

Note: This research was conducted as part of the dissertation for the MSc in Comparative and International Education, supervised by Dr. Maia Chankseliani

1 Context and rationale

Science vs Arts

Total enrolment of students in Science, Technology, Engineering and Mathematics (STEM) subjects compared to non-STEM subjects in public higher-learning institutions.

Year	STEM	%	NON-STEM	%
2009	190,444	43.5	246,876	56.5
2010	201,242	45.1	238,678	54.9
2011	222,457	45.8	265,799	54.2
2012	224,717	43	297,576	57
2013	242,807	43.3	317,492	56.7

[4]

Instituted by the Ministry of Education (MOE) in the National Education Policy, with a target of 60% enrolment in science & technology (S&T) stream in upper secondary school, compared to 40% in arts stream. As of 2017 enrolment in S&T stream stands at 46% [3]

STEM economic imperatives

- Shortage of ICT graduates to fill demand that doubled between 2010 to 2014 [1]
- Estimated shortage of 18,777 researchers, scientists and engineers in government-backed research institutes by 2020 [2]

"60:40 Policy" since 1970

The industry stands to lose the most if they don't contribute



Gaps in understanding role of non-state actors in informal learning & their involvement in the Malaysian landscape

Active participation and promotion of informal STEM learning by corporations, entrepreneurs, NGOs in a Facebook group set up by the MOE



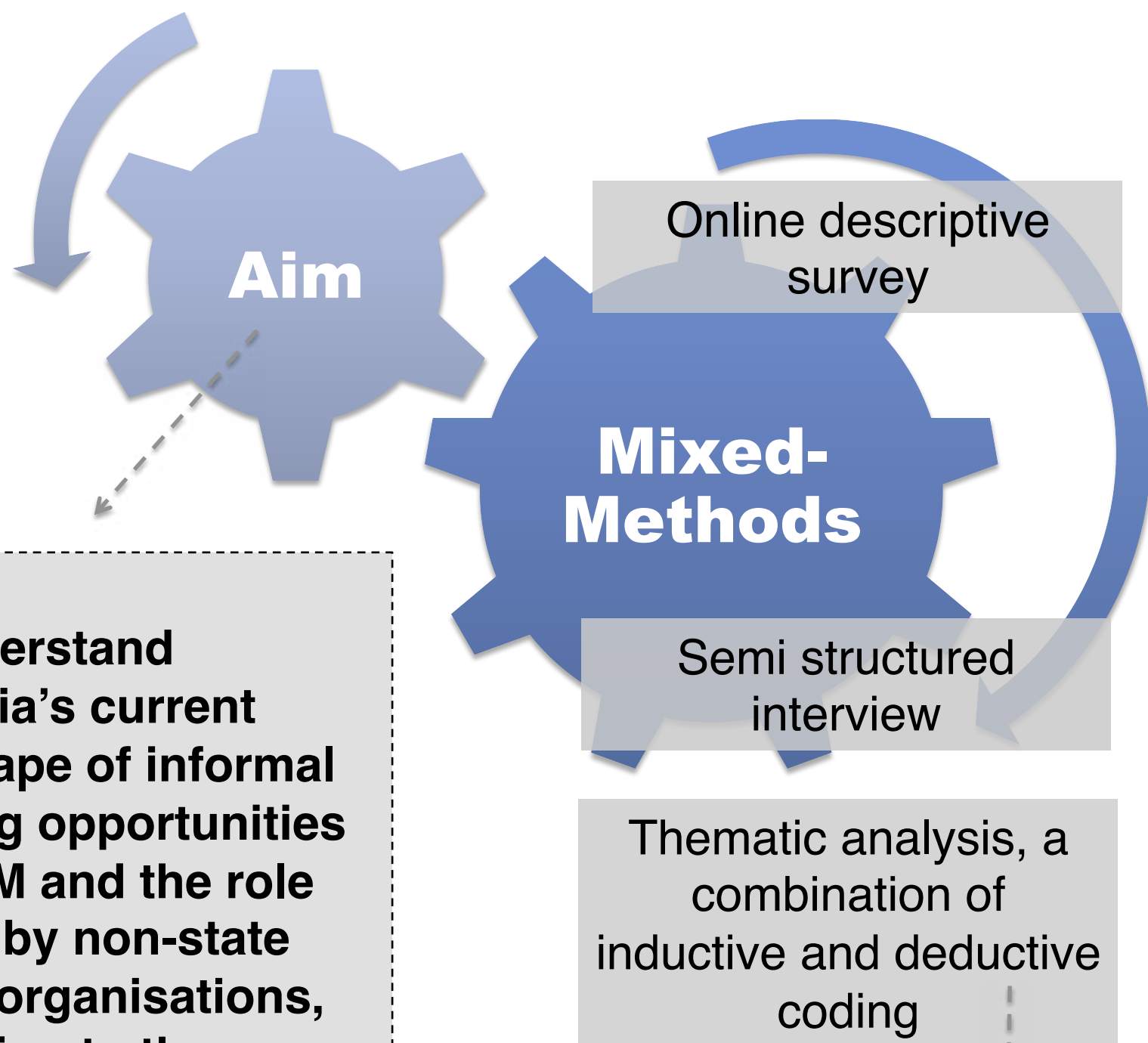
Non-state sector organisations

Informal learning

The MOE intends to adopt "an informal approach to strengthening interest in STEM education and careers...also encourage teachers and students to take greater advantage of informal learning centres" [5]



2



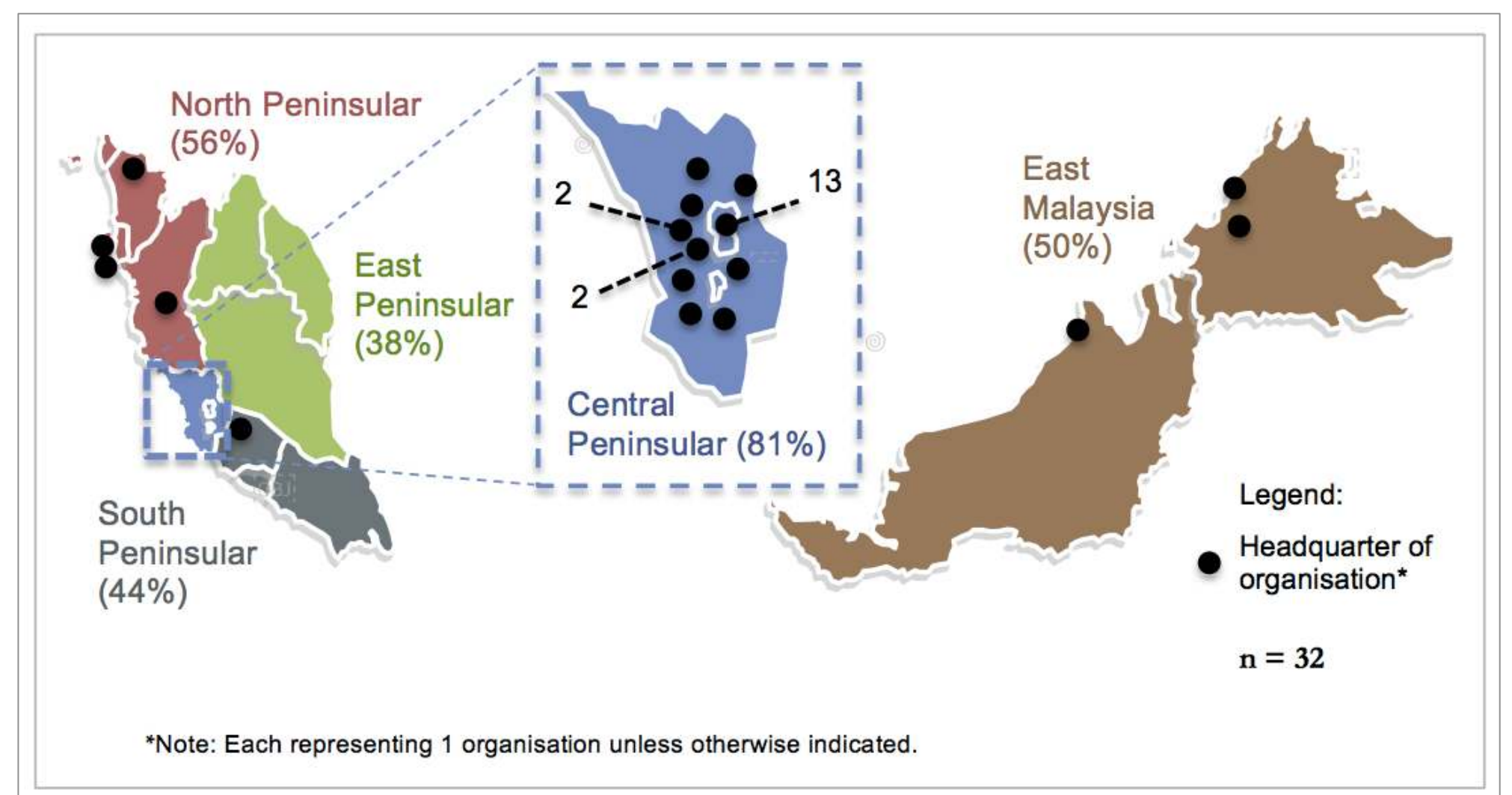
To understand Malaysia's current landscape of informal learning opportunities in STEM and the role played by non-state sector organisations, in relation to the government's agenda to raise STEM interest among students

Najam's model for NGO-Government relationships [6]

		Goals (Ends)	
		Similar	Dissimilar
Preferred Strategies (Means)	Similar	Cooperation	Co-optation
	Dissimilar	Complementarity	Confrontation

3

Findings



- 50% of the non-state sector organisations were **private providers** offering STEM educational activities
- The organisations are overwhelmingly concentrated in the **urbanised Central Peninsular Malaysia**, and provide a majority of their services there
- Order of priority of objectives (highest to lowest):
 - Raise curiosity and engagement
 - Change perceptions and attitudes
 - Complement formal STEM education
 - Contribute towards enculturation of STEM in society
 - Raise career interest in STEM
- The main focus areas are **basic science, engineering/robotics and computer science/ICT**
- Only 12% of organisations targeted **specific groups** of students
- Most organisations fulfill a **complementary** role. The use of informal learning is distinct from formal education offered in schools. Organisations "brings real science to the classroom...A different pedagogical approach [compared] to teaching and learning in our education system"

4 Way forward for DPhil research

Shifting attention to the 'neglected' elements in the landscape: A comparative study of the STEM education and career aspirations of young people in urban and rural Malaysia, adopting **Urie Bronfenbrenner's ecological systems theory**. [7]



- **Microsystem:** interpersonal relations (family, peers, teachers)
- **Mesosystem:** school/family interface, transition to labour market
- **Exosystem:** conditions influenced by socioeconomy, geography
- **Macrosystem:** wider cultural beliefs, political forces
- **Chronosystem:** the passage of time across the lifespan

References: [1] Tan, K. S., & Tang, J. T. H. (2016). *New skills at work: Managing skills challenges in ASEAN-5*. Singapore. [2] Academy of Sciences Malaysia. (2015). *Science Outlook 2015: Action Towards Vision*. Kuala Lumpur. [3] Academy of Sciences Malaysia. (2018). *Science Outlook 2017: Converging Towards Progressive Malaysia 2050 (Executive Summary)*. Kuala Lumpur. [4] Nasa, A. (2015, August 31). A losing battle in Science vs Arts? *New Straits Times*. [5] Ministry of Education Malaysia. (2013). *Malaysia Education Blueprint 2013-2025 (Preschool to Post-Secondary Education)*. Putrajaya. [6] Najam, A. (2000). The Four-C's of Third Sector—Government Relations. *Nonprofit Management & Leadership*, 10(4), 375–396. [7] Taveira, M. do C., Oliveira, I. M., & Araujo, A. M. (2016). Ecology of Children's Career Development: A Review of the Literature. *Psicologia: Teoria E Pesquisa*, 32(4), 1–10.