

1 Teachers' Perception about the New Approaches of Primary 2 Mathematics Textbooks of Bangladesh

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6

7 **Abstract**

8 Textbook is a dynamic part of any educational system. They provide the necessary guidelines
9 for the teacher. So it is critical to know how the teacher perceives about the textbooks as it
10 directly influences his/her practice. This research study aims to find out teachers' perception
11 about the new approaches of mathematics textbooks which have been recently introduced in
12 the primary school of Bangladesh. Moreover, as perception differs from teacher to teacher,
13 this study also finds out whether and how they perceive differently from rural to urban
14 perspective. The study followed a mixed method design. Quantitative and qualitative data is
15 collected through questionnaire from thirty teachers (15 from rural and 15 from urban).
16 Quantitative data is analyzed through descriptive analysis and t-test statistical analysis
17 whereas thematic analysis is done for qualitative data. One of the findings of this study is
18 that the majority of the teachers possess positive views about the new mathematics textbook.
19 It is also found that teacher perception differs from rural to perspective. Rural teachers have
20 more positive views than the urban ones. Considering the implications, the findings of this
21 study will be of significant use for policy makers, curriculum developers, textbook experts,
22 and the teachers who will be using the new textbooks in the classroom

23

24 **Index terms**— textbook, teacher's perception, approaches, descriptive analysis.

25 **1 Introduction**

26 Education is a process that undergoes continuous modification over time. In this modification process, it is needed
27 to develop teaching style, learning process, instructional strategy, and curriculum design. Curriculum design is
28 a continuous process where modification takes place over the time everywhere (Al-Jardani, 2011). Curriculum
29 modification refers to that includes new content knowledge, instructional method and learning outcome through
30 the change of materials and programs (Comfort, 1990; King-Sears, 2001). The primary curriculum of Bangladesh
31 has been revised and modified in 2011 by national education policy 2010 ??NCTB, 2011).

32 Teacher and textbook are two vital components to implement the curriculum. The textbook has to be
33 considered as teacher's source of content, organization and instructional activities and ideas for lessons (Johansson,
34 2006; Reys et al., 2004). To achieve the aims and objectives of primary mathematics curriculum of Bangladesh,
35 mathematics textbooks were developed in 2012. In new mathematics textbooks, most of the lessons started
36 by asking a real-life oriented question which provides a scope to explore students' creative thinking ??NCTB,
37 2016). Smith (1996) refers that new forms of a mathematics textbook may reduce teacher's ability and it will
38 be challenging for the teachers. Given the backdrop, it deserves special attention to know the perception of the
39 teachers about the new approaches of primary mathematics textbooks.

40 2 II.

41 3 Purpose of the Study and Research Question

42 The purpose of this study is to explore the teacher's perception about the new approaches of primary mathematics
43 textbooks. This study also aims to explore whether and how their perceptions vary from rural to urban
44 perspective. As such, the research questions addressed in this study are-1. How do teachers perceive the new
45 approaches of primary mathematics textbook? 2. Whether and how do teachers' perceptions differ from rural to
46 urban perspective? III.

47 4 Literature Review

48 Textbook is a dynamic part of any educational system. They provide the necessary guidelines for the teacher,
49 for instance, connecting with contents, methodologies and the materials to be taught (Salehi & Amini, 2016).
50 Different country has taken multifarious initiatives to reform their textbooks to make it effective. For example, in
51 the Netherlands, development of mathematics education mostly relies on textbooks ??Punhuizen et al. 1998). The
52 mathematics reform movement started in Netherlands in early seventies. On that time mathematics education was
53 concept based. Now it is turned into "New math movement"(ibid). In line with that, in the reformation process,
54 Korean elementary mathematics textbooks appeared with some new approaches such as starting a lesson with
55 question or activity, innovative way of problem-solving, different games and puzzles, multiple ways of problem-
56 solving and classwork (Pang, 2004). Existing literature shows E Tamanna Sultana ? & Shahidul Islam ? that
57 all the approaches incorporated in the Korean textbook are critical for fruitful learning. In a study, Cheesman
58 (2005) argued that starting a lesson with question or activity is helpful for students' effective learning. Mevarech
59 & Kramarski (2012) explained that if a problem is solved innovatively, it will enhance students' ability to think
60 logically and encourage students to think rationally. As a result, it will develop their reasoning skill. According
61 to Wenglinsky (2001), class work in the classrooms significantly facilitates students learning and enhance their
62 academic performance. Besides, it is argued that it can be possible to develop the diversity skill among the
63 students by solving a problem in multiple ways (NCTM, 2000). Paterson (2009) stated that conducting a class
64 with different sorts of game and puzzles is effective one as it not only makes the lesson enjoyable to the students
65 but also helps to understand.

66 As well as, Japanese mathematics textbook also appeared with some approaches such as prior knowledge
67 exploration, mathematical connection with real-life situation and collaborative way of problemsolving (Takahashi,
68 2006). Extant literature also shows that learning mathematics becomes more beneficial if the main focus of
69 the teaching and learning approach is to develop insights rather than focusing on the correct solution of a
70 problem. RMERC (1999) argued that it is necessary to connect the mathematical concept with real-life situation
71 so that learners can build their mathematical knowledge properly. In another study, Reed (2014) explained
72 that if students learn with collaboration, they could understand the insight of the lesson rather than blind
73 memorization. Similarly, the literature shows that for concept development, a diagram with proper illustration
74 is also a helpful approach (Bishop, 1989). This approach is used appropriately in Singaporean Mathematics
75 textbooks too (Beckmann, 2004).

76 In Finish mathematics curriculum, inquiry approach is introduced to explore the student's ability and
77 empowering their reasoning skill (Mendaglio, 2014). Brune (2010) stated that solving a problem by inquiry
78 approach enhances students learning by developing thinking skills. Similarly, textbook reformation also held
79 in Bangladesh over time and the recent reformation held in primary mathematics textbooks in 2016 ??NCTB,
80 2016). In this reformation process, the primary mathematics textbooks appeared with some new approaches.
81 Based on the review of the extant literature, we consider few approaches (stated in table-1) which might be
82 incorporated in the mathematics textbooks.

83 It is urgent to analyze teacher perception and their belief system they belong in a new context (Salehi & Amini,
84 2016). Thompson (1992) showed in his study that teachers view about mathematics is influential rather than
85 the addition of facts, rules, procedures, and theorems. They seem that mathematics is more related to abstract
86 principles than operational pedagogical theory (ibid). Nemser and Floden (1986) elicited that these perceptions
87 may vary from school to school.

88 5 Table-1: Approaches in the new primary mathematics text-
89 books

90 IV.

91 6 Methodology

92 This study adopted a mixed method approach. As participants, 30 primary teachers (15 from rural and 15 from
93 urban) who take mathematics classes were chosen conveniently. A questionnaire containing both open-ended and
94 closed-ended questions was given to each teacher. Data collected through closed ended questions were analyzed
95 using descriptive statistics which facilitated us to find out teachers' perception about new approaches. On the
96 other hand, thematic data analysis was conducted to explore the reasons of the importance of these approaches

97 to the teachers. The themes were developed drawing on the data collected through open-ended questions. An
98 approach was considered to be important for a particular reason when at least five participants indicated the
99 reason. However, the name of the theme does not represent that respondents have always used exactly the term
100 or phrase in their response. Rather, many of their responses were found to be related to the theme though they
101 did not use the exact name of the theme. The participants of this study were obliged to issues of anonymity and
102 ensured them that their name would be kept anonymous as this process requires a sufficient level of trust based
103 on a high level of participant disclosure.

104 V.

105 **7 Result and Findings**

106 Our analysis shows (figure-1) that the new primary textbooks contain all the new approaches. However, teachers'
107 knowledge about these approaches varied; few approaches were very well known and considered while few were not.
108 Our analysis shows that 100% of participants believed that new mathematics textbooks provide adequate scopes
109 to apply approach-10 in the mathematics classrooms while approach-9, 7 4, 3, 2 were perceived to be included
110 in the books by 80% or more of the teachers. On the other hand in case of the approach-6 low percentage of
111 teachers knows this approach. Again significant difference was found about the knowledge in different approaches
112 among the teachers between rural and urban areas. For example, while 100% of the rural teachers were informed
113 of approach-1 and 5, only 50% of urban teachers know about approach-1 and 65% knowledge about approach-5.

114 **8 Figure-1: Teachers knowledge about the approaches in the 115 new textbooks**

116 A t-test statistics is adopted to see whether the rural and urban teachers' knowledge about the approaches vary
117 and found that $t=1.015$ and $p=0.31$. As $p>0.05$, there is an insignificant difference between the rural and urban
118 teachers knowledge about the overall approaches. However, in the case of approach-5 and 1, the p-value is less
119 than the level of significance (0.01 and 0.002 respectively). So, the difference between the knowledge about these
120 approaches in rural and urban teachers largely varies and which is consistent with the figure-1 as well.

121 **9 VI. Mentioned Task by the Participants**

122 To explore whether the teachers could identify the new approaches in the textbooks, they were asked to mention
123 the tasks from the new mathematics textbook where the scopes were provided to solve the problems. Our analysis
124 (Table ??) shows that on average 70% of teachers successfully identified appropriate tasks which are possible
125 to do with the approaches. It is found that all of the rural and urban teachers successfully mentioned the task
126 from the new mathematics textbook in which approach-10 and 7 could be applied. It is also observed that all
127 the rural teachers successfully identified the tasks which provide a scope to apply approach-1 whereas in case
128 of urban teachers a percentage of 53 could do so. Again, though figure-1 reveals that 80% of rural and urban
129 teachers know the approach-9, our analysis in table-2 shows that most of them could not identify the task from
130 the textbook successfully. Such incapability reflects that they are not very much confident about the approach-9.
131 Similarly, tasks related to approach-6 were identified by a very low percentage of teachers which is consistent
132 with our findings in the earlier section. Our analysis shows (Table -3) that most of the teachers have positive
133 views about the new approaches in the mathematics textbooks. 73% of the teachers believe those approaches
134 highly important whereas a small percentage (17%) perceived those as partially important. Surprisingly, 10% of
135 the teachers consider it as non-important.

136 In the case of rural schools, most of the teachers (80%) perceived it as highly critical whereas 13% percentage
137 of them considered it partially important. Also, 7% of the teachers reported it as of no importance. On the
138 contrary, in the urban areas, 67% of the teachers expressed that the approaches introduced in the new textbooks
139 are highly important whereas 20% reported as partially important. Our analysis also shows, as is the rural area
140 a low percentage of teachers (13%) believed it was of no importance. . When questioned about the reasons to
141 give importance to a particular approach, we found that for the same reason different approaches were used.
142 For example, approach-1, 2, 3, 4, 6 and 9 were considered important as these approaches "uphold the interest"
143 (theme-1) of the students. One of the participants stated:

144 **10 I think it is very important to connect the mathematical 145 concept to real-life situation. It makes the lesson interesting 146 and effective.**

147 Again, few of the approaches (1,2,4,7,8 and 9) were perceived important as teachers believed that these approaches
148 "develop creativity and thinking skills" (theme-2) of the students. As reflected by one of the teachers-Solving a
149 problem in an innovative way is interesting. When I solve a problem innovatively, students feel interested in the
150 lesson. It also increases their thinking skill.

151 Our analysis also shows five of the approaches "make the lesson easy and meaningfully

13 DISCUSSION AND IMPLICATIONS

152 understandable" (Theme-3). These approaches are approach-2, 3, 5, 6 and 7. For instance, one of the
153 participants informed:

154 When students learn with collaboration in my class, they enjoyed the class and understood the concept clearly.

155 Theme-4 (develop diversity) emerged as many of the teachers perceived that approach-8 help students to be
156 skilled in developing a diverse solution for a problem. For example, one of the participants claimed:

157 11 Solving a problem in different technique is a good way to 158 understand the problem clearly. I think it not only develops 159 student's creativity but also develops diversity.

160 Our analysis shows that approach-10 was perceived important as teachers believe that it is an effective way to
161 evaluate students learning progress. For instance one of the participants stated: As such, Theme 1 (Uphold
162 interest) emerged as a reason for which approaches-1, 2, 3, 4, 6, 9 were used while theme-2 (Develop creativity
163 and thinking skill) arose as a reason for using approaches-1, 2, 4, 7, 8 and 9. Similarly, theme-3 (Make lesson
164 easy & meaningfully understandable) emerged as a reason for which five approaches were considered important.
165 These are approaches-2, 3, 5, 6 and 7. It is also found that approach-8 and approach-10 emerged in theme-4
166 (Develop diversity) and theme-5 (Evaluate progress) respectively.

167 12 IX.

168 13 Discussion and Implications

169 This study found that teachers possess a positive view about the new approaches of mathematics textbooks.
170 With a very few exceptions, most of them have proper knowledge about where the textbooks provide scope to
171 apply the approaches. It is found that teachers show their positive view on those approaches because they think
172 all these approaches are helpful for fruitful learning. More specifically, conforming the earlier study of Cheesman
173 (2005), they think that starting a lesson by throwing a question or doing some activities (approach-1) is helpful
174 to uphold interest and increase thinking skill. The study also indicates that teachers believe that exploring prior
175 knowledge (approach-2) not only make the lesson interesting but also make the lesson clear to the students and
176 increase thinking ability. Our finding in this regard is supported by Marzano (2004). This study also identifies
177 that connecting mathematical concept with real-life situation (approach-3) create interest among the students
178 and in the meantime, it helps students to learn the concept. This finding is congruent with the earlier findings of
179 RMERC ??1999). Supporting the earlier study of Mevarech & Kramarski (2012), the finding of the study shows
180 that teachers believe that solving problems in an innovative way (approach-4) is very effective one to uphold
181 students' interest in the lesson and develop their creativity. Another finding of this study is that for developing
182 a meaningful concept about the lesson, collaboration (approach-5), playing by puzzles or games (approach-6)
183 and diagram with proper illustration (approach-7) are effective approaches. This finding conforms to the earlier
184 research of Reed (2014), Paterson (2009) and Bishop (1989) respectively. It is also found that solving a problem
185 by playing not only make the lesson understandable but also makes the lesson interesting to the students. The
186 study also identifies that dealing problems with diagram helps students to think critically as well as develop
187 their creativity. Our findings are supported by NCTM (2000) which shows that to develop diversity it is an
188 effective way to solve a problem in multiple ways (approach-8). It also helps students to develop creativity and
189 thinking skill. Conforming to earlier studies Brune (2010), the findings of the study shows that teachers think
190 that solving a problem by inquiry approach (approach-9) enhance students learning by developing thinking skills.
191 However, this study also revealed that though a large percentage of teachers talked about the effectiveness of
192 inquiry approach, in the real context, they have not properly identified the task from the textbook where this
193 approach can be applied. Moreover, they have no clear idea about this approach as well. The findings of the study
194 have given great importance on classwork (approach-10) for effective learning, especially for assessing students'
195 performance which reinforces the findings by Wenglinsky (2001).

196 As a whole, according to the teachers' perception, to make class interesting approach-1, 2, 3, 4, 6 and 9 are
197 very effective one. When the teachers' intention would be to increase students' creative thinking skill, approach-1,
198 2, 4, 7, 8 and 9 could be applied. As meaningful concept development is the prime aim of teaching, approach 2,
199 3, 5, 6 and 7 would be a good contribution to it. To make 21st centuries skilled citizen, it is necessary to prepare
200 students to attend the problem in multiple ways to handle different sorts of situation. So the teacher could
201 be used approaches-8 to prepare students for the challenging world. To justify overall students' performance,
202 approach-10 would be the appropriate option.

203 The study shows that teachers perception about the new approaches in the mathematics textbooks vary from
204 rural to urban perspective, though the variation is not very significant for every approach. Rural teachers have
205 a more positive view in the approaches of starting a lesson key question or activity (approach-1), mathematical
206 connection with real-life situation (approach-3), innovative way of problem solving (approach-4), collaborative
207 way of problem solving (approach-5), multiple ways of problem solving (approach-8), appropriate illustrations
208 and diagrams (approach-7) and mathematical inquiry (approach-9). But rural and urban teachers have similar
209 positive perception about the approaches of prior knowledge exploration (approach-2), classwork (approach-10)

210 and different games and puzzles (approach-6). It is found that while 80% of rural teachers expressed that all
211 approaches are highly important, only 67% of urban teachers possess such kind of view. On the other hand,
212 20% of urban teachers viewed all approaches are partially important whereas 13% hold such kind of view. As
213 a whole, rural teachers have more positive views about the new approaches of mathematics textbooks than the
214 urban ones. These findings are consistent with the study of Singh et al. (2010) where they stated that differences
215 are found between rural and urban teachers' perceptions regarding the use of textbooks.

216 The findings of this study have both theoretical and practical implications. First, we extend the existing
217 literature by exploring the reasons of the importance of the approaches adopted in different countries. We
218 developed five themes (theme-1: uphold interest, theme-2: develop creativity and thinking skill, theme-3: make
219 lesson easy and meaningfully understandable, theme-4: develop diversity and theme-5: evaluate progress) for
220 which the approaches are adopted in textbooks. Since our finding shows, the perception about the new textbook
221 varies from urban to rural areas; it will provide an important guideline to the policy makers that what should be
222 incorporated in the new textbook and what should not. The finding of the study also shows that all approaches
223 could not be identified properly by the teachers though they showed their positive views in this regards. This
224 implies that teachers are not aptly familiar with the new textbook. So, it is needed to provide effective training
225 to the teacher to introduce properly the new approaches of textbooks. Besides, it would be beneficial if textbooks
226 writer provide a direction in the textbooks which approach would be appropriate for which task.

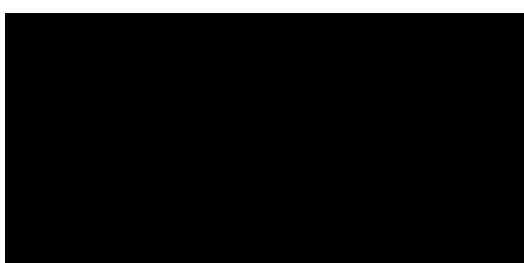
227 **14 X.**

228 **15 Conclusion**

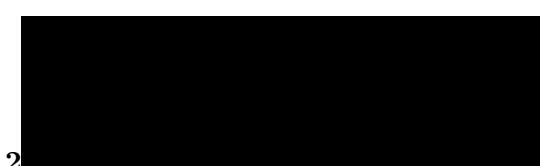
229 Teachers' perception about the new approaches which is adopted in the new mathematics textbook is explored in
230 this study. This study also explores whether this perception varies between urban and rural teachers. Though a
231 majority of the teachers possess positive views about the new textbook; they are not well informed about all the
232 approaches (e.g. approach-9). It is also found that differences are found between rural and urban perspectives. To
233 make sure the effective use of the new textbooks in the classroom, it is required to make the teachers concerned
234 about the new approaches of mathematics textbooks. It is needed for the teachers to go through the new
235 approaches of mathematics textbooks appropriately before going to the class. The study shows what approach
236 is suitable for a specific situation and when different approaches should be used in the classroom. It also offered
few theoretical and practical implications of the findings. ¹



235 Figure 1: Table- 2 :



236 Figure 2:



237 Figure 3: Figure 2 :

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Teachers' Perception about the New Approaches of Primary Mathematics Textbooks of Bangladesh									
Approaches									Rural
Approach-1									100%
Approach-2									93%
Approach-3									73%
Approach-4									87%
Approach-5									73%
Approach-6									13%
Approach-7									100%
Approach-8									87%
Year	Approach-9	Approach-10	Mean						
2018			20%						
14			100%						
Volume			73%						
XVIII									
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X									
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sion									
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(Approach-1		Approach-	Highly Important					
Global	2	Approach-3	Approach-	Rural					
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nal	6	Approach-7	Approach-8	67%					
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ence				67%					
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Our analysis of the data from open-ended questions facilitated us to develop five themes (Theme 1: Uphold interest, Theme 2: Develop creativity and thinking skill, Theme 3: Make the lesson easy and

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Figure 4: Table - 3

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