Investigating the quality of changes made in new Math books at Third Grade Elementary school, and their role in improving students’ learning - A case study on Elementary Schools in Tehran, District 15

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ABSTRACT

Today’s world is along with numerous changes. Every day, significant changes have been made in all scientific fields. These advances are transmitted to the educational system through textbooks and teachers training, in various forms, such as modifying new methods of teaching and testing, and it is crucial to investigate the rate of success in improving students’ learning. In the present study, it is tried to evaluate the quality of changes made in new math books at third grade of elementary school as well as the role of these changes in improving students’ learning. The studied sample includes 246 teachers of third grade in Tehran, District 15, who were chosen based on cluster random sampling. A researcher-made questionnaire was used to collect data. SPSS software was employed to analyze the research data. The results of the study showed that, in teachers’ point of view, changes in contents of the textbook have significantly led to learning improvement and increasing parents’ satisfaction. The changes made in these books significantly have a positive role in making the text consistent, and customizing the patterns topic for age characteristics of students. However, these changes were not successful in customizing the statistics and probability topic for age characteristics of students, and conforming the outline and content of the textbook to the desired objectives. Analyzing the teachers’ ideas in this study showed that most of them were not satisfied with high volume of textbook, lack of time and therefore high work pressure. It seems that the obtained results, especially the mismatch between some parts of topics and content of the book on one hand, and on the other hand, the lack of enough conformity in the outline of the book to age characteristics of students might accompany with some challenges to the quality of student’s learning and development of educational system.

Key words: Quality, change, math, improve learning.

1. Introduction

Design and implementation of educational reforms will increase the learning rate of learners through improving the quality of educational programs (Mac Gains, 1999). The change in a textbook in any format is made with the aim of compensating for the deficiencies and shortcomings of the previous book. From the beginning of this project and setting goals and new programs to implement them in the classrooms, there is a complicate process in which teachers have central roles. In current educational system, textbooks are considered as one of the main learning resources of students that provide a set of learning opportunities to achieve overall and detailed educational objectives. Therefore, investigating the qualitative characteristics of textbooks is of the utmost importance and sensitivity. Since teachers base
their activities on the textbook, and students are required to read and comprehend it, and also because testing and evaluation of educational enhancement is restricted to the content of that book, the importance of this educational media has been emphasized by educational experts (Sheykholeslami, 2002). Gooya (2007) states that considering sociocultural characteristics of Iranian society is a necessity, and the authors of the new textbooks have considered teaching and learning as a social activity and have centered the professional progress program on it. Also, the curriculum should be considered in order to meet the expectations that we have from the ideal man. National curriculum is the constitution of ministry of education, and this curriculum would be the macro plan and framework of educational system of the country. Based on the national curriculum document, faith, knowledge, practice and ethics will be incorporated in the context of the students’ curriculum. According to the polygonal nature of the program, the student’ and the teacher’s presence will not be confined to the classroom and they will be present not only in classroom and school but also in educational, social, and cultural space of the society (Alemiyan, 2010). For example, the math curriculum should, in turn, contribute in training creative, critical, decision maker, selector, commitment and responsible humans. Thus, based on the principles of teaching and learning and content regulation fundamentals, planners and authors of textbooks should select the desired content, compile properly and offer it to students in the form of textbook using the latest findings in pedagogy. In writing the math books, specific attention has been paid to students’ central role. A new approach followed now in writing and reforming math books at different grades is making the mathematical concepts applicable and implementation of problem-solving. Thus, Nosrati (2009) states that one of the main issues which planners of math teaching have always considered is the influence of problem solving method on the progress in mathematics. Alamiyan, the head of department of authoring math books of the ministry of education, believes that the new approach in writing and reforming math books that is currently followed at different levels has been regulated based on making mathematical concepts applicable and implementing problem solving (Roshd magazine of math teaching, 2012, p.26). Rmylard and Geest (2002) believe that during implementation of new curriculum or solving new problem, teachers need professional supports. Changing the math book, changing approaches and teaching methods are among the most important fundamentals of teaching and institutionalisation of mathematical concepts in elementary school level (Davoodi, Rastegar, and Alamiyan, 2011, p.1). Emphasizing on new approaches in education and training scope, the newly published book of third grade of elementary school, tries to provide the setting through diversifying math teaching methods at elementary level, to reach the main objectives including alluring elementary students be toward learning, especially math learning, creating positive attitude towards school and education in them, increasing students’ creativity, strengthening the spirit of cooperation among students and transforming competition to camaraderie in the classroom, impelling students to think about problems and enhancing their confidence for solving math problems, developing critical thinking and higher order thinking skills, nurturing basic skills of reading, writing, and calculating in elementary learners, enhancing research spirit among students through familiarizing them with daily life situations, enhancing meaningful learning through using concrete educational materials, etc (Dezmond and Broomers, 2011).

usiskin (2010) recommends curriculum planners that, to ensure the accuracy of the job they have done, it is necessary to have valid reasons and to answer different questions. In his opinion, each planning group will do its own task according to some criteria, and for each curriculum decision, they have a reason. Pingail (2009) says: "due to advances, science and
educational standards become newer and more diverse and if a real need assessment is not done throughout students and society and books are not written based on that, we cannot expect dynamic and worthwhile schools. The goal of teaching math is not only to nurture elites and individuals interested in math or individuals who wish to pursue math at university level, but in the new written book, the goal of math teaching is to make students live a better life (Seven Important Indexes, 2012). While studying a book named “Teaching Math to Elementary Students Using Developed Countries Method”, by Safavi (2010), I found out that he emphasizes on teaching methods, and along with considering new evolvements in learning mathematics and various viewpoints in education which develop creativity in learners, he concludes that teaching mathematics at Iranian schools is not significantly different with that carried out in the studied countries in terms of content and topics. It means that most of the subjects included in the math books of developed countries exist in Iranian math books as well. However, regarding goal selection, approach, strategies and methods, and math teaching techniques which develop students’ creativity, math books of developed countries are more advanced and prolific than the Iranian math books.

Among the bulk of operational research on the analysis and evaluation of mathematics textbooks, and also planning changes, three operational researches have been more and more considered. Dudaite (2007) states that students’ progress in mathematics are due to the changes in teaching from traditional to dynamic methods and problem solving. Students find learning math interesting when its topics are related to their lives and jobs. Therefore, the desired educational objectives in Lithuania, during educational reform, have been as “developing of mathematical relations, teaching solving math problems and research, teaching standard math solutions, mathematical reasoning, developing positive attitudes toward math, promoting the study of math, and formatting scientific thinking in mathematical form. These objectives have been in turn along with significant success of students in math. In a study, Adibniya (2002) investigated the content of math books at fourth grade of elementary level from teachers’ viewpoint. His findings showed that the content of the math book at fourth grade of elementary level are in accordance with educational objectives of elementary course, basics of content setting and organizing and programming (persistence, progression, and unity), psychological principles and developmental and learning processes, using methods of math teaching and advance educational tools, the desired textbook characteristics, daily life demands, social situation of society, and students’ prior knowledge. Rafi-poor and Gooya (2010) did a research on the importance and direction of changes in math curriculum at a school from teachers’ view. And the findings of their study demonstrated that math teachers predict that typical Iranian students’ performance is weak in solving problems similar to pizza problems, which their features are having background and modeling real problems,. Iranian math teachers relate the main reason of prediction of such phenomenon to the lack of emphasis on literacy aspect of mathematics and not using real significant backgrounds in Iranian math books, and the effect of external evaluation on math teaching. Stajen (2003) also found that teachers interpret reforms in different ways and based on their understanding of the students’ need; select only some parts of them. Each country attempts to change its curriculum with different reasons and based on its needs and facing challenges. Our country is not an exception; educational challenges, social changes and developments, and the new demands and expectations of our society have led us to have national curriculum. So, math department attempted to change the math curriculum. The result of this curriculum is an educational package where textbook is a part of it. Thus, according to this program, the students’ textbook was changed. Yet nobody but a teacher can be influential in writing textbook, and no authority except the teacher himself knows the
weak points of math books. In this new written book, it is tried to encourage students to think and to play an active role in learning through new methods of teaching. At the same time, they learn some skills that enhance their ability in solving problem. In this book, the author looks at different aspects of mathematics. On one hand, mathematics is an art which should display its hidden values in terms of aesthetics and realism. On the other side, this subject is a tool at human service which has determinant presence and application in all human sciences. Teaching various subjects in elementary school makes children familiar with world and its phenomena.

Teaching mathematics in elementary level is one of these subjects. Traditional methods of teaching math do not meet today student’s needs. Changes in elementary school programs and math books as well as fundamental change in teaching methods at elementary level have significant roles in teaching and learning mathematical concepts. So the main issue in present study is the lack of due recognition from the role of implemented changes in newly written math book for enhancing students’ learning. Therefore, the overall goal of this study, is investigating teachers’ ideas about the quality of the changes in the new written math book at third grade of elementary level and its role in enhancing students’ learning. To achieve this goal, the following hypotheses were formulated

1. In teachers’ view, the contents of the new written book at third grade of elementary level have a significant role in improving students’ learning.
2. In teachers’ view, the contents of the new written math book at third grade of elementary level have a significant role in increasing parents’ satisfaction.
3. In teachers’ view, the unity of the new written math book at third grade of elementary level is significantly more than average.
4. In teachers’ view, the patterns topic of the new written math book at third grade of elementary level matches significantly with students’ age level.
5. In teachers’ view, the topic of statistics and probability of the new written math book at third grade of elementary level matches significantly with students’ age level.
6. In teachers’ view, the outline and content of the new written math book at third grade of elementary level is significantly along with the given objectives.

2. Methods

The present study is a descriptive-survey in terms of collecting data, and in terms of objective, it is an applied research. The studied population consisted of three primary school teachers in Tehran, District 15 in 2014. The sampling was based on cluster random method. To collect the data, a researcher-made questionnaire was used which consisted of two parts of two- and five-point questions of Likert scale (the first part comprised 25 questions of two-point from Likert scale, and the second and third parts each had five questions, and the forth part had one question, which all in all are 11 questions of five-point Likert Scale). After designing this instrument, the researchers sent the questionnaire to some experts, and at last, the final questionnaire was designed. In this questionnaire, 25 questions were related to the goal of math book at third grade of elementary school and three other parts comprising 11 questions were related pattern, statistics and probability topics. To reach content validity of this scale, experts’ view and the supervisor’s guidelines were taken into considerations. Based on the experts' offered views about the questionnaire, some uncertainties were solved. The internal consistency of the scale was assessed using Cronbach's alpha coefficient.
According to the obtained coefficients ($\alpha=0.749$), it can be concluded that the internal consistency of the questionnaire is quite acceptable. The statistical population of the present study comprised of 246 teachers of third grade at elementary level in Tehran, District 15, 53 of whom were chosen through cluster random sampling. For data analysis, descriptive statistics such as frequency, percentage, means and inferential statistics including one sample T-student and binomial tests were used. All analyzes were performed using SPSS software.

3. Data Analysis

Subsequently, in order to analyze the data, each hypothesis was separately tested.

Hypothesis 1. In teachers’ view, the contents of the new written book at third grade of elementary level have a significant role in improving students’ learning.

Table 1: Binomial test

<table>
<thead>
<tr>
<th>The definition of each class</th>
<th>Each group of data</th>
<th>Than observed</th>
<th>Ratio test</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First group</td>
<td>yes</td>
<td>42</td>
<td>0.81</td>
<td>0.5</td>
</tr>
<tr>
<td>Second group</td>
<td>no</td>
<td>10</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>52</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

As demonstrated in Table 1, among 52 teachers participated in the study, 81 percent believed that the book content had an effective role in improving students’ learning. The obtained level of significance is substantially less than the researcher’s alpha; therefore, the null hypothesis, which counts no role for the content of the textbook in improving learning, is rejected and the researcher’s hypothesis, which shows the role of textbook in improving learning, is accepted.

Hypothesis 2. In teachers’ view, the contents of the new written math book at third grade of elementary level have a significant role in increasing parents’ satisfaction.

Table 2: Binomial test

<table>
<thead>
<tr>
<th>The definition of each class</th>
<th>Each group of data</th>
<th>Than observed</th>
<th>Ratio test</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First group</td>
<td>No</td>
<td>6</td>
<td>0.12</td>
<td>0.5</td>
</tr>
<tr>
<td>Second group</td>
<td>Yes</td>
<td>46</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>52</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Based on Table 2, among 52 teachers participated in the study, 88 percent believe that parents were satisfied with the role of the book in learning enhancement. The obtained level of significance shows that it is less than the researcher’s alpha; therefore, the null hypothesis (no role for the content of the textbook in enhancing parents’ satisfaction) is rejected and the researcher’s hypothesis, (the positive role of textbook in enhancing parents’ satisfaction) is accepted.
Hypothesis 3. In teachers’ view, the unity of the new written math book at third grade of elementary level is significantly more than average.

**Table 3: Binomial test**

<table>
<thead>
<tr>
<th>Blog book</th>
<th>Each group of data</th>
<th>Than observed</th>
<th>Ratio test</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First group</td>
<td>Yes</td>
<td>15</td>
<td>0.28</td>
<td>0.5</td>
</tr>
<tr>
<td>Second group</td>
<td>No</td>
<td>38</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As Table 3 shows, among 53 teachers participated in this study, 72 percent believe that the coherence of the textbook is more than average. The obtained level of significance shows that it is less than the researcher’s alpha; therefore, the null hypothesis (the coherence of the textbook content is less than the average level) is rejected and the researcher’s hypothesis (the consistency of the textbook content is more than the average level) is accepted.

Hypothesis 4. In teachers’ view, the patterns topic of the new written math book at third grade of elementary level matches significantly with students’ age level.

**Table 4: The one-sample T-test**

<table>
<thead>
<tr>
<th>Blog book</th>
<th>T-statistics</th>
<th>Degree of freedom</th>
<th>Significance level</th>
<th>Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.482</td>
<td>51</td>
<td>0.61</td>
<td>0.27981</td>
<td>0.0535 - 0.5062</td>
</tr>
</tbody>
</table>

Based on Table 4, among 53 teachers participated, 79.2 percent believe that topic of patterns fits with the age level of students. Since the obtained level of significance is less than 0.05 therefore the null hypothesis (the mismatch between the topic of patterns and students’ age level) rejected and the researcher’s hypothesis (the match between the topic of patterns and student’s age-level) is accepted.

Hypothesis 5. In teachers’ view, the topic of statistics and probability in the new written math book at third grade of elementary level matches significantly with students’ age level.

**Table 5: The one-sample T-test student**

<table>
<thead>
<tr>
<th>Blog book</th>
<th>T-statistics</th>
<th>Liberation degree</th>
<th>Significance level</th>
<th>Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.173</td>
<td>51</td>
<td>0.264</td>
<td>0.17212</td>
<td>0.1226 - 0.4668</td>
</tr>
</tbody>
</table>

As Table 5 shows, among 53 participants, 67.9 percent believe that the subjects of statistics and probability are in accordance with students’ age level. Since the obtained level
of significance is more than 0.05; therefore, we cannot reject the null hypothesis (the subjects of statistics and probability mismatch with students’ age level) and thus, the researcher’s hypothesis (the match between the subjects of statistics and probability) is rejected.

Hypothesis 6. In teachers’ view, the outline and content of the new written math book at third grade of elementary level is significantly along with the given objectives.

Table 6: The one-sample T-test student

<table>
<thead>
<tr>
<th>T-statistics</th>
<th>Liberation degree</th>
<th>Significance level</th>
<th>Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blog book</td>
<td>0.784</td>
<td>41</td>
<td>0.437</td>
<td>-0.23 to 0.51</td>
</tr>
</tbody>
</table>

Based on Table 6, among 42 participants, 34 percent believe that the overall outline and content of the book are along with the given objectives. In answering to these questions, we faced 11 missing data which can be due to teachers’ inability to judge the outline of the book. Since the level of significance is more than 0.05, therefore we cannot reject the null hypothesis (mismatch between the outline and content of the book with students’ age level) and so the researcher’s hypothesis (the match between the outline and content of the book with students’ age level) is rejected.

4. Conclusion

The present study was done to investigate the teachers’ view of third grade of elementary about the role of new written book at third grade of elementary level in improving student’s learning. The obtained results convey the teacher’s ideas about role of the new written book in improvement of students’ learning. The results of the study show that, the course subjects have a significant role in improving learning and enhancing parents’ satisfaction. The changes result in increasing learning and parents’ satisfaction. It is due to the fact that in the new written book, the goal is to make students familiar with different ways of solving problems, and involving them in external realities and employing them in daily life. These findings are in line with Dudaite (2007); the findings of Dodeet’s study show that students owe their progress in math to changes in teaching method from traditional to dynamic and problem solving method. Students find learning math interesting when its subjects relate to the content of their lives and job; therefore, it leads to improved learning and enhanced parents’ satisfaction. Then, from teachers’ point of view, topic of patterns significantly matches with the students' age of this level, but teachers have a different idea and feedback to changes that is due to their believes about course subjects. These findings are consistent with Stajen’s (2003) that states teachers interpret reforms in different ways, and based on their understanding of students’ needs, select some parts of reforms. But teachers believe that the topic of statistics and probability is significantly inappropriate for this level. In the view of this book authors, at this age, students are ready to learn statistics and probability to use them in everyday life. But for students of third grade of elementary school, it is not interesting to know the number of clients going to bank or the record of a shop’s sale, or to use probability in everyday life. Teachers believe that, students cannot imagine themselves in such situations since they are not yet involved with these issues in life. In this investigation, teachers do not
believe in significant match between subjects and content of the textbook and objectives set for students. These findings are not in line with Adibniya’s (2002). He investigated the content of math books at fourth grade of elementary level from teachers’ viewpoint. The findings of his study showed that the content of the math book at fourth grade of elementary level are in accordance with educational objectives of elementary course, planning and organizing of content and programming (persistence, progression, and unity), psychological principles and developmental and learning processes, daily life demands and social situation of society, and students’ prior knowledge. Book writing department considers the goal of teaching mathematics as: student’s better life, achieving competencies in mathematical modeling and problem solving, developing thinking skills, linking between various demonstration of math and their interpretation, linking mathematics with other sciences, and in general, using mathematical concepts in surrounding environment and interpreting and analyzing them. But in reality, it is not the case since the volume of the contents of the new book at third grade is high and is inappropriately categorized and their explanations are not through. The new system of changing books, has confused teachers and parents, and the mismatch between parents’ knowledge and lack of minute time table in providing teachers with the book and inadequate and ineffective teaching, and selection of teachers who are not competent enough to transform the subjects have put the process of teaching children in trouble. Teachers also do not have enough time to review and repeat the lessons. Also they have to analyze all of these different solutions for students, and state their relationships to their lives and involve students with these subjects to reach those objectives. So, teacher teaches according to the budgeting and students cannot learn the subjects well and will face a lot of difficulties especially in higher levels.

In a general conclusion, teaching different courses make students familiar with world and its phenomena at elementary level. Teaching mathematics is one of those lessons. Changes in elementary curriculum and math book and also fundamental change in teaching methods at this level have a significant role in teaching and learning mathematical concepts. Thus changing and updating with the present science is necessary. In this study, the goal of investigating the new written book with new educational methods is to encourage students to think so that they play an active role in teaching. And at the same time, they learn competencies that enhance their ability in solving problems. According to the obtained results, following suggestions are offered to writers, teachers and parents:

In providing the new book, writers should pay attention to the available time and high volume of classes at schools for teachers so as they have more time to teach these materials. Also, before global distribution of each new book, it is better to implement it in smaller area and detect its possible deficits and resolve them, then they use it all over the country. The content of the book must be revised so that the topics are interrelated like a chain. Also teachers should be able to freely choose the appropriate contents and class activity. The math book of elementary school is designed in a way that takes away any choice from teachers so that teachers only focus on course subjects. While, through revising the content and liberating teachers in choosing, teachers can differentiate between the activities that lead students to thinking and those that are only obsessive and choose those activities that facilitate learning. So, like literature, in each educational grade, math should include at least two free topics from which teacher can choose.

Ministry of education should also use experienced teachers during in-service teacher training courses, and provide teachers at all school with teacher’s guide so that they do not face a lot of problems while teaching.
Teachers should select best teaching methods that make students think more. When the method does not work, teachers should use other new methods. Successful teachers are the ones who always enter the class with love, and love their students. They are patient and do not get angry with students’ different and sometimes wrong answers. Also teachers should pioneer in investigating the content of math books and reflect their efficiencies to the authorities. Since no one except a teacher can be influential in writing math book, and no authority except the teacher himself knows the week points of the book, they have to write down the problems and summarize them during school year and send them together with their suggestions to the Organization of Research and Planning and Textbook writing so that they are implemented while revising the textbooks in further publishing. School officials should provide educational facilities, educational technology and the right atmosphere for learning and accompany teachers. Undoubtedly, due to the variety of computer programs, using computer systems in math classes will help elementary students in learning mathematical concepts. It is a good idea to establish math labs to increase students’ creativity. Also the number of students must be enough so that the teacher can communicate with all of them, because inadequate conditions, lack of educational facilities and high volume of students lead to slow and ineffective teaching. Holding briefing sessions for parents’ information about new methods is the school officials’ duty.

Lack of parents’ attention to the issue that most math problems must be done at home is one of the reasons why teaching math has some deficiencies. So, parents should cooperate with teachers during the school year so that their children make more progress.

In the new written book, much of duties are on the part of teacher which is not apt due the high volume of the class and the book, and few available facilities. Students will hurt most. Teachers believed that it was more appropriate that in writing the new book, teacher’s views of this grade have been taken into account.

5. References

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