Bulletin of Education and Research
April 2018, Vol. 40, No. 1 pp. 57-76

Alignment between Mathematics Curriculum and Textbook of Grade VIII in Punjab

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Abstract

The curriculum document is considered to be the road map for the attainment of the national goals. For this purpose, the text books are developed in such a way that the contents presented in the books are aligned with curriculum document. The study was aimed to align the textbook of Mathematics (grade VIII) with reference to National Curriculum 2006 for Mathematics I-XII and Bloom's taxonomy in Punjab. This study was qualitative in nature. The alignment level was measured through Surveys of Enacted Curriculum method [SEC].The content analysis protocol was developed by reviewing the literature, National Curriculum 2006 for Mathematics and Mathematics text book developed by Punjab curriculum and Textbook Board [PCTB]. The content analysis protocol was validated in the light of opinions from two curriculum specialist and two assessment experts. The outcomes of the study revealed that the textbook of Mathematics at grade VIII was not properly developed, as instructions were stated in the National Curriculum for Mathematics (2006). There were so many gaps found between the students learning outcomes as mentioned in the Curriculum and the content (units of the book). The study suggests that curriculum needs to be revised and continuous evaluation is required to maintain the standards of the Curriculum.

Keywords: Alignment, National Curriculum Mathematics, Surveys of Enacted Curriculum method, Textbook.

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Introduction

Textbook is a unique instructional tool due to its characteristics among all other instructional materials used and suggested to implement the curriculum. It is durable, permanent, portable and having no need of electricity or electronic device while using (Sunday, 2014). Text book is the most important device in teaching-learning process (Aziz & Zain, 2010; Oakes & Saunders, 2002; Spillane, 2004). It decided whether the content meets desired students' needs on long-term basis. Textbook is primary tool and the basic source to implement the curriculum suggested and written by the Government. Mahmood (2010) defines the term "textbook" as an authentic material to be presented in classroom. According to Wen-Cheng, Chien-Hung, and Chung-Chieh (2011) textbooks offer guidance about course and activity design to novice teachers; it assures a measure of structure, consistency, and logical progression in a class. For the proper implementation of any curriculum, text book is an integral part of the education system and cannot be neglected (Mahmood, 2010).

Mathematics is often considered as a difficult subject to teach and learn. Students usually took math as a boring and complex subject on the other hand teachers also took this subject challenging and complicated and need to acquire greater skills to teach (Gafoor & Kurukkan, 2015; Jameel & Ali, 2016; Ma & Xu, 2004; Liu & Koirala, 2009).Properly written and high quality books can play a vital role to improve mathematical skills of students. Allington proved in his research that students' learning is directly affected by the quality of textbooks (2002). In this advanced era, math and science become essential to produce successful students and to cope with the challenging world outside. Moreover, Students' interest in math makes them able to take complete advantages from the career options in future (Gravemeijer, Stephan, Julie, Lin, & Ohtani, 2017). Thus, it is mentioned in the National Curriculum for Mathematics (2006) that to improve student's mathematical skills, properly written and high quality books can play a vital role. This advanced era math and science become essential to produce successful students and to cope with the challenging world outside. Moreover, Students' interest in math makes them able to take complete advantages from the career options in future. Further, it is stated in National curriculum for Mathematics (2006) that Mathematical structures, operations and processes provide students with a framework and tools for reasoning, justifying conclusions and expressing ideas clearly. When students become able to identify relationships between mathematical concepts and everyday situations. They can make connections between Mathematics and other subjects, Moreover students develop the ability to use Mathematics to extend and apply their knowledge in other fields.

According to Venkataiah (1993) the curriculum being the main instrument of education, it cannot be static. As the frontiers of knowledge expand with time, the curriculum should be updated, restructured in such a way that it would enhance the quality and standard of education. According to Avez–Lopaz (2003) politicians and curriculum developers have an important impact by making policy decisions that directly affect how textbooks will ultimately be used in the classroom. In the end, however, the teachers in the classroom, through their everyday decisions, determine what opportunities for learning mathematics their students will have.

Altundağ, Yıldız, Köğce and Aydın (2009) explained the two main purpose of school mathematics: first is to raise the workforce of the industry and technology to increase the rate of literacy; secondly, individual learners proceed their careers with this subject as a mathematician in the future. Aggarwal (2001) suggested some textbook features upon which the relevancy and adequacy of a textbook could be checked. Those are:

- Selection of Content: This consists of eight parameters that included the content must be relevant, adequate coverage of the content, enough content of each topic, authentic, up-to-date and integrated content and that content should be linked with daily life.
- Presentation of the content: Parameters to check the presentation of a textbook are appropriate and attractive title, motivating presentation, creative and interesting content.
- Verbal communication language: He further pointed out that the text book must be contained appropriate vocabulary, short and simple sentences correct spelling, correct punctuations
- Visual illustration: Illustration should be suitable for the mental level of the students, easily portable and up to date, motivate learners, relevant and purposeful, accurate, simple and cheap, and large enough for sight.

Ornstein (1994) concluded that the accomplishment of educational objectives is intensely dependent on the degree of alignment between the textbooks and the curriculum guidelines marked by curriculum development agencies. Volumes of researches are conducted around the globe in recognition with the significance of this issue (Dalim & Yusof, 2013; Kulm, Roseman, & Treistm, 1999; Mahmood, 2010, 2011; McCluskey, 2006; Rehman, 2004) but as Nicholls (2003) rightly argued that methods for textbook research are under-consideration and in need of further research.

In Pakistan the role of textbook development rests with the provincial or regional Textbook Boards, and private publishers have also started developing textbooks. These boards and private publishers publish the textbooks according to guidelines provided in the National Curriculum (Mahmood, 2010).Pakistan is far behind from the developed countries, especially in the field of science including Mathematics. So to face the challenges of the new time and globalization there is a definite need to update our curricula according to the recent developments and concepts to make it in consonance with the emerging needs (Halai, 2008). Consequently, most of the responsibilities lay on curriculum developers and teacher's methodology. Therefore, curriculum needs continuous feedback for its better success in implementation (Ramparsad, 2001). Unfortunately, nobody pay attention towards the reviews on curriculum as well as on textbooks once it is implemented. It is therefore, worth investigating to identify the gaps between the National Curriculum 2006 for Mathematics I-XII and the textbooks for Mathematics at 8^{th} grade so that curriculum and textbook developers can base their decisions regarding the quality of both the curriculum and the textbook. So this state of affairs compelled the researchers to conduct this study to fill the gap.

Research Questions

The research questions of the study were following:

- Are Student Learning Outcomes (SLOs) of National Curriculum for Mathematics (2006) aligned with the content of textbook of Mathematics (grade VIII) and the levels of Bloom's taxonomy?
- Are the textbook's features aligned with the guidelines given in the National Curriculum for Mathematics (2006)?

Methodology

This study was qualitative in nature. The textbook of Mathematics (grade VIII) during the session 2016-2017 school years was aligned with the National Curriculum for Mathematics (2006). Surveys of Enacted Curriculum method was used to measure the alignment level. This method has been used internationally to measure the alignment between curriculum and textbook (Bhatti, Jumani, & Bilal, 2015; Liu, Zhang, Liang, Fulmer, Kim, & Yuan, 2009; Kurz, Elliott, Wehby, & Smithson, 2010; Ndlovu & Mji, 2012). The content analysis protocol was developed by researchers. The content analysis protocol was validated in the light of opinions from two curriculum specialist and two assessments' experts. The content of the textbook was analyzed according to the students learning outcomes (SLOs) given in the curriculum. The content analysis protocol was comprised of two parts. First part contained the checklist about textbook style and structure and the second part consisted of unit wise checklist.

Data Analysis and Interpretation

This section includes textbook style& structure, distribution table of units from curriculum and textbook. Comparison was made between textbook content and the SLOs as mentioned in National Curriculum of 2006 for Mathematics I-XII.

Part 1: Textbook Style and Structure

The textbook of mathematics grade VIII was written by Amin, Shafiq-ur-Rehman, Saeed, Baig, Anwar and Shirani (2016). It contained 10 units. The units have no outline which showed the list of headings and sub headings. Similarly, no SLOs were given in the textbook. There was no short introduction which explain what the unit covers and why. Key terms are not bold in the content. Each unit contains features boxes which contain some more useful information regarding mathematical formula or working rules etc. But the issue is with the font size of feature boxes that are too small to view. The textbook contains a lot of illustrative examples which help to build conceptual understanding about the topic. Punctuation and spelling mistakes are also found in textbook.

The textbook has learning review exercises which appropriate to check the students' understanding. Summary of the units are also given at the end of each unit. Each unit has objective type items (i.e. multiple choice and short questions) along with each unit. The textbook of mathematics grade VIII has unit wise answers of the questions in the end of the book. Textbook has glossary and symbols table but neither bibliography nor index as described in National Curriculum 2006 for mathematics I-XII.

Part2: Distribution table of units from curriculum and textbook

Table 1

Units of curriculum and textbook

Unit #	Units in Curriculum	Units in Textbook
1	Operations on Sets	Operations on Sets
2	Real Numbers	Real Numbers
3	Number Systems	Number Systems
4	Financial Arithmetic	Financial Arithmetic
5	Polynomials	Polynomials
6	Factorization, Simultaneous Equations	Factorization, Simultaneous Equations
7	Fundamentals of Geometry	Fundamentals of Geometry
8	Practical Geometry	Practical Geometry
9	Areas and Volumes	Areas and Volumes
10	Demonstrative Geometry	Not Exist
11	Introduction to Trigonometry	Not Exist
12	Information Handing	Information Handling

The above table 1 shows the distribution of content in curriculum and textbook. National Curriculum 2006 for mathematics I-XII has 12 units and textbook have 10 units. Two units are missing in textbook i.e. Demonstrative Geometry and Introduction to Trigonometry. According to preface of textbook the committee found that these two units may be excluded from book being difficult for grade VIII students. The Board of Governor (BOG) of Punjab Curriculum and Textbook Board has approved these recommendations.

Part 3: A Comparison of Textbook Content with the SLOs mentioned in curriculum

Table 2

Unit 1: Operations on sets

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
1.1 Sets	Recognize set of natural numbers (N) (Knowledge)	Yes
	Recognize set of Whole numbers (W) (Knowledge)	Yes
	Recognize set of integers (Z) (Knowledge)	Yes
	Recognize set of rational (Q) (Knowledge)	Yes
	Recognize set of even numbers (E) (Knowledge)	Yes
	Recognize set of odd numbers (O) (Knowledge)	Yes
	Recognize set of prime numbers (P) (Knowledge)	Yes
	Fine a subset of a set. (Application)	Yes
	Define proper (?) and improper (?) subsets of a set. (Understanding)	Yes
	Find power set P(*A*) of a set. *A*. (Application)	Yes
1.2 Operations On Sets	Verify commutative and associative laws with respect to union and intersection. (Analysis)	Yes
	Verify the distributive laws. (Analysis)	Yes
	State and verify De Morgan's laws. (Analysis)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

The table 2 shows that first unit "Operations on Sets" was aligned with the SLOs that are mentioned in the National Curriculum 2006 for mathematics I-XII. The main focus of the SLOs is on knowledge level of Bloom's taxonomy but a little focus on application and analysis level of Bloom's taxonomy.

Table 3
Unit 2: Real Numbers

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
2.1Irrational Numbers	(i) Define an irrational number. (Knowledge)	Yes
	(ii) Recognize rational and irrational numbers. (Understanding)	Yes
	(iii) Define real numbers. (knowledge)	No
	(iv) Demonstrate non-terminating/non-repeating(or non-periodic) decimals. (Application)	Yes
2.2 squares	(i) Find perfect square of a number. (Application)	Yes
	(ii) Establish patterns for the squares of natural numbers (e.g., $4^2 = 1 + 2 + 3 + 4 + 3 + 2 + 1$). (Application)	Yes
2.3 squares Roots	(i) Find square root of • a natural number (e.g. 16, 625, 1600), (Application)	Yes
	• a common fraction $\left(\text{e.g. } \frac{9}{16}, \frac{3}{6}, \frac{4}{9}, \frac{6}{4}, \frac{4}{9}\right)$ (Application)	Yes
	• a decimal (e.g. 0.01, 1.21, 0.64), given in perfect square from, by prime factorization and division method. (Application)	Yes
	(ii) Find square root of a number which is not a perfect square (e.g., the numbers 2, 3, 2.5). (Application)	Yes
	(iii) Use the following rule to determine the number of digits in the square root of a perfect square. Rule: Let *n* be the number of digits in the perfect square then its square root contains $\frac{??}{2}$ digits if *n* is even, $\frac{?? + 1}{2}$ digits if *n* is odd. (Application)	Yes
	(iv) Solve real life problems involving square roots. (Application)	Yes
2.4 Cubes and cube Roots	(i) Recognize cubes and perfect cubes. (Knowledge)	Yes
	(ii) Find cube roots of a number which are perfect cubes. (Application)	Yes
	(iii) Recognize properties of cubes of numbers. (Knowledge)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 3 displays that SLOs of unit 2 "Real Numbers" of National Curriculum 2006 for mathematics I-XII is aligned with the textbook. The content is same as mentioned in the National Curriculum 2006 for mathematics I-XII. The main focus of the SLOs is on application level of Bloom's taxonomy but a little focus on knowledge level of Bloom's taxonomy.

Table 4

Unit 3: Number System

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
3.1 Numbers System	(i) Recognize base of a number system. (Knowledge)	Yes
	(ii) Define number system with base 2, 5, 8 and 10. (Knowledge)	Yes
	(iii) Explain binary number system (System with base 2) Understanding)	Yes
	• Explain number system with base 5 (Understanding)	
	• Explain octal number system (system with base 8) (Understanding)	Yes
	• Explain decimal number system (System with base 10) (Understanding)	Yes
3.2 Conversions	(i) Convert a number from decimal system to a system will base 2, 5 and 8, and vice versa. (Application)	Yes
	(ii) Add, Subtract and multiply number with base 2, 5 and 8. (Application)	Yes
	(iii) Add, Subtract and multiply numbers with different base (Application)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

The table 3.4 demonstrates that SLOs of unit 3"Number System" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on first three level of Bloom's taxonomy i.e. knowledge, understanding and application.

Table 5

Unit 4: Financial Arithmetic

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
4.1 Compound Proportion	(i) Define compound proportion. (Knowledge)	Yes
	(ii) Solve real life problems involving compound proportion, partnership and inheritance. (Application)	Yes
4.2 Banking 4.2.1 Types of a Bank Account	(i) Define commercial bank deposit, types of a bank account (PLS savings bank account, current deposit account, PLS term deposit account and foreign currency account). (Knowledge)	Yes
	(ii) Describe negotiable instruments like cheque, demand draft and pay order. (Knowledge)	
4.2.2 On-line banking	(iii) Explain on-line banking, transactions through ATM (Auto Teller Machine), debit card and credit card (Visa and Master). (Understanding)	Yes
4.2.3 Conversion of Currencies	(iv) Convert Pakistani currency to well-known international currencies. (Application)	Yes
4.2.4 Profit/Markup	(v) Calculate	
	• the profit/markup (Application)	Yes
	• the principal amount (Application)	Yes
	• the profit/markup rate (Application)	Yes
	• the period (Application)	Yes
4.2.5 Types of Finance	(vi) Calculate	
	• Overdraft (OD) (Understanding)	Yes
	• Running Finance (RF) (Understanding)	Yes
	• Demand Finance (DF) (Understanding)	Yes
	• Leasing. (Understanding)	Yes
	(vii) Solve real life problems related to banking and finance. (Application)	Yes
4.3 Percentage 4.3.1 Profit and Loss	(i) Find percentage profit and percentage loss. (Application)	Yes
4.3.2 Discount	(ii) Find percentage discount (Application)	Yes
	(iii) Solve problems involving successive transaction. (Application)	Yes
4.4 Insurance	(i) Define insurance. (Knowledge)	Yes
	(ii) Solve real life problems regarding life and vehicle insurance. (Application)	

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 5 displays the SLOs of unit 4"Financial Arithmetic" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on first three level of Bloom's taxonomy i.e. knowledge, understanding and application.

Table 6

Unit 5: Polynomials

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
5.1 Algebraic Expression	(i) Recall constant, variable, literal and algebraic expression. (Knowledge)	Yes
5.2 Polynomial	(i) Define • Polynomial (Knowledge) • Degree of Polynomial (Knowledge) • Coefficients of a polynomial (Knowledge) (ii) Recognized polynomial in one, two and more variable. (Knowledge) (iii) Recognize polynomials of various degree (e.g. linear, quadratic, cubic and biquadratic polynomials). (Knowledge)	Yes Yes Yes Yes Yes
5.3 Operations on Polynomials	(i) Add, subtract and multiply polynomials. (Application) (ii) Divide and polynomial by a linear polynomial. (Application)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 6 shows that SLOs of unit 5 "Polynomials" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on two level of Bloom's taxonomy i.e. knowledge and application.

Table 7

Unit 6: Factorization, Simultaneous Equations

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
6.1 Basic Algebraic Formulas	Recall the formulas: • $(a + b)^2 = a^2 + 2ab + b^2$ • $(a + b)^2 = a^2 - 2ab + b^2$ • $a^2 - b^2 = (a - b)(a + b)$, And apply them to solve problem like: Evaluation $(102)^2$, $(1.02)^2$, $(98)^2$ and $(0.98)^2$. (Application) Find $x^2 + \frac{1}{x^2}$ and $x^4 + \frac{1}{x^4}$ when the value of $x \pm \frac{1}{x}$ is given. (Application)	Yes Yes

6.2 Factorization	Factorize expression of the following types: • ka + kb + kc, (Application) • ac + ad + bc + bd, (Application) • $a^2 \pm 2ab + b^2$, (Application) • $a^2 - b^2$, (Application) • $a^2 \pm 2ab + b^2 - c^2$. (Application)	Yes Yes Yes Yes Yes Yes
6.3 Manipulation of Algebraic Expression	Recognize the formulas: • $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ • $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$, and apply them to solve the problem like: Find $x^3 + \frac{1}{x^3}$ and $x^3 - \frac{1}{x^3}$ when the value of $x \pm \frac{1}{x}$ is given. (Application)	Yes
6.4 Simultaneous Linear Equations	(i) Recognize simultaneous linear equations in one and two variables. (Knowledge) (ii) Given the concept of formation of linear equation in two variables. (Understanding) (iii) Know that • A single linear equation in two unknowns is satisfied by as many pair of value as required. (Knowledge) • Two linear equations in two unknowns have only one solution (i.e., one pair of values). (Knowledge)	Yes Yes Yes Yes
6.5 Solution of Simultaneous Linear Equations	(i) Solve simultaneous linear equations using • Methods of equation the coefficients (Applications)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 7 shows that SLOs of unit 6 "Factorization, Simultaneous Equations" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on two levels of Bloom's taxonomy i.e. knowledge and application.

Table 8

Unit 7: Fundamentals of Geometry

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
7.1 Parallel Lines	(i) Define parallel lines. (Knowledge)	Yes
	(ii) Demonstrate through figures the following properties of parallel lines.	Yes
	• Two lines which are parallel to the same given line are parallel to each other. (Application)	
	• If three parallel lines are intersected by two transversals in such a way that the two intercepts on the second transversal are also equal. (Application)	Yes
	• A line through the midpoint of the side of a triangle parallel to another side bisects the third side (an application of above property) (Application)	Yes
	(iii) Draw a transversal to intersect two parallel lines and demonstrate corresponding angles, alternate interior angles, vertically opposite angles and interior angles on the same side of transversal. (Application)	Yes
	(iv) Describe the following relations between the pairs of angles when a transversal intersects two parallel lines.	Yes
	• Pairs o corresponding angles are equal. (Application)	
	• Pairs of alternate interior angles are equal (Application)	Yes
	• Pair of interior angles on the same side of transversal is supplementary, and demonstrates them through figures. (Application)	Yes
7.2 Polygons	(i) Define a polygon (Knowledge)	Yes
	(ii) Demonstrate the following properties of a parallelogram	Yes
	• Opposite angles of a parallelogram are equal. (Application)	
	• Diagonals of a parallelogram bisect each other (Application)	Yes
7.3 circle	(i) Demonstrate a point lying in the interior and exterior of a circles. (Application)	Yes
	(ii) Describe the terms; sector, secant and chord of a circle, concyclic point, tangent to a circle and concentric circles. (knowledge).	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 8 displays that SLOs of unit 7 "Fundamentals of Geometry" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on two levels of Bloom's taxonomy i.e. knowledge and application

Table 9
Unit 8: Practical Geometry

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
8.1 construction of Quadrilaterals	(i) Define and depict two converging (non-parallel) lines and find the angle between them without producing the lines (Knowledge).	Yes
	(ii) Bisect the angle between the two converging lines without producing them. (Knowledge)	Yes
	(iii) Construct a square	Yes
	• When its diagonal is given (Application)	
	• When the difference between its diagonal and side is given (Application)	Yes
	• When the sum of its diagonal and side is given (Application)	Yes
	(iv) Construct a rectangle	Yes
	• When two side are given (Application)	
	• When the diagonal and side are given. (Application)	Yes
	(v) Construct a rhombus	Yes
	• When one side and the base angle are given (Application)	
	(vi) Construct a parallelogram	Yes
	• When two diagonals and the angle between them is given. (Application)	
	• When two adjacent sides and the angle included between them is given. (Application)	Yes
	(viii) Construct a regular pentagon	Yes
	• When a side is given. (Application)	
	(ix) Construct a regular hexagon	Yes
	• When a side is given. (Application)	
8.2 Construction of a Right Angled Triangle	Construct a right angled triangle	Yes
	• When hypotenuse and one side are given. (Application)	
	• when hypotenuse and the vertical height from its vertex to the hypotenuse are given. (Application)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 9 shows that SLOs of unit 8 "Practical Geometry"of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on two levels of Bloom's taxonomy i.e. knowledge and application.

Table 10

Unit 9: Areas and Volumes

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
9.1 Pythagoras Theorem	(i) State the Pythagoras theorem and give its informal proof. (Application)	Yes
	(ii) Solve right angled triangles using Pythagoras theorem. (Application)	Yes
9.2 Hero's Formula	State and apply Hero's formula to find the areas of triangular and quadrilateral regions. (Application)	Yes
9.3 Surface Area and Volume	(i) Find the surface area and volume of a sphere. (Application)	Yes
	(ii) Find the surface area and volume of a cone. (Application)	Yes
	(iii) Solve real life problems involving surface area and volume of sphere and cone. (Application)	Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 10 shows that SLOs of unit 9 "Areas and Volumes" of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is only on one level of Bloom's taxonomy i.e. application.

Table 11

Unit 11: Demonstrative Geometry

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
10.1 Demonstrative geometry	(i) Define demonstrative geometry. (Knowledge)	No
10.1.1 Reasoning	(ii) Describe the basics of reasoning. (Understanding)	No
10.1.2 Axioms Postulates and Theorem	(iii) Describe the types of assumptions (axioms and postulates). (Understanding)	No
	(iv) Describe parts of a proposition. (Understanding)	No
	(v) Describe the meanings of a geometric theorem corollary and converse of a theorem (Understanding)	No
10.2 Theorems	Prove the following theorems a long with corollaries and apply them to solve appropriate problems.	No
	(i) if a straight line stands on another straight line, the sum of measures of two angles so formed is equal to two right angles. (Application)	No
	(ii) If the sum of measures of two adjacent angles is equal to two right angles, the external arms of the angles are in a straight line. (Application)	No

	(iii) If two lines intersect each other, then the opposite vertical angles are congruent. (Application)	No
	(iv) In any correspondence of two triangles, if two sides and included angle of one triangle are congruent to the corresponding sides and included angle of the other, the two triangles are congruent. (Application)	No
	(v) If two sides of a triangle are congruent, then the angles opposite to these sides are congruent. (Application)	No
	(vi) An exterior angle of a triangle is greater in measure than either of its opposite interior angles. (Application)	No
	(vii) If a transversal intersects two lines such that the pair of alternate angles are congruent then the lines are parallel. (Application)	No
	(viii) If a transversal intersects two parallel lines the alternate angles so formed are congruent. (Application)	No
	(ix) The sum of measures of the three angles of a triangle is 180^o. (Application)	No

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 11 demonstrates that content of the unit 11"Demonstrative Geometry"of National Curriculum 2006 for mathematics I-XII is not exists in the textbook. The main focus of the SLOs is on first three level of Bloom's taxonomy i.e. knowledge, understanding and application.

Table 12

Unit 12: Introduction to Trigonometry

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
11.1 Trigonometry	(i) Define trigonometry. (Knowledge)	No
11.2 Trigonometric Ratios of Acute Angles	(ii) Define trigonometric ratios of an acute angle. (Knowledge)	No
	(iii) Find trigonometric ratios of acute angles (30^o, 60^o and 45^o) . (Application)	No
	(iv) Define trigonometric ratios of complementary angles. (Knowledge)	No
	(v) Solve right angled triangles using trigonometric ratios. (Application)	No
	(vi) Solve real life problems to find heights (avoid naming angle of elevation). (Application.	No

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

Table 12 illustrates that content of the unit 11"Introduction to Trigonometry" of National Curriculum 2006 for mathematics I-XIIis not exists in the grade VIII mathematics' textbook. The main focus of the SLOs is on two levels of Bloom's taxonomy i.e. knowledge and application.

Table 13

Unit 13: Information Handling

Topic	SLOs in Curriculum The students will be able to:	Content in Textbook
12.1 Trigonometry Distribution	(i) Define frequency, frequency distribution (knowledge) (ii) Construct frequency table. (Application) (iii) Construct a histogram representing frequency table. (Application)	Yes
12.2 Measures of Central Tendency	(i) Describe measures of central tendency. (Knowledge) (ii) Calculate mean (average), weighted mean, median and mode for ungrouped data. (Application) (iii) Solve real life problems involving mean (average), weighted mean, median and mode. (Application).	Yes Yes Yes

Note: The words in parenthesis "()" shows the level of Bloom taxonomy.

The table 13 shows that SLOs of unit 12 "Information Handling "of National Curriculum 2006 for mathematics I-XII is completely aligned with the textbook. The main focus of the SLOs is on two levels of Bloom's taxonomy i.e. knowledge and application.

Conclusion and Discussion

Textbook was aligned with the curriculum except two units i.e. "Demonstrative Geometry" and "Introduction to Trigonometry". These units were missing and the reason to exclude is also mentioned in the preface of the textbook, which seems unreasonable. These two units are very much important, as trigonometric functions is a requirement for understanding many branches of Science and Mathematics. These topics should be covered at elementary level to comprehend the higher concepts at secondary level. According to Dündar (2015), most students who encounter the trigonometric concepts in their high schools for the first time in their lives they become unable to relate these ideas with real life and do not know where they come from. On the other hand, if the students are able to understand the concepts of "Areas and Volumes", "Practical Geometry" then the trigonometry and the demonstrative geometry are not much difficult to understand at 8^{th} grade level.

Moreover, the focus of the textbook was only on lower cognitive levels of Bloom's taxonomy i.e. knowledge, comprehension, application and the rest of other higher cognitive levels are neglected. Textbook structure given in the National Curriculum 2006 for mathematics I-XII was also not following exact pattern, for example bibliography and index were missing even after various revisions of the textbook.

Recommendations

On the basis of conclusion, the following recommendations were made:

SLOs may be written in the textbook for the teachers as well as students' guidance. Textbook content may be designed according to all the levels of Bloom's taxonomy rather than focus only on two or three levels. The two units that has been excluded from the textbook i.e. Introduction to Trigonometry and Demonstrative Geometry are very much important units. Therefore, at least the introductory concepts regarding missing units may be included.

Textbook is need to be more structured regarding guidelines given in the National Curriculum 2006 i.e. bibliography and index are missing from the textbook. Punctuation and spelling mistakes should also be correct. Textbook cover is also need to be more appealing and interesting for the students. Colors may be added to the textbook as it seems quite boring to view. Font size of feature boxes may be large enough to sight. Mathematics Textbook for class 8th in Punjab may be redesigned according to the curriculum.

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