Future Schools in 2030

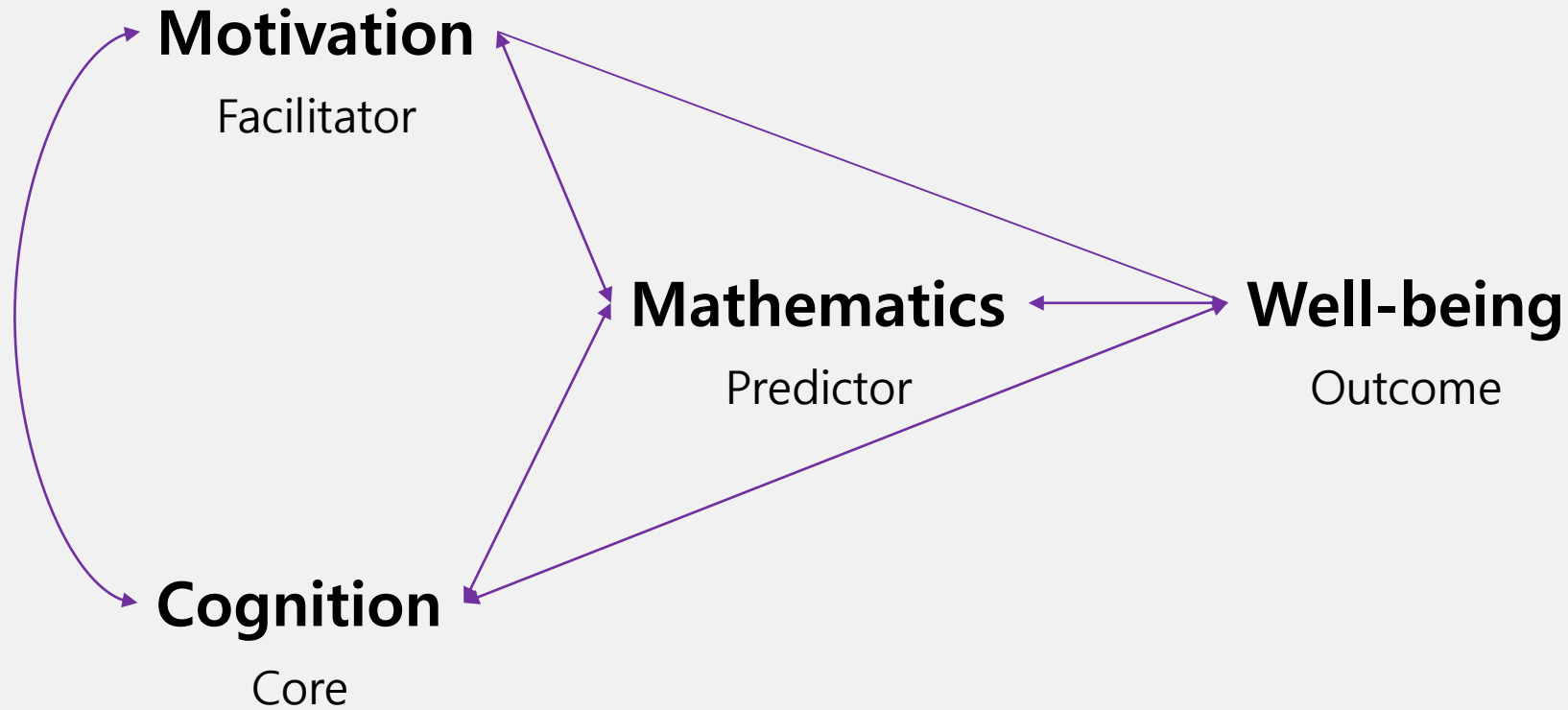**The Developmental Dynamics of Cognition, Mathematics, Motivation and Well-being**

Professor Pirjo Aunio (University of Helsinki), Professor Markku Niemivirta University of Oslo/University of Helsinki) & Professor Sha Tao (Beijing Normal University)

北京师范大学未来教育高精尖创新中心
Beijing Advanced Innovation Center for Future Education

The aim of this research project
The Developmental Dynamics in Cognition, Mathematics, Motivation and Well-being
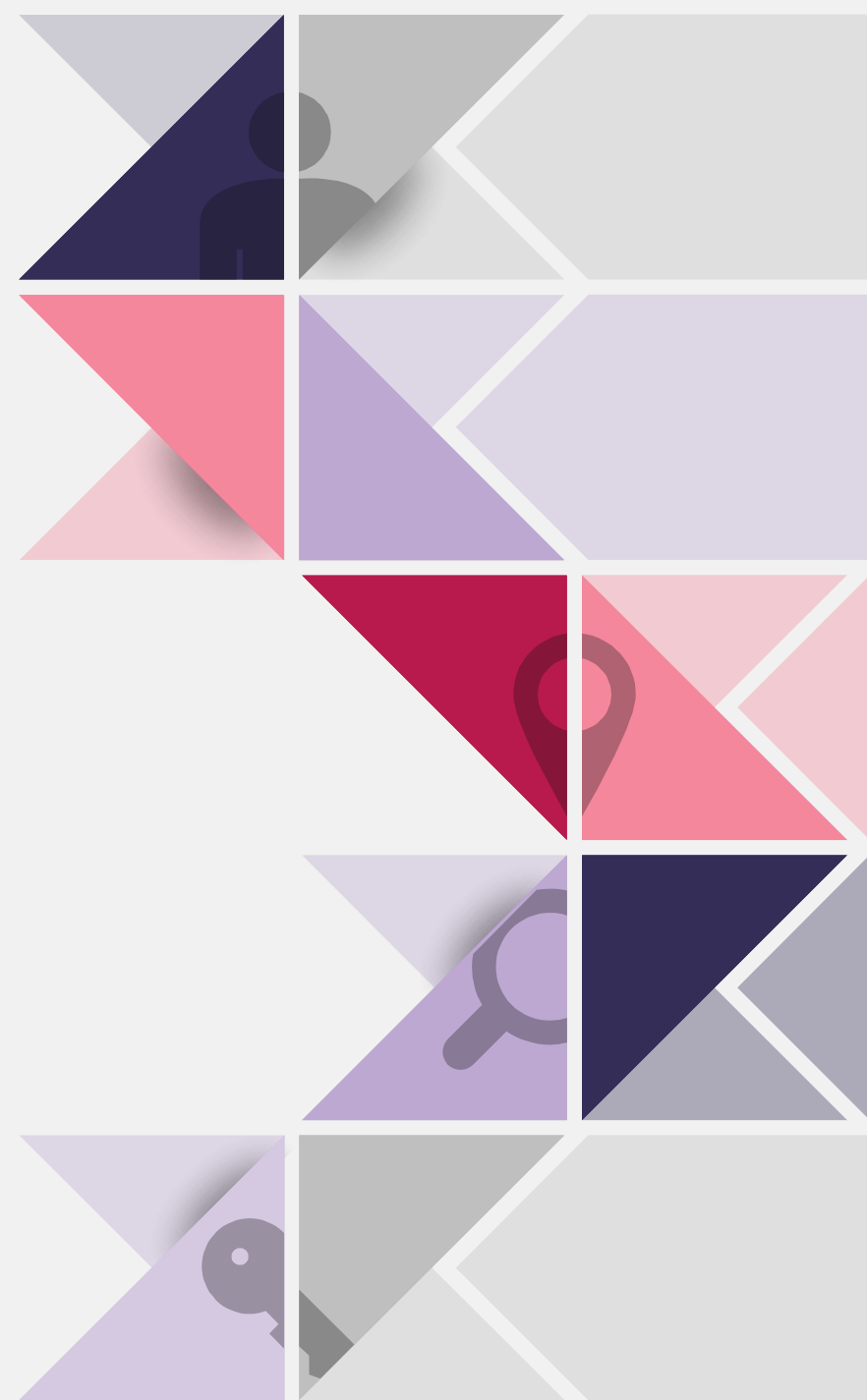
Goal of the project

To examine the developmental dynamics in cognition, mathematical skills, motivational tendencies, and well-being within two different educational settings

Points of interest

1. Longitudinal design

2. Cross-cultural comparison

3. Broad view on learning and achievement

Key measures

- Mathematical skills (Math Achievement Test, Stage I, Grades 1 to 3)

  - Basic arithmetic skills

  - Measurements

  - Applied arithmetic

  - Reasoning

- Cognitive components (Children and Adolescent Cognition Manual, National Children's Study of China (NCSC), National Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University)

  - Short-term memory (STM I Visual Number Immediate Recognition; STM II Paired Association Immediate Recognition)

  - Attention

  - Visuo-Spatial Ability (VSA I Hidden Figures, VSA II Mental Rotation)

  - Long-term memory (LTM I Visual Number Delayed Recognition, LTM II Paired Association Delayed Recognition)

  - Reasoning (Reasoning I Digit Analogy, Reasoning II Graph Analogy, Reasoning III Graph Sequence)

Key measures

- Motivational tendencies
    - Value and expectancy beliefs
        - Utility, importance, interest
        - Competence, effort, anxiety
    - Achievement goal orientations
        - Mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, work avoidance
    - Control beliefs
        - Agency beliefs
        - Means-ends beliefs

- Well-being
    - Fear of failure
    - Academic withdrawal
    - Self-esteem
    - School value
    - Emotional exhaustion
    - Perfectionistic tendencies
        - Standards, discrepancy, expectations

- Temperament
    - Behavioral inhibition, behavioral approach, reward seeking

Procedure and updated timetable

| Schedule	Procedure
November 2016	Piloting of the measures
November & December 2016	Research permits from communities, schools and parents
January & February 2017	Data collection – first phase
March 2017	Data coding
April – June 2017	Results from the first phase
December 2017 & January 2018	Data collection – second phase
December 2018 & January 2019	Data collection – third phase
December 2019 & January 2020	Data collection – fourth phase

Piloting phase

- **Finland**

  - Math Scale (Chinese -> English -> Finnish):
    - Participants: 20 children, 16 boys, aged 9 y. 4 m.

  - Cognition (Chinese-> English-> Finnish)
    - forthcoming

  - Motivation (Finnish)
    - forthcoming

Piloting phase – Math Fin

Total score: M 15.25 (SD 4.52) (Min 9, Max 23) (38 was highest possible score), Cronbach alpha .69
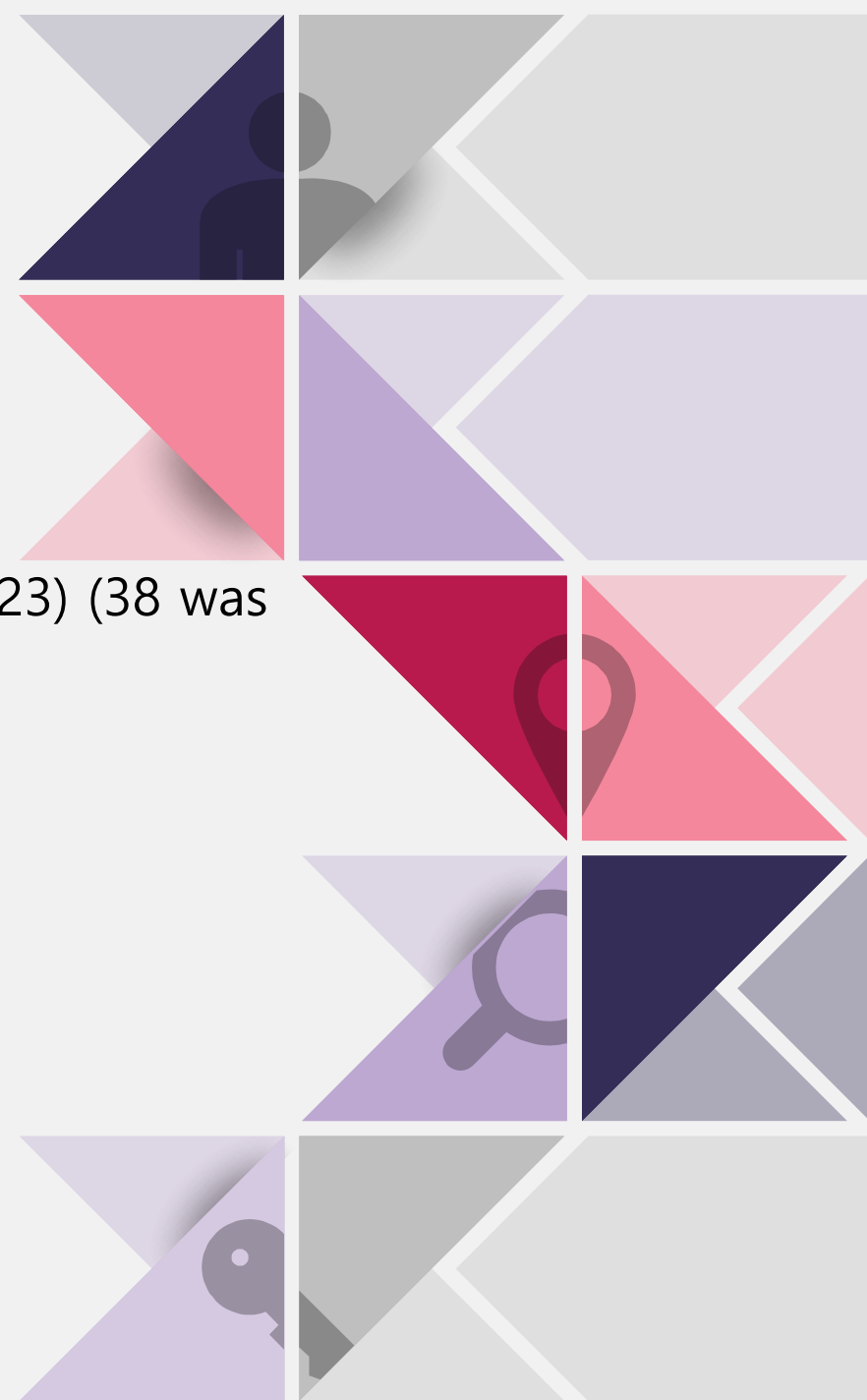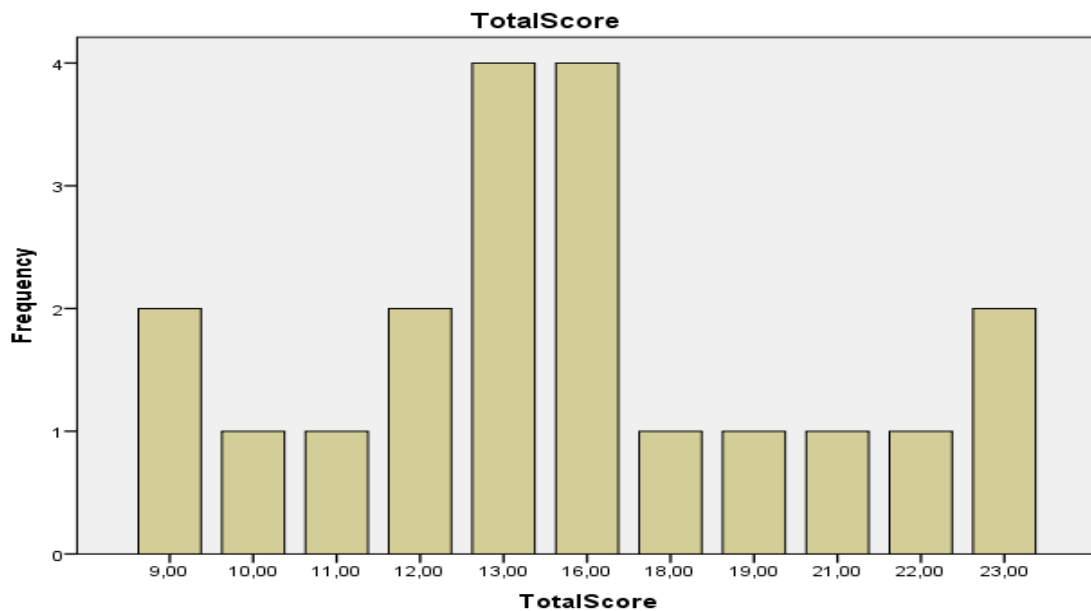
Piloting phase – Math Fin

- Too easy items >.95, one item (Item 1)

- Too difficult <.05, one item (Item 25)

-> no need to delete any items

Item-Total Score correlations are weak in the beginning of the scale but better in the end of the measurement

Piloting phase

- Beijing

  - Motivation and Well-being Scale (Finnish-> English ->Chinese)

    – Participants 18 children (9 boys and 9 girls) in Beijing, Mean age 11 y. 5 m. (In months M 136.83, SD 4.93)

    – The piloting study showed some in translation of the items, we need to make changes and re-pilot it.
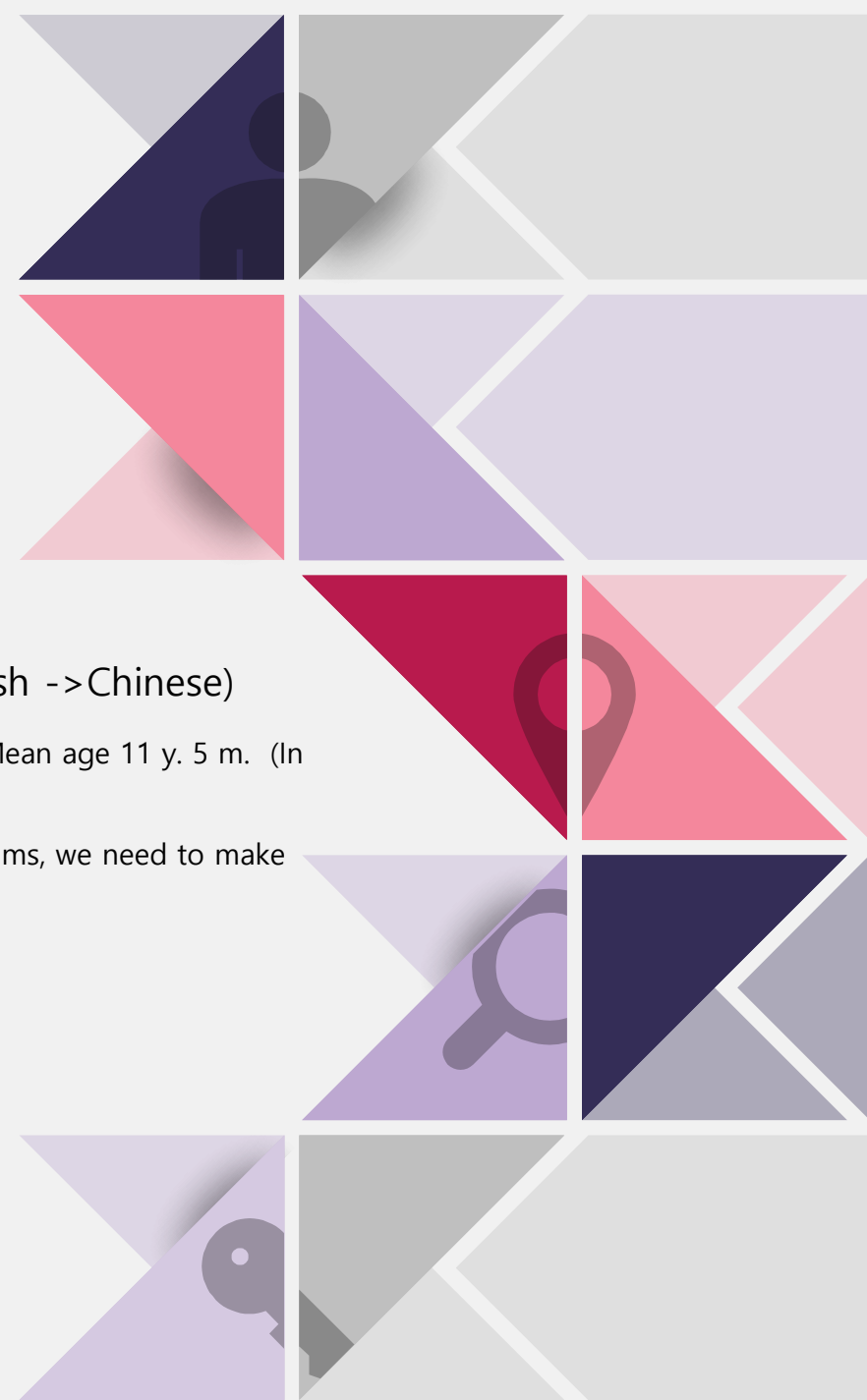
Next steps

Finland

- Piloting of the Cognitive measurement (Feb.)

- Agreement with participating schools (Jan-Feb.)

- Data collection (March-April)

Beijing

- Piloting of the Motivation and Wellbeing Scale (Feb.)

- Data collection (March-April)