The Relationship Between Reading Ability and Standards-Based Mathematics Achievement

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Abstract
A sequential mixed methods study examined the relationship between reading ability and standards-based mathematics achievement. Hypotheses were tested using archived SRI and GCRCT data taken from 279 sixth grade students and four teacher interviews. Results indicated that reading ability had a statistically significant relationship with standards-based mathematics achievement.

Problem
The problematic conditions that led to this study are the questions surrounding whether student reading levels are a major factor that contributes to the stagnation of standards-based mathematics test scores and unsatisfactory student performance, as standards-based mathematics requires students to apply more reading skills than traditional mathematics. Although literature suggests that a relationship exists between reading ability and some traditional forms of mathematics, the relationship between reading ability using student Lexiles and standards-based mathematics achievement data had not been investigated.

Purpose
Test the relationship between reading ability and standards-based mathematics achievement.

Explore teachers’ perspectives of the relationship between reading level and mathematics achievement from their experiences.

Relevant Literature
Themes that emerged from the literature and the results of the study and their contributing authors are:
- information processing theory (Simon, 1978).
- cognitive load theory (Meyenboer & Sweller, 2005).
- mathematics as a language (Vukovic, & Lesaux, 2013).
- mathematics and reading instruction (Burns, 2006; Fuentes, 1998; Meaney & Fleet, 2008; Kester Phillips et al., 2009).
- reasoning and mathematics (Kribs & Ruebel, 2008).
- phonological processing (Geary, 1993; Geary et al., 2007, Reikas, 2006).
- teacher perceptions ((Brophy & Good, 1974; Skinner & Belmont, 1993; Hardré & Sullivan, 2008; Ben-Peretz, 2011).

Procedures
The data collection was done in two stages:
- Collection of archived sixth grade scores (N=279).
- Conducted four semi-structured teacher interviews.

Data Analysis
Instrumentation
- Scholastic Reading Inventory (SRI)
- Georgia Criterion Referenced Competency Test (GCRCT)

Quantitative Analysis
Pearson Product-Moment Correlation (r) tests were run between the variables of reading ability and standards-based mathematics achievement.

Qualitative Analysis
Data taken from qualitative interviews were coded by myself and a qualified coder then inter-rater reliability was calculated.

Integration of Methods
Further quantitative analysis were conducted as a result of the qualitative findings.

Findings
A moderate positive correlation was found between reading ability and standards-based mathematics achievement R = .682 (n = 279, p < .01).

Teacher interview responses identified specific sub-domains that require extensive amounts of reading comprehension which caused for additional correlation test to be run and assessed. The results are in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Algebra</th>
<th>Number and Operation</th>
<th>Measurement</th>
<th>Geometry</th>
<th>Data Analysis &amp; Probability</th>
<th>Math Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexile</td>
<td>.816**</td>
<td>.554**</td>
<td>.526**</td>
<td>.597**</td>
<td>.617**</td>
<td>.682**</td>
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