“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”
Research Conference, 4-5 March 2015, Doha, Qatar

Understanding School Effect through PISA 2012 Results

Observations and Factors in the Variation of Achievement in Abu Dhabi.

Shaikha Al Zaabi & Dr. Jarrod Hingston
ADEC P-12 Policy, Assessment Division
Student Achievement and School effect

While student attainment is individual to each student, there are commonalities and shared aspects within schools that effect achievement and lend themselves to investigation (Heck & Thomas, 2009).

Consider this, do people typically describe educational quality at the school level or the student level?

E.g. Does a parent typically say: ‘My child attends a school with many good students’

Or

‘My child attends a good school’

When we refer to ‘school effect’ we refer to shared aspects within a school that can be attributed to influencing student achievement.
Assumptions about school effect and student attainment

Assumptions are often made by educators and the community about student achievement within the Abu Dhabi school system, two of the most frequent assumptions are:

- Students who attend private schools reach higher levels of academic attainment in comparison with students who attend public schools.
- Female students are outperforming male students in academic attainment, therefore ‘boys’ schools are typically of a lower quality than ‘girls’ schools.

<table>
<thead>
<tr>
<th>PISA 2012</th>
<th>Mathematics</th>
<th>Reading</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abu Dhabi Public Schools</td>
<td>395</td>
<td>413</td>
<td>420</td>
</tr>
<tr>
<td>Abu Dhabi Private Schools</td>
<td>455</td>
<td>454</td>
<td>465</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PISA 2012</th>
<th>Mathematics</th>
<th>Reading</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abu Dhabi Female Students</td>
<td>429</td>
<td>463</td>
<td>462</td>
</tr>
<tr>
<td>Abu Dhabi Male Students</td>
<td>414</td>
<td>397</td>
<td>417</td>
</tr>
</tbody>
</table>

PISA 2012 results indicated that these assumptions may be correct.

ADEC’s Assessment Division conducted a study of background factors to identify if these assumptions could be confirmed.

“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”, 4-5 March 2015, Doha, Qatar.
Research Questions

Based on Abu Dhabi’s PISA 2012 results:
- Does Abu Dhabi face a high proportion of school effect in the variation of student achievement?
- Are school type and student gender significant factors in student achievement in Abu Dhabi?
- What other background factors are significant in the variation of student achievement in Abu Dhabi?
Methodology

We know from previous studies that variation in student achievement can be attributed to:

1. Commonalties within a school (school Effect)
2. Behaviors and characteristics of individuals (student effect)

Using a multi-level regression model, we can identify school and student effect by measuring the association of characteristics that are common within a school and attributed to an individual. The analysis uses two levels:

1. Level One – student level data
2. Level Two – School level data

Level One data is directly attributed to each student's Level Two school data.

Step One – creates a ‘null’ model which identifies the proportion of variation in achievement that can be explained by school effect.

Step Two – Is the creation of various experimental models. These experimental models introduce background variables and test if these variables explain the variation in achievement.

Intraclass correlations are used to compare experimental models to the null model. Fifteen to twenty experimental models were created for each domain until the best model for explaining variance was identified.

HLM (Raudenbush, Bryk, Cheong & Congdon 2004) and SPSS softwares were used for these analyses.

“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”, 4-5 March 2015, Doha, Qatar
Explaining Variation In Mathematics Achievement – All School Types

Abu Dhabi’s mathematics results revealed that 48% of the variation achievement is attributable directly to schools.

Abu Dhabi’s school effect is very high when compared to most other countries.

International Comparisons

Abu Dhabi

Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC), 4-5 March 2015, Doha, Qatar
Significant Factors for Explaining School Effect - PISA 2012 Mathematics

The significant background factors explain:
- 45% of the variation in mathematics achievement
- 71% of the school effect
- 21% of the student effect

Significant inequality exists between schools located in urban areas and schools located in rural and remote areas.

Gender difference is not significant when these factors are considered.

No significant difference between ADEC public schools and private/other schools when these factors are considered.

Abu Dhabi's Explained Variance (All Schools)

- Student Effect - Unexplained Variance: 11%
- Student Effect - Explained Variance: 34%
- School Effect - Unexplained Variance: 41%
- School Effect - Explained Variance: 14%
Significant Factors for Explaining School Effect - PISA 2012 Mathematics

Significant Background Factors for Explaining School Effect

Student gender, nationality and different grade levels of study were controlled for in the model.

Significant factors included:

- School location
- Education resources available at home
- School offers extracurricular creative activities
- Quality of school infrastructure
- Quality of educational materials in schools
- Practicing ability grouping in schools (detrimental)
- Students’ sense of belonging to school
- Students feeling supported by Mathematics teacher

School type and gender were not significant in this model!

"Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)", 4-5 March 2015, Doha, Qatar
Significant Factors for Explaining School Effect - PISA 2012 Mathematics

- A major disparity exists in Abu Dhabi between the home and school locations of public and private school students.

- The PISA 2012 Mathematics results indicated that there is a greater disparity between urban and rural schools than public and private schools.

Comments

Comments

- A major disparity exists in Abu Dhabi between the home and school locations of public and private school students.

- The PISA 2012 Mathematics results indicated that there is a greater disparity between urban and rural schools than public and private schools.

“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”, 4-5 March 2015, Doha, Qatar
Significant Factors for Explaining School Effect - PISA 2012 Reading Literacy

Null Model: School effect explains 54%

Student Effect: 46%
School Effect: 54%

Experimental Model: Variation In Reading explained by significant factors

- Student Effect - Unexplained Variance: 10%
- Student Effect - Explained Variance: 21%
- School Effect - Unexplained Variance: 33%
- School Effect - Explained Variance: 36%

Comments

- The significant background factors explain:
  - 43% of the variation in reading achievement
  - 61% of the school effect
  - 22% of the student effect
- No significant difference between ADEC public schools and private/other schools when these factors are considered.

“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”, 4-5 March 2015, Doha, Qatar
## Significant Factors for Explaining School Effect - PISA 2012 Reading Literacy

<table>
<thead>
<tr>
<th>Significant Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (43 point difference favoring females)</td>
</tr>
<tr>
<td>School Location (minimum of 18 point difference between city and town)</td>
</tr>
<tr>
<td>Sense of belonging to school (minimum of 11 point difference supporting high sense of belonging)</td>
</tr>
<tr>
<td>Creative extracurricular activities offered at school (minimum of 29 point difference favoring schools with activities)</td>
</tr>
</tbody>
</table>

The PISA 2012 Reading Literacy results support assumptions about female students typically having higher attainment in reading.

The assumption about private school students having an advantage over public school students was not supported.
Significant Factors for Explaining School Effect - PISA 2012 Science

Null Model: School effect explains 54% of Abu Dhabi’s variation in Science achievement

Experimental Model: Variation In Science explained by significant factors

- Student Effect - Unexplained Variance
- Student Effect - Explained Variance
- School Effect - Unexplained Variance
- School Effect - Explained Variance

Comments

- The significant background factors explain:
  - 44% of the variation in reading achievement
  - 71% of the school effect
  - 19% of the student effect
- No significant difference between ADEC public schools and private/other schools when these factors are considered
- No significant difference in gender when these factors are considered.

"Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)", 4-5 March 2015, Doha, Qatar
**Significant Factors for Explaining School Effect - PISA 2012 Science**

<table>
<thead>
<tr>
<th>Significant Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Location (minimum of 19 point difference between city and town)</td>
</tr>
<tr>
<td>Home educational resources (minimum of 14 point difference for having access to resources at home)</td>
</tr>
<tr>
<td>Sense of belonging to school (minimum of 11 point difference supporting high sense of belonging)</td>
</tr>
<tr>
<td>Creative extracurricular activities offered at school (minimum of 33 point difference favoring schools with activities)</td>
</tr>
</tbody>
</table>

The PISA 2012 Science results do not support assumptions about school type and gender being significant factors in student achievement in Science.
Key Conclusions About School Effect

The PISA 2012 results indicate that:

- there is a higher degree of school effect on student achievement in Abu Dhabi in comparison with many other education systems
- assumptions about student achievement being higher in private schools are incorrect
- assumptions about student achievement being higher for females (and ‘Girls’ schools) are only correct for reading literacy
- schools located in high population areas have significantly higher student achievement levels than schools located in remote areas
- schools that establish programs to promote creativity (e.g. creative extracurricular activities such as music and art) tend to have higher achieving students
- the students’ sense of belonging (e.g. a student must be socially and emotionally comfortable) within the school is critical to student attainment.
Addressing these issues

The Abu Dhabi New School Model:
- Established in 2010/11 academic year
- Currently operating from KG1 to Grade 7
- Bi-literacy program that emphasizes 21st century skills
- Program operating in all public schools, urban and remote
- Emphasis on resources and creativity.

Future Schools program:
- New and renovated public schools being opened across the Emirate
- Schools have world-class facilities for academic and extracurricular activities

İrtiqaa:
- School inspections for public and private schools
- Assess academic and non-academic aspects of schools.

“Enhancing Student Performance in Programme for International Student Assessment (PISA) in the Gulf Cooperation Council States (GCC)”, 4-5 March 2015, Doha, Qatar
Questions?

Shaikha Al Zaabi, Section Manager, International Assessment
shaikha.alzaabi@adec.ac.ae

Dr. Jarrod Hingston, Acting Division Manager – P-12 Assessment
Jarrod.hingston@adec.ac.ae
References
