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A CROSS-CULTURAL ANALYSIS OF THE VOICE OF CURRICULUM MATERIALS

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This paper presents a cross-cultural analysis of how authors of elementary mathematics curriculum materials communicate with teachers and what they communicate about, focusing on six teacher’s guides from three distinct school systems, Flanders, U.S. and Sweden. Findings revealed distinct differences between approaches common to each cultural context that relate to different educational traditions. These findings point to differing assumptions about the knowledge needed by teachers to enact instruction. Further research is needed to explore these patterns qualitatively and consider teachers’ use of these materials when planning and enacting instruction.

Keywords: textbook analysis, teacher guides, cross-cultural study, Flanders, USA, Sweden

INTRODUCTION

Mathematics curriculum materials and textbooks are used by elementary teachers around the world. They are commonly viewed as a primary tool for teachers’ instructional design and as “the links between the ideas presented in the intended curriculum and the very different world of the classroom” (Valverde et al., 2002, p. 55). Designed for use by teachers, these materials represent assumptions about what mathematics instruction should look like and how teachers might be supported to enact instructional designs. As such, they stand as cultural artifacts (Pepin, Gueudet, Trouche, 2013). Cross-cultural analyses of curriculum materials can uncover cultural similarities and provide insight into differences.

This paper presents a cross-cultural analysis of curriculum materials, focusing on the teacher’s guide, in three distinct school systems: the United States; Flanders, the Dutch speaking part of Belgium; and Sweden. The focus of our analysis was on the voice of the text, defined as the ways curriculum authors communicate with teachers and what they communicate about (Remillard, 2005). Our analysis focused on what different approaches to communicating with teachers reveals about: a) how curriculum materials support teachers; b) assumptions about what teachers need to know to enact instruction; and c) differences in cultural traditions and educational practices. We also wondered about patterns that cut across cultural boundaries and their implications for future research.

BACKGROUND AND FRAMEWORK

Our analysis rests an adaptive view of curriculum use, which holds that teachers actively interpret and construct curriculum in the classroom. (Remillard, 2005). This perspective raises questions about the type of guidance curriculum materials might provide. Ball and Cohen (1996) argue that, rather than simply scripting instruction, “curriculum materials could
contribute to professional practices if they were created with closer attention to processes of \textit{curriculum enactment}” (p. 7). Building on this idea, Davis and Kajcik (2005) propose that curriculum designed to be \textit{educative} for teachers in this way might help teachers a) attend to student thinking, b) engage the content and make connections within the discipline, c) understand curriculum designers’ rationale for pedagogical choices, and d) mobilize curricular materials within a specific classroom context.

\textbf{METHODS}

We analysed a sample of lessons from teacher’s guides from 6 curriculum programs, 2 distinct programs selected from each cultural context. In order to examine how the authors communicate with the teacher, we coded each unit (sentence, phrase, figure) in a sample of 72 lessons, using a coding scheme designed to study how curriculum materials support teachers. The 72 lessons were evenly distributed among grades 3-5 and 2 programs for each country. Table 1 provides a brief overview of the coding scheme, adopted from the ICUBiT study in the U.S. and based on Davis and Krajcik’s (2005) design principles. Codes 2-4 and D are viewed as educative. See online version of paper for details about the 6 programs.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|p{0.7\textwidth}|}
\hline
Code & Short Title & Abbreviated Description \\
\hline
0 & Providing Referential Information & Information about the lesson without simultaneously accomplishing aims specified in other categories \\
1 & Directing Actions & Indicates what teachers and students should do or say \\
2 & Design Transparency & Communicates author’s intent behind design decisions \\
3 & Anticipating Student Thinking & Indicates intended student understanding or likely misconceptions and how to respond \\
4 & Explaining Mathematical Ideas & Describes key mathematical concepts, relationships, definitions, or properties or their importance \\
D & Decision Making & Indicates that teacher should make a decision \\
\hline
\end{tabular}
\caption{Overview of Coding Scheme}
\end{table}

Results of coding analysis were compiled and are presented in Table 2. Within and across country comparisons are discussed in the four sections that follow.

\textbf{HOW THE U.S. CURRICULA COMMUNICATE WITH TEACHERS}

\textbf{Development and programme philosophy}

The two U.S. curriculum programs, \textit{Everyday Mathematics (EM)} and \textit{Math in Focus (MiF)}, represent two different instructional traditions. \textit{EM} was developed with NSF-funding to reflect the vision presented in the NCTM \textit{Standards}. The aim is to build conceptual understanding by gradually building on students’ informal knowledge. \textit{MiF} was adapted from one of the mathematics programs developed and used in Singapore. \textit{MiF} also emphasizes conceptual understanding, but takes a more directive pedagogical approach.
Table 2: Variations in Types of Guidance for Teachers across Six Curriculum Programs

<table>
<thead>
<tr>
<th></th>
<th>Mean units per lesson</th>
<th>Referential Information</th>
<th>Directing Action only</th>
<th>Dir. action &amp; Ed. Support</th>
<th>Design Transparency</th>
<th>Student Thinking</th>
<th>Explaining Math Ideas</th>
<th>Tot. Educative Support</th>
<th>Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EM (US)</strong></td>
<td>180</td>
<td>28</td>
<td>27</td>
<td>42</td>
<td>23</td>
<td>19</td>
<td>15</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td><strong>MiF(US)</strong></td>
<td>109</td>
<td>22</td>
<td>27</td>
<td>55</td>
<td>21</td>
<td>28</td>
<td>21</td>
<td>52</td>
<td>5</td>
</tr>
<tr>
<td><strong>NT (Fl)</strong></td>
<td>97</td>
<td>26</td>
<td>35</td>
<td>52</td>
<td>19</td>
<td>18</td>
<td>14</td>
<td>39</td>
<td>4</td>
</tr>
<tr>
<td><strong>KP (Fl)</strong></td>
<td>121</td>
<td>16</td>
<td>43</td>
<td>66</td>
<td>18</td>
<td>19</td>
<td>18</td>
<td>41</td>
<td>17</td>
</tr>
<tr>
<td><strong>MD (Sw)</strong></td>
<td>21</td>
<td>10</td>
<td>36</td>
<td>51</td>
<td>38</td>
<td>11</td>
<td>11</td>
<td>54</td>
<td>15</td>
</tr>
<tr>
<td><strong>ME (Sw)</strong></td>
<td>32</td>
<td>15</td>
<td>18</td>
<td>42</td>
<td>29</td>
<td>32</td>
<td>23</td>
<td>68</td>
<td>20</td>
</tr>
</tbody>
</table>

*Note.* a Units coded as directing action and containing educative support; b Educative supports; c Total percent of units coded as educative supports, excluding multiply codes.

**Differences in how the programmes guide the teacher**

When it comes to communicating with and guiding the teacher, the two curricula are comparable in the proportion of units written to direct teacher actions (27%). A notable difference between the two curricula is evident when examining the use of two types of educative features, particularly features designed to communicate about mathematics concepts and student thinking. Proportionally, MiF devotes about 50% more attention to communicating with the teacher about student thinking and mathematics concepts. These differences can be accounted for when examining the proportion of directing-action units also coded as hybrids (EM=42%; MiF=55%). In addition to communicating to the teacher what to do or say, these units communicate details about the design of the curriculum, student thinking, or the mathematics.

**HOW THE FLANDERS CURRICULA COMMUNICATE WITH TEACHERS**

**Development and programme philosophy**

Both Nieuwe Tal-rijk (NT) and Kompas (KP) are frequently used in Flanders and are representative for the spectrum of curriculum programmes. NT and KP were developed in response of the launch of the Attainment targets in 1998. In line with the philosophy of the targets, both NT and KP stress the importance of conceptual understanding, realistic contexts, and communication. They differ in the specific approach toward communication. KP recurrently stresses the importance of correct use of mathematical language. NT promotes discussion of mathematical ideas and strategies through small group collaboration.
Structure

Both programs consist of student texts and a teacher’s guide. The teacher’s guide includes lesson plans and print material for assessment and differentiation. KP also includes electronic material for additional practice. Lessons in both guides are grouped in units that address several domains. Lessons in NT and KP contain considerable detail; they have a fairly high mean number of units per lesson (NT=97; KP=121). Besides the main body of the lesson, which contains detailed guidance for enacting the lesson (NT=71%; KP=93%), both programs also include an introductory section (NT=23%; KP=7%). Lessons in NT also contain a number of optional items (7%). Whereas the main body of the lesson in KP has a fixed structure for all lessons, the structure of the main body of lessons in NT varies.

Differences in how the programmes guide the teacher

Both NT and KP contain a high proportion of directive guidance (NT=52%; KP=66%). In contrast, the proportion of educative guidelines is among the lowest in our sample (NT=39%; KP=41%). Both programs contain among the highest proportion in our sample of guidelines that are merely directive, containing no additional supports (NT=35%; KP=43%). KP is more directive, both in number of units that are merely directive and in the units that intertwine directive and educative guidance. KP also includes a higher proportion of instances that indicate that the teacher should make a decision (NT=4%; KP=17%).

HOW THE SWEDISH CURRICULA COMMUNICATE WITH TEACHERS

Development and programme philosophy

Matte Direkt (MD) is a traditional curriculum programme (in the Swedish system), with a new issue adapted for the new national curriculum in 2011. In MD, students work alone or in pairs for most of the lesson. The role of the teacher is to introduce the lesson and get the students working. Goals for each lesson are listed in a box on the first page for each chapter in the teacher’s guide and the student book. Matte Eldorado (ME) is a new curriculum programme that builds directly on the 2011 national curriculum. Each chapter begins with two pages that contain the unit goals, the authors’ interpretation of the goals, the pre-knowledge the students should have, and a discussion of how each goal is met in the chapter.

Similarities in structure

The two Swedish curriculum programmes share several common traits even if they differ in some important aspects. Both programmes give information on each page in the student textbook, and both have a system for differentiating instruction using optional tracks. Both programmes also present goals in the beginning of each chapter, although in rather different ways. Compared to the programmes from the other countries in this study, the two Swedish teacher’s guides are very short, on average 21 (MD) and 32 (ME) coded units per lesson.

Differences in how the programmes guide the teacher

MD has a higher proportion of units (sentences or images) that direct teachers’ actions, whereas ME communicates more about the mathematical content and student thinking. Of all six programs in our sample, ME has the smallest percentage of units coded as merely
directing action. ME also has the highest proportion of units coded as educative support and the highest proportion of units indicating the teacher should make a decision. Both programs contain a high proportion of units that communicate about design transparency (MD more than ME). A distinct feature of ME is that it asks the teacher questions concerning the students’ work (e.g.; “Are the students’ own expressions correct and on what level of difficulty are they?”). These rhetorical questions are used to raise the teachers’ awareness of certain aspects of student learning.

DISCUSSION AND CONCLUSION

Our cross-cultural analysis has revealed a number of differences, both across and within the cultural contexts. They also point to fruitful areas for future research.

One difference is the amount of guidance offered in the lessons of the teacher’s guide. In contrast to lessons in the U.S. or Flanders teacher’s guides, lessons in the Swedish guides contain rather limited detail. For instance, EM (US) contains nearly 9 times as many units per lesson than MD (Sw). Another difference relates to the balance between directive and educative guidance. The Flanders lessons are much more directive than educative. The US lessons and MD (Sw) are quite balanced, and lessons in ME (Sw) are more educative than directive. These differences may reflect and relate to differences in educational traditions. In Swedish elementary math education, student texts have a central position. The teacher’s role is to facilitate the student-text interaction. The teacher’s guide indicates what the teacher might look for and expect. In Flanders and the U.S., teachers play a directive role, leading instruction. The teacher’s guides, in turn, offer directive guidance for this role. In the U.S., there is also a strong commitment to student-student collaboration and some of the educative features in U.S. guides may be aimed supporting this less directive role. It is worth noting that the dominant instructional mode in each culture is reflected in the mode by which text authors communicate with teachers.

These observations raise several questions about assumptions about the knowledge teachers need to enact instruction. Might it be that the Swedish curriculum authors assume teachers know how to engage students with the content, whereas the U.S. and Flanders curriculum authors assume teachers need more prescription? It is interesting to note that, although the proportion of indications to make a decision differs across the curriculum programs, except for KP (Fl), the number of decisions to be made per lesson is similar (an average between 3 and 8 decisions per lessons). Another interesting variation to analyse more deeply is the difference in guidance that is merely directive and guidance that combines directive guidance with educative guidance. This hybrid approach appears to assume that teachers benefit from directive guidance when it is accompanied by educative explanations.

To summarize, this cross-cultural analysis has pointed to within and cross-cultural differences that appear to reflect educational contexts and values in each culture. Further research might explore these differences qualitatively and in greater depth and consider differences in how teachers use the guidance their curriculum guides provide.

Note

1 A full version of this paper can be downloaded at http://www.gse.upenn.edu/icubit/
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References


