Factors Impacting Students' Mathematical Performance and Beliefs

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Questions/Background

Our data comes from a study of elementary education majors. The larger study investigated their mathematical knowledge and beliefs about mathematics and teaching/learning mathematics. After coding student strategies for each mathematical task and analyzing their mathographies, we were interested to see if there was a connection between students' beliefs about mathematics, mathematics learning, and performance on different mathematics tasks.

Methods

Sample: 23 Math Reasoning I Students
48 Math Reasoning III Students

Data: 7 assessment tasks at the end of the course:
Math Reasoning I - three fraction tasks
Math Reasoning III - two measurement tasks and two geometry tasks

Mathographs: Essays on beliefs about mathematics learning/teaching

Assessments and mathographies were given within a similar time frame.

Data Analysis:

Questions that remain:

How do elementary education majors perform according to their likes and dislikes of particular mathematics subjects?
How much of an impact do teachers have on whether a student liked or disliked a particular subject?
What qualities do students see in their favorite and least favorite teachers?

Results

Students' Performance on Mathematics Subjects According to Preference

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Correct-Correct</th>
<th>Correct-Partial</th>
<th>Partial-Correct</th>
<th>Partial-Partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1s19-1</td>
<td>12 / 20</td>
<td>16 / 20</td>
<td>10 / 20</td>
<td>14 / 20</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>R1s19-2</td>
<td>16 / 20</td>
<td>12 / 20</td>
<td>14 / 20</td>
<td>10 / 20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement</th>
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</thead>
<tbody>
<tr>
<td>R1s39-1</td>
</tr>
<tr>
<td></td>
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<tr>
<td>R1s39-2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1s49-1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>R1s49-2</td>
</tr>
</tbody>
</table>

We coded each student strategy as correct, partially correct, or incorrect.

Results:

We noticed that there was a connection between whether the student liked or disliked a specific mathematics subject and whether the student liked or disliked the teacher of that subject:

57.8% of students in our study did not have this relationship present.
25.6% of students in our study did have this relationship present.
16.7% of students in our study did not give enough information in their mathographies for us to make a claim.

Conclusion

After categorizing students on each task and reading their mathographies, we were able to conclude:

We found that if a student likes the particular mathematics subject, they tended to perform better on the tasks within that particular subject compared to those who disliked that particular mathematics subject. The inverse of this relationship will also stand.

Implication of this relationship between students’ preference of teacher and students’ preference of mathematics subject:

Questions that remain:

How could further research validate the relationship between performance of mathematics subject and level of understanding?
How could further research validate the relationship between students’ preference of teacher and students’ preference of mathematics subject?
Do teachers impact what mathematics subjects students like or dislike the mathematics subjects impact student preference of teachers?
How can teaching programs implement development on favorite teacher qualities?

Resources

Elizabeth Hughes, & Olof Steinthorsdottir
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Mathematics Resources Information Center, 1-32.