International
Dialogue DEVELOPING
A VISION
on STEM FOR EARLY
EDUCATION

Summary of the IDoS learning paper, 2023

Title:

How can networks help encourage the development and professionalisation of innovative early STEM Education in a changing world?

Abstract:

The **world is becoming more complex** and requires, among other skills, STEM knowledge and literacy of its learners, community members, and societies alike. Thus, an extensive advocacy for quality early STEM Education is needed. This paper outlines how **impact networks** (formed to address complex social or environmental issues) can **promote the development and professionalisation of early STEM Education**. It aims to support field-developing institutions to increase the impact of their work **for a better and easily accessible education** worldwide.

After reviewing the context and the intended impact of early STEM Education, the paper describes various **network types** and then assesses the networks approaches of educational organisations and their network partners in multiple countries **(Part I)**.

The paper reflects on the various functions and **success factors of networks** in relation to the authors' six organisations' networks in their respective countries and analyses the networks according to opportunities and challenges **(Part II)**.

The paper argues for the relevance of network collaborations and for the potential of **networks as agents of change**, exemplifying their impact on improving STEM Education in a changing world **(Part III)**.

Part I:

Networks for impact: Why and how networks help promote change in early STEM Education

At times of crises such as the climate crisis, the Covid-19 pandemic, economic recession, and growing inequality the **need for competent citizens with problem-solving skills and a sustainable mindset** becomes more crucial. The authors of this paper are convinced that STEM Education (for Sustainable Development) helps children from an early age to develop skills and competencies to navigate through a complex world and to shape it both actively and responsibly. STEM initiatives around the globe (like the IDoS peers) work towards **training teachers to accompany children in their STEM learning**. Where resources in this field of education are often scarce (e. g. size, human and financial resources, scale, and time), **collaborations in the form of networks help initiatives create a desired impact**. This paper lists five types of networks (**Resilience Networks, Scale Networks, Action Networks, Movement Networks, and Learning Networks**) and allocates the six IDoS peer's networks to these types to exemplarily show their engagement. It becomes clear that

all networks presented are – in one way or another – contributing to the common goal of enhancing STEM Education.

Table 2. Network types based on Slaughter (2017) and Ehrlichman (2021).

Function	Resilience Networks	Scale Networks	Action Networks (Task Networks)	Movement Networks	Learning Networks
Purpose	Focused on improving dynamic social resilience; building strength, stability, and capacity	Focused on bringing promising solutions to scale (upscaling solutions)	Focused on performing tasks and coordinated action, and creating products together	Focused on aligning networks around common aims; inducing movement	Focused on connecting and learning of members

Part II:

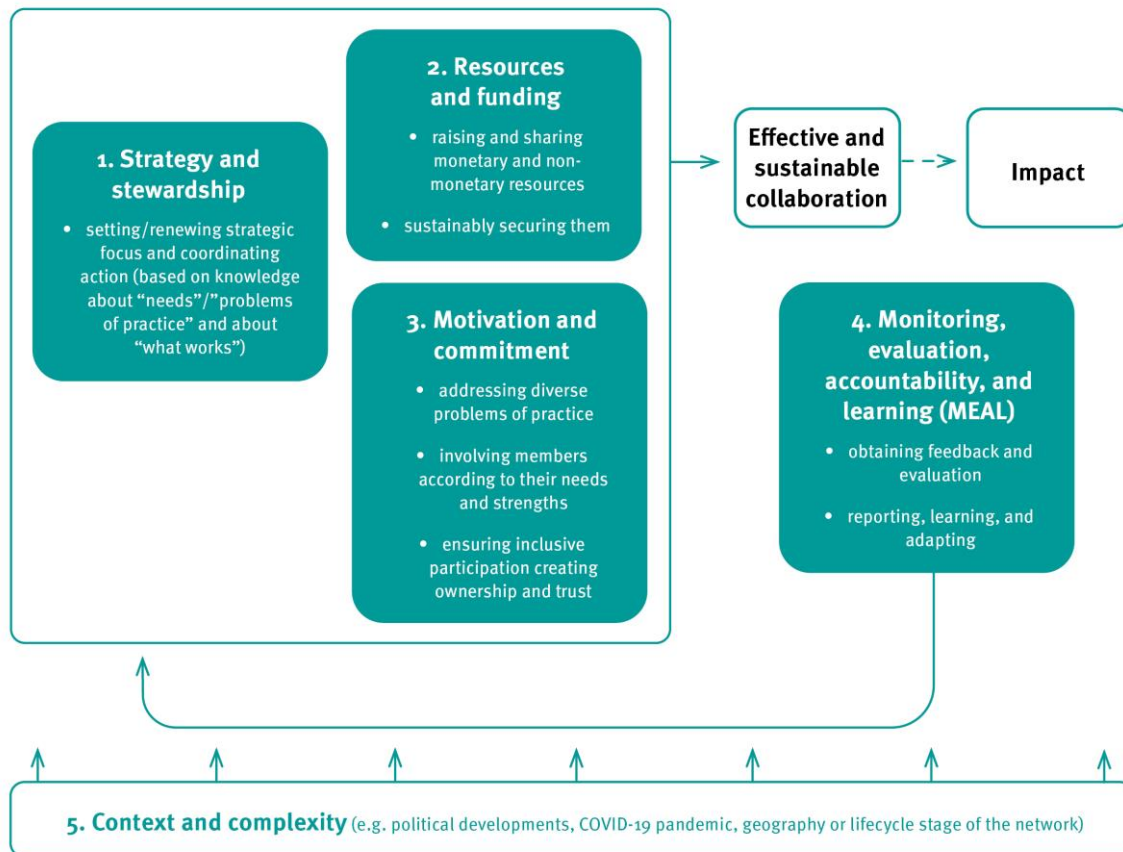**"Thriving Networks": Success factors for impact network collaboration**

To support other organisations in handling the challenges identified in Part I, the second part of the paper sets out to share reflections and best-practices derived from the IDoS peers' individual cases. Actors of early STEM Education are thereby meant to be encouraged to pursuit networks and collaborate in order to create an impact.

The authors identify elements and **key practices that determine the success of a collaborative network**. These include: a good **strategy and stewardship** of the network (1), sufficient **resources and funding** (2), high **motivation and commitment** of network members (3), the application of effective **practices of monitoring, evaluation, accountability, and learning (MEAL)** (4), as well as the network's ability to adapt to the **context and complexity** it is faced with (5).

Success factors of networks

1. Strategy and stewardship
- setting/renewing strategic focus and coordinating action (based on knowledge about "needs"/"problems of practice" and about "what works")

2. Resources and funding
- raising and sharing monetary and non-monetary resources
- sustainably securing them

3. Motivation and commitment
- addressing diverse problems of practice
- involving members according to their needs and strengths
- ensuring inclusive participation creating ownership and trust

4. Monitoring, evaluation, accountability, and learning (MEAL)
- obtaining feedback and evaluation
- reporting, learning, and adapting

Effective and sustainable collaboration

Impact

5. Context and complexity (e.g. political developments, COVID-19 pandemic, geography or lifecycle stage of the network)

Part III:

Opportunities and outcomes: Why the IDoS peers embrace networks as agents of change

The third part summarises findings of Part I and II, arguing in favour of **networks as agents of change**. The authors of the paper once more express their conviction that impact networks designed to **support early STEM Education** – such as those described by the IDoS peers – play an important role in advancing childrens' understanding of and actions towards the complex, rapidly changing conditions of the world. If successful, such **networks can create a culture of sustainability** – meeting the critical needs of the present **on both a local and global scale**, without compromising the needs of the future.

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About IDoS:

The International Dialogue on STEM Education (IDoS) is a joint initiative of **Stiftung Kinder forschen (Little Scientists Foundation)** and **Siemens Stiftung** that promotes high-quality early STEM Education for Sustainable Development.
The IDoS member organisations ("IDoS peers") share the conviction that global developments and the demands for a quality education arising thereof can best be tackled by working together internationally. They are seeking a systematic and regular exchange, combining the global knowledge on STEM Education and its local practice, from which the organisations involved can benefit in a sustainable way. By engaging with leading institutions across the globe, the parties can enhance the efficiency and effectiveness of their work, implementing it in a context-specific, knowledge-based, and practice-oriented manner.