCO's programs have been instrumental in providing training and inspiration to young people at global scale. These programmes and actions are also based on the analysis outlining that "workers in STEM play a direct role in driving economic growth".[27]

According to the World Economic Forum, between 2015 and 2020, the number of jobs requiring STEM skills grew at three times the rate of other jobs;[28] the International Labour Organization (ILO) found that STEM-related jobs are projected to grow by 8% between 2018 and 2028, compared to an overall job growth rate of 5%.[29]

Whetsell, Jan Baas, and Koen Jonkers, "Openness and Impact of Leading Scientific Countries," *Frontiers in Research Metrics and Analytics* 3 (2018): 1–10, https://doi.org/10.3389/frma.2018.00007

25 African Union Commission. (n.d.). Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024). African Union. Available at: https://au.int/en/documents/20140926/science-technology-and-innovation-strategy-africa-2024-stisa-2024.

26 Jonathan Rothwell, *The Hidden STEM Economy* (Washington, DC: Brookings Institution, Metropolitan Policy Program, 2013).

27 World Economic Forum, *10 Jobs of the Future – According to the World Economic Forum* (Geneva: World Economic Forum, 2020), https://www.weforum.org/agenda/2020/02/10-jobs-of-the-future-according-to-the-world-economic-forum/

28 World Economic Forum, *10 Jobs of the Future – According to the World Economic Forum* (Geneva: World Economic Forum, 2020), https://www.weforum.org/agenda/2020/02/10-jobs-of-the-future-according-to-the-world-economic-forum/

29 International Labour Organization, *World Employment and Social Outlook: Trends 2019* (Geneva: International Labour Organization, 2019), https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_644408.pdf

Even if capacity building in STEM represents a challenge for both the North[30] and the South[31] for different reasons, UNESCO's attention on STEM-research is particularly focused on Africa. In Africa, STEM is one of UNESCO's two priorities along with gender. To strengthen capacities in STEM in Africa, Category 2 Centres have promoted exchanges in scientific disciplines, to promote theoretical and experimental research and support advanced training for local investigators.[32] Indeed, sub-Saharan Africa research output[33] in STEM is less than for other disciplines. Only 29% of all research in sub-Saharan Africa (excluding South Africa) is in STEM fields. Since 2002, the share of STEM research has not grown; it experienced a slight decline of 0.2 percent annually since 2002. In terms of the quality of STEM research, as measured through citation impact, it was approximately 0.68- compared to a global average of 1.00 (reference). In countries such as Malaysia, Vietnam and South Africa, the impact was greater than the global average (1.03), and experienced 15% growth since 2003.[34] It is essential to illustrate these figures and trends not only for predicting the future economic growth of the region but also to prepare for building STEM capacities and improving resilience through taiored policies and initiatives. The importance of developing and improving capacities and capabilities to enhance preparedness and response capacity has been highlighted by recent pandemics such as Ebola and COVID-19.[35]

30 National Science Foundation, *NSF Includes Report* (Alexandria, VA: National Science Foundation, 2023), https://www.nsf.gov/news/special_reports/nsfincludes/index.jsp ; European Commission. (2016). A new skills agenda for Europe. http://eur-lex.europe.eu/legal-content/EN/TXT/?uri=CELEX:52016DC0381

31 African Union. (2014). Science, Technology and Innovation Strategy for Africa 2024 (STISA). https://au.int/sites/default/files/documents/38357-doc-stisa-2024_english.pdf

32 UNESCO, "Category 2 Centres Based in Africa," UNESCO, accessed February 27, 2023, https://www.unesco.org/en/natural-sciences/centres

33 Where for output can be considered tangible deliverables that are produced as a result of conducting research (such as publications or data sets).

34 Andreas Blom et al., *Sub-Saharan African Science, Technology, Engineering, and Mathematics* Research: A Decade of Development (Washington, DC: World Bank Publications, 2016).

35 Margaret E. Kruk et al., "What Is a Resilient Health System? Lessons from Ebola," *The Lancet* 385, no. 9980 (2015): 1910–12; World Health Organization, *WHO's Response to COVID-19:*

V. Conclusions & recommendations

After a thorough and theoretical analysis of capacity building initiatives, including the UNESCO C2C in Mashhad, along with a comprehensive review of literature and the authors' own experience, it is evident that when science capacity building is carried out effectively and the needs of local communities and global interests are aligned, it can serve as a pivotal factor in:

1) Increasing the attractivity of the region/country where Centers are established for both talents and investments;
2) Respond to local needs through the creation of *ad hoc* facilities and centres (e.g., like in the case of obesity/nutrition in Mashaad, Iran) and to act as regional focal point to enhance scientific cooperation and dialogue with neighborhood countries;
3) Create job opportunities for the local workforce incorporating multiple skills (e.g., support functions for researchers and technicians), to employ in both the Public and Private sector;
4) Escalate STEM-related discussions at strategic levels, raising awareness on science capacity building importance and recruiting new sponsors for a shared vision. The discourse of science is not limited to scientists alone, as it extends to the funding ecosystem, multilateral cooperation, policy makers, and local communities alike. In fact, effective sponsorship plays a crucial role in ensuring that STEM initiatives are integrated into a comprehensive framework and are given due attention by decision makers and communities.
5) Create bridges to facilitate knowledge-sharing and create North-South and South-South cooperation, leveraging on the soft power of science;

Lessons Learned for Resilient Health Systems (Geneva: World Health Organization, 2021), https://apps.who.int/iris/bitstream/handle/10665/343157/71wd06e-rev1-PR-Response-LessonsLearned-210693.pdf

6) Foster a culture of transparency, accountability and data-oriented mindsets. This aligns with research on the C2C in Mashhad, which, despite its highly valuable estimated impact in the conception phase, highlights the need for more data to strengthen SDG-driven initiatives and assess their actual impact post-launch, pointing to a key limitation in this study due to the lack of such measurements.
7) Ensuring stakeholders' accountability, governance and activities' monitoring during the entire projects' lifecycles (on the short, middle and longer term). Monitoring outputs' analysis and results (e.g. publications number, citations, patents…) is a key success factors to prevent bluewashing and SDG-washing, which is a phenomenon on the raise. In 2022, Heras-Saizarbitoria et al. showed that, after an analysis of 1370 sustainability reports, companies were evasive or silent concerning their approach in SDGs-related initiatives. Indeed, explicit reference to the SDGs and frequent use of UN symbology and pictograms are often included in reporting to communicate an image of social responsibility and an alignment with sustainability issues, often lacking substance in the information provided and, on the indicators, and methodologies adopted - lack of substance generating an opaque understanding concerning the operationalization and execution of SDGs-related initiatives.[36]
8) Empower youth and raise their ambitions, with social benefits on gender equality and economic development, in the framework of the Agenda 2030.[37]

Amidst recent developments, there is a growing recognition of the criticality of inclusion, highlighting the significance of Community Capacity Building (CCB) in line with the "Leave No One Behind (LNOB)" principle,

36 Iker Heras-Saizarbitoria et al., "Organizations' Engagement with Sustainable Development Goals: From Cherry-Picking to SDG-Washing?," *Corporate Social Responsibility and Environmental Management* 29, no. 2 (2022): 316–28.

37 Atef Hamdy et al., *Towards Women Participation in Scientific Research in Africa* (Abuja: African Union, Scientific Technical Research Commission, 2017), https://austrc.org/app/publications/Women%20in%20Science.pdf

which embodies the central and transformative promise of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals. Even in the STEM field, capacity building should not be disconnected from full respect for human rights and people-centric vision, as the preservation of humanity (as a whole) and the ecosystem must be at the core of any sustainable initiative.

In the spirit of this commitment, UNESCO decided to dedicate the 2023 International Day of Education (January 24th) to Afghan girls and women, stressing on their call to immediately restore fundamental right to education in the region. Rights' threatening not confined to Afghan's borders, as showed by the fact that 130 million girls are denied the human right to education around the world.[38] At the moment of the redaction of this article, five months after the murder of Mahsa Amini in Iran, the Deputy Governor of Lorestan in Iran, Majid Monemi, said 50 female students of a high school in Borujerd were poisoned, following a serial poisoning of students started in December 2020.

In conclusion, capillary approaches (e.g. such as UNESCO Category 2 Centers) are crucial for connecting local and global solutions and building capacities for development. By using a combination of top-down and bottom-up approaches, partnerships, and investments, capacity building initiatives can address the challenges faced by the Global South and contribute to the overall development of the region. Moreover, by leveraging on shared interests and the soft power of science, such initiatives can foster constructive dialogues among countries and stakeholders who may not have interacted otherwise. The COVID-19 pandemic has highlighted the importance of international scientific collaboration, effective science communication, and anticipating people's needs to address current and future global challenges through collaborative efforts while ensuring that no one is left behind.

38 Office of the High Commissioner for Human Rights (OHCHR), "The World Is Failing 130 Million Girls Denied Education: UN Experts," United Nations Human Rights, January 30, 2023, https://www.ohchr.org/en/press-releases/2023/01/world-failing-130-million-girls-denied-education-un-experts

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