The Use of Technology in Elementary Mathematics Classrooms

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Purpose
The purpose of the study is to examine elementary mathematics educators’ use and perceptions of technology in the classroom.

Research Questions
1. What technological devices are being used in elementary mathematics classrooms?
2. What factors lead teachers to use these devices?
3. How do teachers use these devices?
4. What are teachers’ perceptions of technology in the classroom?

Literature Review
• Technology can increase academic performance (Ball & Stacey, 2005)
• Instruction can be enhanced by using technology (Xianfang, 2019)
• Particular type of knowledge is required to implement technology effectively (Koh, Chai, & Tay, 2014)

Methods
The researcher interviewed teachers about their use and perceptions of technology in their mathematics classroom using a semi-structured interview protocol.

Participants
The researcher interviewed 10 elementary mathematics teachers from 7 different school districts in the state of Texas.

Factors that lead to technology use
• Teacher access to technology
• Age appropriateness of technology
• Purpose of technology (e.g., assessment, game, etc.)
• Funds allowed for technology
• Recommendations from other teachers
• Need for the technology
• Alignment to the state standards

Types of Technology
<table>
<thead>
<tr>
<th>Type of Technology</th>
<th>Description</th>
<th>Example</th>
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<tbody>
<tr>
<td>Classroom Devices (CD)</td>
<td>Devices used in the classroom that may run apps or different software. These devices can be used to gather data, basic classroom polls, and promote visualizations.</td>
<td>Tablets, laptops, desktop computers, interactive whiteboards</td>
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<tr>
<td>Digital (Virtual) Manipulatives (DM)</td>
<td>A digital model of manipulatives can be used to explore and create conjectures within mathematics.</td>
<td>Base 10 blocks, ten frames, colorful counters, dice</td>
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<td>Web-Based Resources (WBR)</td>
<td>Web-based resources are tools that students and teachers may use via the internet (e.g., Khan Academy, Math Manipulative Technology, ESGI software, Education Galaxy)</td>
<td>Saxon Math, Fast Fractions, GeoGebra</td>
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<tr>
<td>Nonmathematical (NM)</td>
<td>Programs used by teachers and students that can serve a mathematical purpose but are not exclusive to the mathematical community.</td>
<td>Word processing, presentation software, spreadsheet software, communications applications, document cameras</td>
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</tbody>
</table>

Summary of Findings

Overall Summary

Conclusions
• Technology is in use in elementary schools
• Technology choice and implementation not always purposeful with respect to learning mathematics concepts

Discussion/Implications
• Professional development for teachers (NCTM, 2014)
• Develop TPACK (e.g., Olofson, Swallow, & Neumann, 2016)
• Guidance for choosing (e.g., Shin, Smith, & Kim, 2018)
• Effective strategies for implementation (Ball & Stacey, 2005)

Limitations/Future research
• Perceptions only of a small sample
• The effectiveness of different types of technology
• Professional development regarding technology for elementary mathematics teachers
• Case studies of effective classroom implementation

References