Information and Communication Technology (ICT) Factors Associated with Mathematics and Science Achievement

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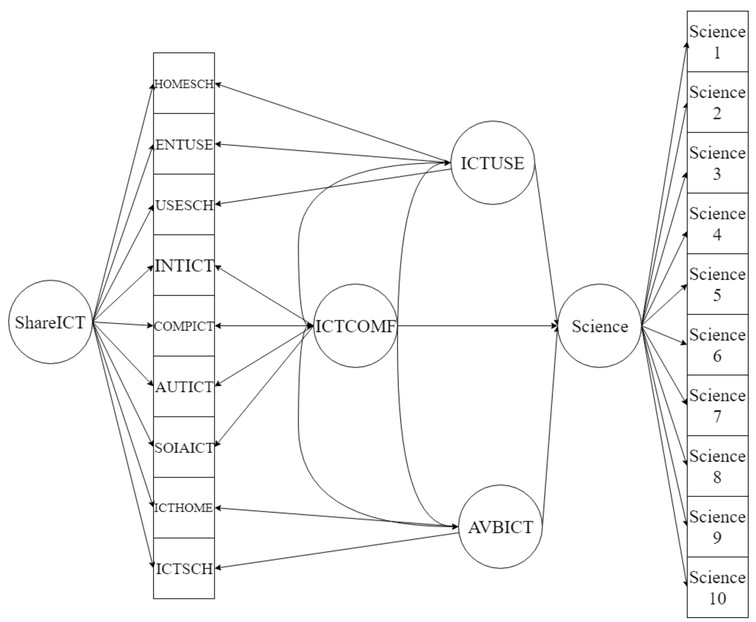
Introduction

- Our goal was to explore how Information and Communication Technology (ICT) affected the mathematics and science scores of 15 year old students.
- ICT includes devices, networks, applications, and systems that enable connections to others and to information.
- ICT spending has increased in schools (e.g., $37 million projected in Alberta until 2024).
- Finland and Bulgaria were chosen because they are technology Frontrunners and Challengers, respectively (Rido-Cano & Bodewig, 2018).

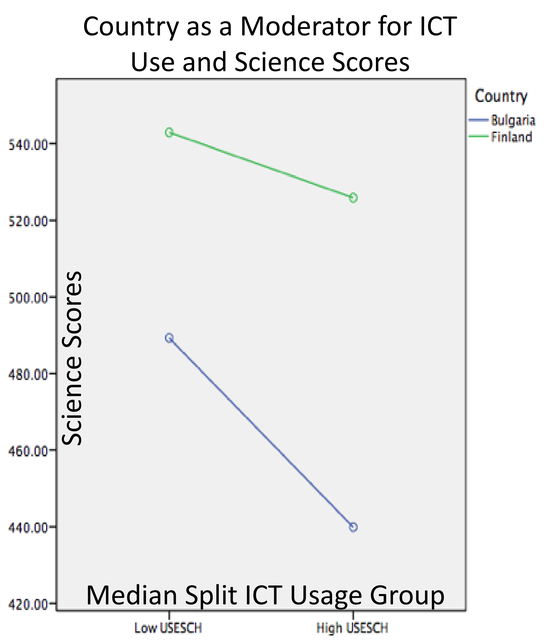
Methods

- The study explores the 2015 Programme for International Student Assessment (PISA) data from the Organization for Economic Co-operation and Development (OECD).
- Structural Equation Modelling was used to combine 9 Likert scale observed variables into 3 latent variables to predict 10 plausible mathematics or science scores.
- Another latent variable, ShareICT, was created to control for the non-unique variance in the observed variables.
- Country was found to have a small moderating effect on science scores.

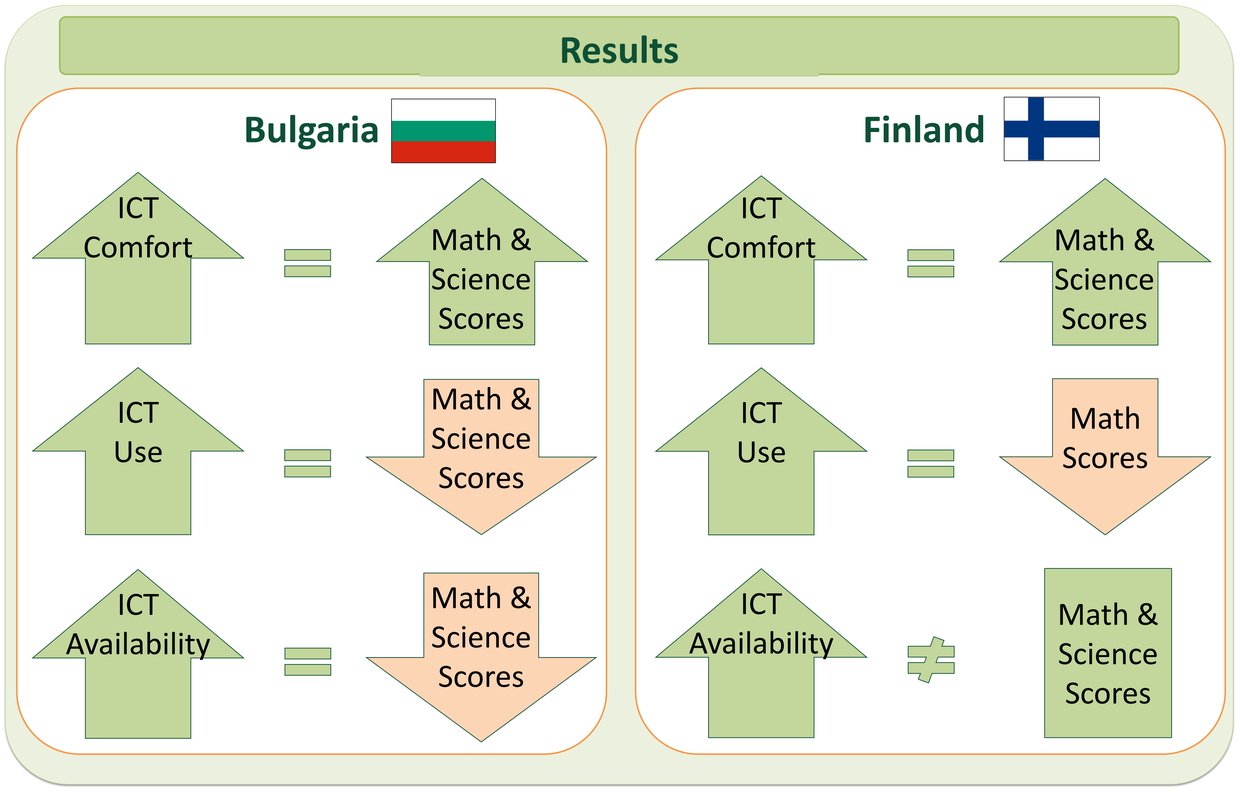
Proposed Model



Moderation Effect



Results



Discussion

- As students become more comfortable with ICT (increased perceived competence and autonomy, increased interest, and inclusion as a topic in conversation), they are better able to use that technology to more effectively learn science and mathematics.
- Without comfort with ICT, high ICT use and availability become detrimental to learning.
- This may be due to the time it takes to learn to use ICT or to students being distracted by the ICT.
- Whether a country is a technology frontrunner or a challenger seems to affect the implementation of technology and the science scores of the students.

Directions for Future Research

In future work, reading achievement will be explored and more countries will be included into the analyses using the *Alignment Method* from Muthén and Asparouhov (2013).

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