Coherent Research: Search for social transformation through universal participation in the generation of knowledge

Sujaya Neupane, PhD
York University, Canada
sujay@yorku.ca

Dariush Nothaft
Crooked Media Inc.
dariush.nothaft@gmail.com

Sunisha Neupane, PhD candidate
University of Sussex, UK
s.neupane@ids.ac.uk

Summary. Coherent Research is a non-profit organization that aims to address asymmetry in the generation of knowledge. Building on our experience, we plan to implement a science training program initially in Nepal and Canada with the goal of raising human resources that recognize the relationship between one's intellectual pursuit and one's role in social transformation. In the long term, we aim to contribute toward a cultural shift in how scientific knowledge is generated throughout the world. We envision our work to mature into building local institutions of learning that enable communities to generate and apply knowledge relevant to their social realities.

Introduction. UNESCO estimates that 87% of the world's researchers and 94% of publications are from G20 countries[1]. This global imbalance means that problems, questions, and realities of the rest of the world are often either overlooked or misinterpreted. For decades, the international community has launched aid and development programs aimed at eradicating poverty, improving access to food, education, and healthcare, and enhancing the overall livelihoods of people around the world. These efforts are undeniably crucial. However, it is equally important to ensure that everyone has the opportunity to participate in research and knowledge generation— to create more scientifically literate communities capable of advancing knowledge most relevant to their social realities and to democratize knowledge generation by incorporating diverse perspectives and insights in scientific theories.

The assymetry in knowledge generation can be observed across countries where only a narrow proportion of their demography - the socioeconomically privileged - participates in scientific activity[5]. The combined effect of this global social reality is a massive brain drain on the one hand and extreme competition at a handful of science research hubs in the high-income nations on the other.

Existing outreach programs aimed at generating interest in science often unintentionally overlook pre-existing interest or fail to fully connect with the social realities of the communities they seek to engage. Internationally, collaborations are often instigated and steered by researchers in high-income countries while the partners in low-income countries follow a pre-set agenda, a complex issue consistently pointed out by researchers[6,7]. What is needed are sustained efforts toward greater democratization of science, research activities and knowledge generation.

We started a science capacity development program five years ago through a neuroscience collaboration between researchers in Canada and Nepal. The research that was pursued in Nepal was motivated by the problem posed by Nepali researchers at the outset. We learned that by remaining close to the reality of Nepali society and understanding the needs of trainees and collaborators, it was possible to conduct rigorous academic work that was socially relevant[8]. However, more work is needed to develop the scientific capacity of communities where science has remained underfunded and understudied. **We aim to contribute to this end as a non-profit collective.**

We have distilled our learnings so far into a scientific training program which we call 'the bridge program'. The bridge program aims to inculcate in science trainees the habit of intellectual pursuit harmoniously with their desire to contribute to social transformation. This two-fold empowerment approach is our attempt to address a core problem we have identified in the scientific research enterprise: the pedagogy of science training lacks a framework that can integrate an individual's pursuit of knowledge with the individual's desire to improve the human condition. As such, a scientist's intellectual quest remains fragmented from the

social reality in which they live. The two-fold approach, therefore forms one of the fundamental elements of our conceptual framework for action.

Rather than viewing science as a source of technical solutions to social needs conceived by the 'experts' and handed to the 'non-experts', we view science as an orientation that allows all involved participants to collectively engage with and address their social reality. Under this view, science is not limited to 'hard sciences' but encompasses any endeavor aimed at the systematic investigation of reality.

Our approach, therefore has a posture of learning - consult, generate questions, take actions and reflect - to search for ways of building research capacity for social transformation. For example, our Nepali neuroscience trainees have reported significant challenges in comprehending academic papers. These difficulties are alleviated when they read the papers with a mentor, suggesting the benefits of using less academic jargon and more accessible language. The issue lies not in the inability to understand scientific concepts but in the vocabulary and writing style that pose barriers. In response, we developed a systematic plan to address this issue, recognizing that students globally might encounter similar challenges. A spin-off project emerged from this initiative to develop an online platform that (1) enables authors to narrate the story of their publications with fewer communicative barriers and, where applicable, (2) provides a flexible platform for authors to open-source their data and code, allowing scientists to reproduce and replicate the results.

Ultimately, we aim to contribute to building societies in which community members and social institutions act in harmony as protagonists of change. We believe that wide participation in knowledge generation and nurturing the spirit of inquiry will play a central role in the growth of such societies.

Plans of action - bridge research training program

We will develop our ongoing research in Nepal[8] into a *bridge training program* in which recent undergraduates undergo a three-phase research training. Although our current research field is limited to neuroscience, we aim to widen our circle of collaborators across research domains and countries.

Bridge program

	Phase 1	Phase 2	Phase 3
Activities	-Methodologies seminar -Replication project -In-person workshop	-Research project -Integrate research and social reality	-Research project -Mentor new trainees -Contribute to discourse
Nature of mentorship	Accompaniment	Co-investigation	Promote independence

More specifically, trainees entering the *bridge program* will be mentored by two co-supervisors - a primary supervisor based at a Nepali institution and a remote co-supervisor in a region with advanced science infrastructure. In phase 1, trainees will take an online interdisciplinary course designed by *Coherent Research*. This course will foster an understanding of research methodologies across various scientific subfields.
Trainees will engage in replication projects,s for which we will leverage openly available datasets. We expect phase one to last 6-8 months. We will conduct an annual in-person workshop in Nepal for trainees to present and discuss research ideas.

Phase 2 and 3 will be research-intensive, with each trainee leading a novel research project based in Nepal. During this period, trainees will incorporate feedback on their scientific work with close mentorship from the co-supervisors. Trainees will present their work at an international conference and engage in the process of writing and publishing a peer-reviewed research article. Importantly, they will mentor the new cohort of trainees. This portion of this program emphasizes service to others, which will help develop their capacity to mentor and support the next cohort of trainees. During these years, trainees will gradually transition from being accompanied in the path of research to the path of independent investigation and service.

We aim to develop a model of mentorship in which mentees are accompanied in their path of intellectual development by diffusing the inherent power imbalance and helping to nourish their confidence and competence. To achieve that, we think participation is essential. We will hold regular consultative meetings with our collaborators in grant writing, institutional reforms, and pedagogical decisions. Crucially, we will invite the mentees to participate in these consultations. Such an approach has greatly benefited our past and ongoing work.

We will pursue our plans in collaboration with universities and research institutes that we are currently affiliated with both in and outside Nepal.

Proof of concept - Reflection on past experience

Our organization builds on a neuroscience research collaboration that started in 2019[9]. We established a vision science research lab at Tilganga Institute of Ophthalmology in Nepal. Our initial focus has been on vision rehabilitation caused by pediatric stroke, an overlooked clinical condition in marginalized communities[10]. This research topic was motivated by the experience of Nepali ophthalmologists receiving numerous case referrals for blindness caused by neonatal brain damage. Moreover, since the proposed research was conducted by a Nepali research trainee at a Nepali institute mentored by a Nepali-Canadian scientist[8,11], there was a shared understanding of the social reality of Nepal. Mentorship and research thus carried out enriched the consultation on scientific, administrative and pedagogical matters.

Another field of research we are engaged in is medical anthropology. To achieve a granular understanding of the community's maternal healthcare needs in rural Nepal, we conducted ethnographic and participatory research in the villages of Jumla, a remote region in western Nepal. One of us lived in these communities as a community member for over a year. We identified gaps in the maternal health policies that theoretically appear effective on paper by observing the inaccessibility of peri-natal care, delivery options and post-natal care due to contextual challenges such as geographic terrain and engrained cultural norms. We also found a great interest in the research question and process from community members. We have thus identified opportunities to bring the bridge program to a rural community in Nepal in health and anthropology. We aim to develop methodologies where community members in a rural population can exercise their capacity for inquiry and integrate methods from various scientific fields to forge their own paths toward healthier lives and development.

Our experience thus far is a testimony to our vision: we trained students to conduct scientific research that directly addresses a health need in Nepali society. Our research findings have opened avenues for new research, and our experience mentoring students in neuroscience has opened doors to applying our approach to other fields of science. As we gain more experience working under our conceptual framework, we aim to contribute to the discourse on higher education and the role of consultative practices in science training.

We currently collaborate with the following research labs - Dr. Christopher Pack's lab at McGill University, Canada, Dr. Thomas Elston at the University of Texas at Austin, and Dr. Roberto Bottini at the University of Trento, Italy. Similarly, we have established collaborations in Nepal with Dr. Suresh Manandhar, Professor of Artificial Intelligence at Madan Bhandari University of Science and Technology, Kathmandu, and with Dr. Keepa Vaidya and Dr. Srijana Adhikary at Tilganga Institute of Ophthalmology.

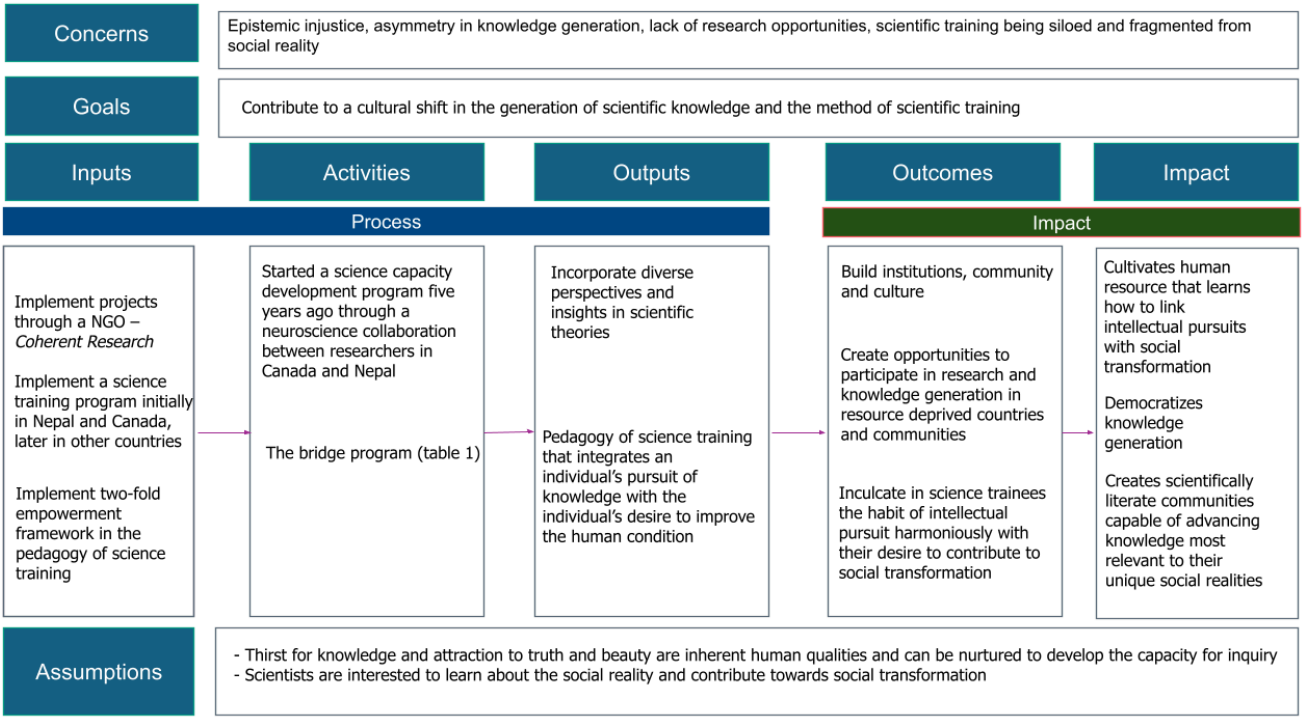
Conceptual framework and theory of change

Fundamental to our conceptual framework is its generative nature, continually informed by cycles of consultation, action, and reflection. Participation and consultation are essential to remain attuned to social reality. With broader participation, a more accurate read of our social reality becomes possible, leading to richer processes of hypothesis generation, theory-making, and experimentation. Scientific inquiry will then achieve higher attunement to the truth it seeks to uncover[4,12,13].

Another element of our conceptual framework for action is our conviction about human nature. We regard the thirst for knowledge and attraction to truth and beauty as inherent human qualities that can be nurtured to develop the capacity for inquiry[8,14]. The investigation of truth, however, is not limited to aspects of physical reality; it also encompasses the social dimension of how a scientist ought to live and contribute to society. Therefore, related to human nature, a crucial element of our theoretical framework is two-fold empowerment: the pursuit of one's own intellectual growth and contribution to social transformation. Science research conducted within this framework cannot happen in silos isolated from the society the scientist lives in. Instead, the pursuit of knowledge becomes a crucial aspect of a broader methodology for improving the human condition.

Only with the concurrent development of the culture of science can we realistically aim to attain universal participation in the generation of knowledge. For a culture of science to evolve, one must focus not only on individual capacity building but also on nurturing the development of institutions. The empowerment of individuals and the development of institutions are not independent processes. With a loving and trusting relationship, each empowers and develops the other. With such a relationship gradually emerging, individuals recognize that growing one's intellectual capacity is bound to one's effort to transform society. Our approach aims to develop such awareness in our trainees and in institutions we collaborate with - the awareness of seeing the interrelationship between intellectual pursuits, the exigencies of society and the capacity to address them.

To achieve our long-term vision of building vibrant institutes of learning, we have conceived a theory of change that unfolds gradually:



References

1. UNESCO Science Report. The race against time for smarter development. in *UNESCO Science Report 2021* 30–77 (United Nations, 2021).
2. Henrich, J., Heine, S. J. & Norenzayan, A. The weirdest people in the world? *Behav. Brain Sci.* **33**, 61–83; discussion 83–135 (2010).
3. Segall, M., Campbell, D. & Herskovits, M. The influence of culture on visual perception. *xvii* **268**, (1967).
4. Longino, H. E. *Values and Objectivity in Scientific Inquiry*. (Princeton University Press, 1990).
5. Morgan, A. C. *et al.* Socioeconomic roots of academic faculty. *Nat. Hum. Behav.* **6**, 1625–1633 (2022).
6. Harvey, B., Huang, Y.-S., Araujo, J., Vincent, K. & Sabiiti, G. Breaking vicious cycles? A systems perspective on Southern leadership in climate and development research programmes. *Clim. Dev.* **14**, 884–895 (2022).
7. Nair, K. N. & Menon, V. Capacity Building for Demand-led Research: Issues and Priorities. Preprint at https://ecdpm.org/download_file/1085/2062.
8. Neupane, S., Pandey, A., Prasai, S., Shrestha, D. & Neupane, S. Developing science research by recognizing the human capacity for inquiry. *J. Neurosci.* **43**, 7243–7246 (2023).
9. Joint Canada-Israel Health Research Program. *IDRC - International Development Research Centre* https://www.idrc.ca/en/joint-canada-israel-health-research-program-2.
10. Teoh, L. J., Solebo, A. L., Rahi, J. S. & British Childhood Visual Impairment and Blindness Study Interest Group. Visual impairment, severe visual impairment, and blindness in children in Britain (BCVIS2): a national observational study. *Lancet Child Adolesc Health* **5**, 190–200 (2021).
11. Pandey, A., Neupane, S., Adhikary, S., Vaidya, K. & Pack, C. C. Cortical visual impairment at birth can be improved rapidly by vision training in adulthood: A case study. *Restor. Neurol. Neurosci.* **40**, 261–270 (2022).
12. Oreskes, N. Chapter 1. Why Trust Science? Perspectives from the History and Philosophy of Science. in 15–68 (2019).
13. Karlberg, M. & Smith, T. Articulating a consultative epistemology. *J. Bahá'í stud.* **19**, 59–99 (2009).
14. Farid-Arbab, S. *Moral Empowerment: In Quest of a Pedagogy*. (Wilmette, Illinois: Baha?'i? Publishing, 2016).