



University of South Florida

Digital Commons @ University of South Florida

Education Policy Analysis Archives (EPAA)

USF Faculty Collections

September 2001

Educational policy analysis archives

Arizona State University

University of South Florida

Follow this and additional works at: https://digitalcommons.usf.edu/usf_EPAA

Recommended Citation

Arizona State University and University of South Florida, "Educational policy analysis archives" (2001).
Education Policy Analysis Archives (EPAA). 389.
https://digitalcommons.usf.edu/usf_EPAA/389

This Book is brought to you for free and open access by the USF Faculty Collections at Digital Commons @ University of South Florida. It has been accepted for inclusion in Education Policy Analysis Archives (EPAA) by an authorized administrator of Digital Commons @ University of South Florida. For more information, please contact scholarcommons@usf.edu.

Education Policy Analysis Archives

Volume 9 Number 33

September 14, 2001

ISSN 1068-2341

A peer-reviewed scholarly journal
Editor: Gene V Glass, College of Education
Arizona State University

Copyright 2001, the **EDUCATION POLICY ANALYSIS ARCHIVES**.
Permission is hereby granted to copy any article
if **EPAA** is credited and copies are not sold.

Articles appearing in **EPAA** are abstracted in the *Current Index to Journals in Education* by the [ERIC Clearinghouse on Assessment and Evaluation](#) and are permanently archived in *Resources in Education*.

Similarity of Mathematics and Science Achievement of Various Nations

Algirdas Zabulionis
Vilnius University
Lithuania

Citation: Zabulionis, A. (2001, September 14). Mathematics and Science Achievement of Various Nations. *Education Policy Analysis Archives*, 9(33). Retrieved [date] from <http://epaa.asu.edu/epaa/v9n33/>.

Abstract

In 1991-97, the International Association for the Evaluation of Educational Achievement (IEA) undertook a Third International Mathematics and Science Study (TIMSS) in which data about the mathematics and science achievement of the thirteen year-old students in more than 40 countries were collected. These data provided the opportunity to search for patterns of students' answers to the test items: which group of items was relatively more difficult (or more easy) for the students from a particular country (or group of countries). Using this massive data set an attempt was made to measure the similarities among country profiles of how students responded to the test items.

Introduction

In the educational community, folklore has it that "The German education system is quite similar to that of Austria," or "All post-communist countries teach mathematics in the same way," and the like. Sometimes these statements are based on an analysis and comparison of national school structures, the curricula or textbooks. Is it really possible to measure the similarity between the countries? Usually, the phenomena of the similarity of the national educational systems is descriptive and subjective; their features are seldom measured and placed on a scale. Data from the Third International Mathematics and Science Study (TIMSS) provided the opportunity to search for patterns among nations in students' answers to the test items. (Notes 3 and 4)

An attempt to group the TIMSS participating countries had already been undertaken by analyzing national curricula in mathematics and science (Notes 1 and 2). The countries were grouped by *a priori* geographic and economic conditions, or by investigating statistically some patterns in the national math and science curricula. This last mentioned method of looking for statistical similarities is close to the method described in this article. The difference is in the nature of the data used: the curriculum analyses dealt with the intended curriculum whereas the emphasis in this article is on the achieved curriculum, i.e., what was actually learned by the students in the countries.

Conceptual Framework

Figure 1 presents the difficulty levels (p-values) of 20 items forming a part of the TIMSS mathematics test for three countries X, Y, and Z. These items have been ordered by their difficulty; that is, the actual percentage of students obtaining the right answer for each item.

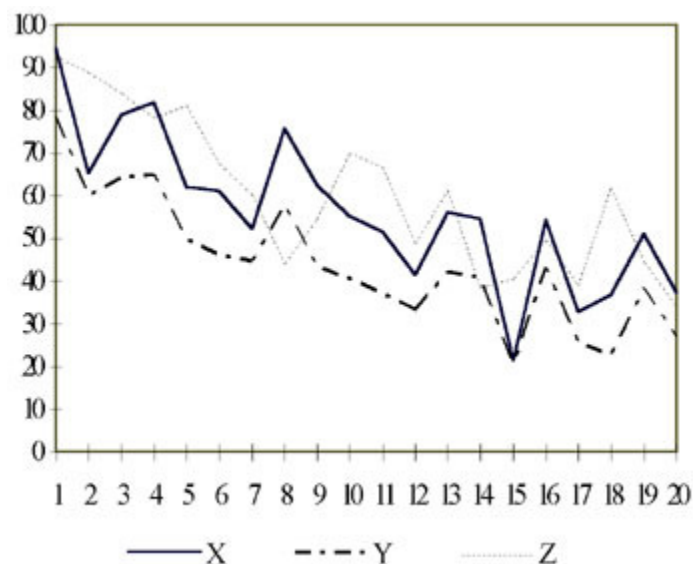


Figure 1. Item difficulties for 20 TIMSS items for countries X, Y and Z.

It can be seen that the students in countries X and Y performed this part of the test relatively similarly, despite the fact that country X had higher overall achievement than country Y. The students in these two countries performed in a similar way on the same items relative to other items. Country Z students performed in quite a different way: the overall students scores on this set of items were about the same as in Country X, but the relative national item difficulties for these two countries were quite different.

The World Wide Web address for the *Education Policy Analysis Archives* is epaa.asu.edu

General questions about appropriateness of topics or particular articles may be addressed to the Editor, [Gene V Glass](mailto:glass@asu.edu), glass@asu.edu or reach him at College of Education, Arizona State University, Tempe, AZ 85287-0211. (602-965-9644). The Commentary Editor is Casey D. Cobb: casey.cobb@unh.edu .

EPAA Editorial Board

[Michael W. Apple](#)

University of Wisconsin

[John Covalesskie](#)

Northern Michigan University

[Sherman Dorn](#)

University of South Florida

[Richard Garlikov](#)

hmwkhel@scott.net

[Alison I. Griffith](#)

York University

[Ernest R. House](#)

University of Colorado

[Craig B. Howley](#)

Appalachia Educational Laboratory

[Daniel Kallós](#)

Umeå University

[Thomas Mauhs-Pugh](#)

Green Mountain College

[William McInerney](#)

Purdue University

[Les McLean](#)

University of Toronto

[Anne L. Pemberton](#)

apembert@pen.k12.va.us

[Richard C. Richardson](#)

New York University

[Dennis Sayers](#)

California State University—Stanislaus

[Michael Scriven](#)

scriven@aol.com

[Robert Stonehill](#)

U.S. Department of Education

[Greg Camilli](#)

Rutgers University

[Alan Davis](#)

University of Colorado, Denver

[Mark E. Fetler](#)

California Commission on Teacher Credentialing

[Thomas F. Green](#)

Syracuse University

[Arlen Gullickson](#)

Western Michigan University

[Aimee Howley](#)

Ohio University

[William Hunter](#)

University of Calgary

[Benjamin Levin](#)

University of Manitoba

[Dewayne Matthews](#)

Education Commission of the States

[Mary McKeown-Moak](#)

MGT of America (Austin, TX)

[Susan Bobbitt Nolen](#)

University of Washington

[Hugh G. Petrie](#)

SUNY Buffalo

[Anthony G. Rud Jr.](#)

Purdue University

[Jay D. Scribner](#)

University of Texas at Austin

[Robert E. Stake](#)

University of Illinois—UC

[David D. Williams](#)

Brigham Young University

EPAA Spanish Language Editorial Board

Associate Editor for Spanish Language
Roberto Rodríguez Gómez
Universidad Nacional Autónoma de México

roberto@servidor.unam.mx

Adrián Acosta (México)

Universidad de Guadalajara
adrianacosta@compuserve.com

Teresa Bracho (México)

Centro de Investigación y Docencia
Económica-CIDE
bracho dis1.cide.mx

Ursula Casanova (U.S.A.)

Arizona State University
casanova@asu.edu

Erwin Epstein (U.S.A.)

Loyola University of Chicago
Eepstein@luc.edu

Rollin Kent (México)

Departamento de Investigación
Educativa-DIE/CINVESTAV
rkent@gemtel.com.mx
kentr@data.net.mx

Javier Mendoza Rojas (México)

Universidad Nacional Autónoma de
México
javiermr@servidor.unam.mx

Humberto Muñoz García (México)

Universidad Nacional Autónoma de
México
humberto@servidor.unam.mx

Daniel Schugurensky

(Argentina-Canadá)
OISE/UT, Canada
dschugurensky@oise.utoronto.ca

Jurjo Torres Santomé (Spain)

Universidad de A Coruña
jurjo@udc.es

J. Félix Angulo Rasco (Spain)

Universidad de Cádiz
felix.angulo@uca.es

Alejandro Canales (México)

Universidad Nacional Autónoma de
México
canalesa@servidor.unam.mx

José Contreras Domingo

Universitat de Barcelona
Jose.Contreras@doe.d5.ub.es

Josué González (U.S.A.)

Arizona State University
josue@asu.edu

María Beatriz Luce (Brazil)

Universidad Federal de Rio Grande do
Sul-UFRGS
luceb@orion.ufrgs.br

Marcela Mollis (Argentina)

Universidad de Buenos Aires
mmollis@filo.uba.ar

Angel Ignacio Pérez Gómez (Spain)

Universidad de Málaga
aiperez@uma.es

Simon Schwartzman (Brazil)

Fundação Instituto Brasileiro e Geografia
e Estatística
simon@openlink.com.br

Carlos Alberto Torres (U.S.A.)

University of California, Los Angeles
torres@gseisucla.edu