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Analysing Students' Learning Outcomes and Items in Assessment Exercises of Textbook with Single National Curriculum of General Science at Primary Level

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Abstract

This study examines how Grade V Science textbook and the Single National Curriculum (SNC) are aligned. The objectives of the study were to: a) investigate the alignment of students' learning outcomes (SLOs) of SNC for general science (2020) with its corresponding textbook of grade V; and b) critically analyze the questions given in assessment exercises of the textbook concerning revised Bloom's taxonomy. The documents evaluated for the study were the SNC for general science (2020) and the textbook of grade V. Three instruments: Curriculum Textbook Alignment Framework, Curriculum Textbook Alignment Rubric, adapted from Saeed and Rashid (2014), and Curriculum Textbook Alignment Checklist were used. The checklist was created by the researcher and validated by the two experts. Results revealed that some of the textbook's questions were not aligned with the SLOs of SNC. The analysis of the 80 SLOs showed that 64 of them entirely aligned with assessment items, 16 of them failed to produce assessment items in the textbook exercises, 127 of the questions were from lower-order thinking skills (LOTs) and only 20 were from HOTs of the revised Bloom's taxonomy. It was recommended that there should be a balance of higher and lower-order cognitive skills, and textbook authors should be well-versed in the revised Bloom's taxonomy of the cognitive domain.

Keywords: *Students' learning outcomes (SLOs), Items in assessment exercises, textbook, Single National Curriculum (SNC), General Science, Primary Level.*

Introduction

Raising educational levels contributes to the prosperity of nations worldwide. A country's philosophical and educational objectives are recognized and explained in the curriculum paper. Curriculum documents are given a great deal of attention in highly developed countries.

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In 2020, Pakistan introduced the Single National Curriculum (SNC), which was subsequently implemented in primary schools for the 2021–2022 academic year. The General Science SNC (2020) was created to support TIMSS (Trends in International Mathematics and Science Study) in order to encourage scientific literacy, and foster critical thinking.

There are three types of curriculum documents: curriculum for achievement (product curriculum), curriculum for teaching (process curriculum), and curriculum aspires to be (proposed curriculum). The planned curriculum is a formal document that contains the curriculum developers' original thoughts. Implemented curriculum refers to the student activities that lead to the desired curriculum. Achieved curriculum is the result of the two curricula that were previously discussed (Kyi, Errabo, & Isozaki, 2023).

The researcher found some of the studies on Single National Curriculum (SNC) such as, (a) Expected challenges, merits and demerits with respect to SNC (Abbas, Basit, Akhtar, Mehmood, & Nazim, 2022), (b) Capacity building of teachers at primary level through SNC (Batool, Shaheen, & Iqbal, 2023), (c) Analysis of teachers' perceived self-efficacy in implementing general science Single National Curriculum 2020 at primary level (Muqadar, Ishfaq, Tahir, & Tufail, 2023), and (d) Teachers' Expectations and Concerns by implementing SNC (Zaman, Saleem, & Ali, 2021).

The implementation of the Single National Curriculum (SNC) under Prime Minister Imran Khan's leadership. The motto of SNC is "One Nation One Curriculum," and its primary goals are to promote social harmony, national unity, the abolition of discipline-specific disparities, equal education, teacher and student mobility between provinces, and the holistic development of pupils. The final SNC document was approved, and it was then implemented on several levels. First, in 2021–2022, it was applied at the elementary school level. Second, in 2023–2024 it was implemented at the elementary level; and the third phase of implementation took place in the current school year, 2024–2026, at the secondary level.

A textbook that is curriculum-aligned will be crucial to the implementation of the curriculum. Alignment is crucial since the external exams are built around curriculum that has been developed. Every aspect of teaching and learning in Pakistan is based on textbooks. Researchers discovered numerous flaws in textbook publishers' claims that they adhere to curriculum norms and meet publishing requirements. Thus, it is necessary to carry out these studies to look at how well curricula match relevant

textbooks (Bhatti, Jumani, & Bilal, 2015). The SNC has established textbook evaluation standards that must be met in real-world situations. When evaluating a textbook, three factors are considered: (a) the textbook's potential performance (also known as predictive or pre-use); (b) the textbook's actual usage (also known as in-use); and (c) a reflective evaluation of the textbook (also known as retrospective or post-use).

Revised Bloom's Taxonomy

The systematic way of categorizing things is called taxonomy. Hierarchical domains include upper, middle, and lower levels of different categories (Mongar, 2022). In 1956, Benjamin, S. Bloom developed the taxonomy which incorporated six levels of cognition, Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. In 2001, an amendment was made by Loren Anderson and Krathwohl with the work of Bloom and they introduced six levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating.

The curriculum provides instructions on how to accomplish all goals. Curriculum specialists thus concentrate on curriculum alignment, which is essential for raising the value of education. If the textbook instruction is in line with the curriculum standards, the learner's accomplishment level could be raised. It is not an easy effort to achieve the curriculum criteria; suitable educational resources, such as teacher professional development and proper training for teaching and performance assessment, are needed (Bhatti et al., 2015).

An alignment study conducted in Morocco investigated the relationship between earth science and life science textbooks and their elementary and secondary curricula. A survey study with 37 Likert scale items was carried out. The results showed that although there is some need to emphasis on the cultural factor in textbooks compared to curricula, they show a good connection between content and abilities with their respective curricula. A study found that knowledgeable instructors may enhance the quality of instruction by using their understanding of and proficiency with instructional language (Saayoun et al., 2023).

Curriculum characterizes the educational structure of the country. Its implementation is based on the capability and credibility of the system which produce good teacher because the teacher is the only one entity who is the final implementer of the curriculum physically. Overall environment of the educational structure of the nation plays major role through providing good quality resources for appropriate

implementation of the formal curriculum. Day by day changes in societal need make dynamic nature of curriculum which requires a list of resources for applying at classroom level. Strong managerial act also contribute for applying curriculum in suitable way (Piala et al., 2024).

Siregar, Sukyadi, and Yusuf (2024) conducted a study to assess the English textbook and compared it with its corresponding curriculum. Textbook provided academic guidance to students and professional guidance to teachers. Analyzed English textbook helps the students to improve their writing skills. Study concluded that textbook requires such type of writing material which enhanced wide-ranging writing ability of students, through this student actively perform daily task at classroom as well as societal level.

A study was carried out by dos Santos et al., (2024) to assess the curriculum-matched textbooks. Numerical expression analysis and fraction analysis were used in the study to analyze the data. It made clear how closely textbooks adhere to curriculum requirements. The study concluded that textbooks do not include examples from actual life as required by the curriculum. As a result, teachers are unable to modify the material to align with the cultural norms of the classroom. It is important to train teachers to face novel obstacles.

According to Bhatti, Khurshid, and Ahmad (2017), the biology textbook is out of balance across all Bloom's taxonomy cognitive levels and does not follow the curriculum. According to a mixed-method study by Raza, Waheed, and Gilani (2023), physics textbooks at the IX level do not adhere to the Higher-Order Thinking skills (HOTs) required by curricular standards to meet curriculum goals.

Seitz (2017) examines the three types of curricula in terms of choosing textbook content in accordance with curriculum guidelines and also looks at striking a balance between HOTs and LOTs. The study established a correlation between the curriculum's objectives and the assessment items in the textbook exercise. Results revealed that 97% of the textbook's material is in line with the learning objectives. As a result, the study looked into 7% cognitive level alignment between the curriculum and the textbook.

A framework of six themes is used to evaluate mathematics textbooks in order to emphasize their value. According to Zeynivandnezhad, Saralar-Aras, and Halai (2024), the textbook was evaluated based on six criteria: knowledge-based, audio-visual aids, communication skills, cultural identity, teaching approach, and evaluation

exercises. Through curriculum alignment, Karabacak & YAPICIOĞLU (2020) conducted a study to ascertain the teacher's teaching style. While multi-grade instructors were unable to synchronize the curriculum with regard to pedagogy and assessment, classroom teachers were able to do so with regard to content. Teachers are unable to match classroom activities with the curriculum due to lack of resources.

Objectives of the Study

1. Investigate the alignment of student learning outcomes (SLOs) narrated in Single National Curriculum with the textbook in the subject of General Science at grade V.
2. Examine how far the assessment exercises of the General Science textbook have been developed according to revised Bloom's Taxonomy of Educational Objectives.

Research Questions

1. To what extent Student Learning Outcomes (SLOs) of Single National Curriculum are aligned with the textbook in the subject of General Science at grade V?
2. How far the assessment exercises of the General Science textbook are aligned with the different levels of revised Bloom's Taxonomy of Educational Objectives?

Method and Procedure

The study was qualitative in character. Document analysis was used to conduct this study. The textbook's content was examined for mistakes and omissions using content analysis. The alignment of SNC with the textbook with regard to SLOs, content, and assessment tasks was done in depth through qualitative analysis.

In the study, to evaluate the textbook and explore the association, relatedness, or relevance of SNC and general science textbook with respect to SLOs, content and questions, three tools were used:

1. Curriculum-Textbook Alignment Framework (CTAF)

2. Curriculum-Textbook Alignment Rubric (CTAR)

3. Curriculum-Textbook Alignment Checklist (CTAC)

The curriculum-textbook alignment framework consists of three components: curriculum organization (horizontal alignment between textbook chapters), chapter

analysis (including tasks, alignment evidence, Bloom's taxonomy, assessment plans, and SLOs), and descriptive analysis (12 elements to evaluate chapter alignment). This tool, adapted by Saeed and Rashid (2014), assesses even distribution of content across textbook chapters.

The second tool i.e. the Curriculum-Textbook Alignment Rubric (CTAR) by Saeed and Rashid (2014), evaluates chemistry curriculum-textbook alignment at the secondary level. It includes five components: goals, materials, exercises, student evaluations, and an overall review. Each component is rated at four levels: 25%, 50%, 75%, or 100% based on the presence of intended details.

The third tool i.e. Curriculum-Textbook Alignment Checklist, was developed by the researcher to assess the alignment of the grade V general science textbook with the Single National Curriculum. It covers four areas: SLOs, content, activities, and assessment tasks across varying cognitive levels.

Data Analysis and Interpretation

The Single National Curriculum (SNC) 2020 is horizontally organized to some extent. First chapter "Classification of Living Organism" provides preliminary information or concept for second chapter "Microorganism" and it was observed that a strong connection was found between first and second chapter. On the other hand, if we see the alignment between topics within a chapter all topics were well connected and also aligned with respective Student Learning Outcomes (SLOs). There are some suggestions for textbook writers; a) The keywords "organism" and "kingdom" should be defined before going to start the first chapter. b) The definition of invertebrates with respect to the absence of backbone should be given, before describing the topic "invertebrates". c) The reproduction process of fishes and amphibian should be added in textbook. d) The themes of the habitats of the insects and worms should also be added in the textbook.

Chapter-wise Analysis

Analysis of Chapter 1

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Describe classification of living organisms and its importance"	1.1 State the importance of classification?	Understanding
		1.2 Write one characteristic and one example of Monera and Protista?	Analysing
		1.3 What is the similarity between Fungi and Animals?	
2.	"Classify the plants into two major groups (dicots and monocots) and give examples of each group"	Not found	Not found
3.	"Compare and contrast the structure of dicot and a monocot plant (with respect to their seeds, leaves and flowers)"	What is the number of cotyledons in a gram seed?	Remembering
4.	"Differentiate between vertebrates and invertebrates based on their characteristics"	Not found	Not found
5.	"Classify vertebrates into, fish, amphibians, reptiles, birds and mammals on the basis of their characteristics"	5.1 Which one of the following is the foot of an aquatic bird?	Understanding
		5.2 The cats belong to which group?	Remembering
		5.3 A fish respire through which organ?	Remembering
		5.4 Write the differences between amphibians and reptiles	Analysing
		5.5 CRQ # 1*	Understanding
		5.6 CRQ # 2*	Analysing
		5.7 CRQ # 3*	Understanding

6.	"Classify invertebrates into five groups (sponges, worms, insect, snail and starfish) on the basis of their characteristics"	6.1 Which group is found only in the ocean?	Remembering
		6.2 Write the differences between worms and insects	Analysing
7.	"Analyse some of the factors caused by human which are affecting Biodiversity"	7.1 Define biodiversity	Remembering
		7.2 Investigate Q # 1*	Understanding
		7.3 Investigate Q # 2*	Understanding
8.	"Suggest and write some measures for conservation of endangered species"	Not found	Not found

Analysis of Chapter 2

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Define and describe microorganisms"	Not found	Not found
2.	"Identify the main groups of microorganisms and gives examples of each"	2.1Penicillium is an example of which group?	Understanding
		2.2 Mushrooms belong to which group?	Remembering
		2.3 Which one of the following is not a microorganism?	Remembering
3.	"Recognize some common diseases of each group caused by microorganisms"	3.1 Food is contaminated due to the presence of ---- in the environment?	Understanding,
		3.2 Why are some bacteria and fungi called decomposers?	Understanding,
		3.3 CRQ #1 *	Understanding,
4.	"Highlight the role of microorganisms in deco position and discuss its harmful and beneficial effects"	4.1 What causes polio?	Understanding,
		4.2 What is a pathogen? How does it enter in the bodies of organisms?	Understanding,
		4.3 Write two harmful effects of bacteria? Investigate Q #2*	Understanding

5.	"Recognize that microorganisms get transmitted into humans and spread infectious diseases"	How does a mosquito transmit disease?	Understanding
6.	"Discuss and deduce advantages and disadvantages (any 3) of microorganisms by using some daily life examples"	6.1 How does the microorganism yeast work to soften and raise dough of flour?	Understanding
		6.2 Write two benefits of bacteria.	Understanding
		6.3 Investigate Q # 1*	Understanding
7.	"Suggest preventive measures to protect him/her-self from these infections"	Not found	Not found

Analysis of Chapter 3

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Examine and describe structure of flower"	1.1 Can you tell the names and functions of the four parts of a flower?	Understanding
		1.2 Label the given picture:	Remembering
		1.3 In the given picture of flower, which are the reproductive parts of the flower?	Remembering
2.	"Define pollination and describe its types with examples"	2.1How will you compare self-pollination and cross pollination?	Analysing
		2.2Which type of pollination is must for papaya?	Understanding
		2.3 CRQ #2	Analysing,
		2.4 Investigate # 1	Understanding
3.	"Define reproduction and differentiate between sexual and asexual reproduction in plant"	Define reproduction.	Remembering,

4.	"Describe the structure of a seed and demonstrate its germination"	4.1The gram seed is covered by which structure? 4.2 CRQ #1	Remembering, Understanding
5.	"Compare and contrast the structure and function of chick pea and maize seed"	5.1 The given figure is of dicot seed. Which statement is correct about it? 5.2 Compare gram and maize seed.	Remembering Analysing
6.	"Illustrate the condition necessary for seed germination"	Which conditions are necessary for seed germination?	Remembering

Analysis of Chapter 4

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Define pollution and its types"	Not found	Not found
2.	"Explain the main causes of water, air and land pollution"	2.1Write three causes of air pollution. 2.2 Which one of the following acts causes most of the air pollution? 2.3 CRQ #1*	Understanding, Remembering, Understanding
3.	"Explain the effects of water, air and land pollution (unclear/toxic water, smoke, smog, excess CO_2/other gases, open garbage dumps, industrial waste etc.) on the environment and life"	3.1 What are the four effects of pollution on life? 3.2 Investigate # 1*	Understanding Understanding
4.	"Discuss and explain the effects of burning fossil fuels and releasing greenhouse gases in air"	4.1Which of the following is not a greenhouse gas? 4.2 What is greenhouse effect? 4.3 What will be the effects of global warming?	Remembering Understanding Understanding

5.	"Differentiate between biodegradable and non-biodegradable materials"	5.1 Which one of these is non-biodegradable? 5.2 Investigate Q # 2	Remembering, Understanding,
6.	"Explain the impact of non-biodegradable materials on the environment"	CRQ # 2*	Understanding
7.	"Investigate possibilities and suggest ways to reduce non-biodegradable materials"	CRQ # 3*	Understanding
8.	"No SLOs for these items in assessment exercise of textbook"	8.1. Which disease is caused due to air pollution? 8.2. The germs present in it cause typhoid. 8.3. Write three ways of preventive measures to reduce pollution.	Remembering Remembering Understanding

Analysis of Chapter 5

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Identify observable change in materials that do not result in new materials with different properties (e.g., dissolving, crushing aluminium cane)"	CRQ # 1*	Understanding
2.	"Recognized that matter can be changed from one state to another by heating or cooling (candle wax)"	What type of change is it when metal expands on heating?	Understanding
3.	"Describe and demonstrate the state of water (melting, boiling, freezing, evaporation and condensation)"	3.1. Explain evaporation giving examples from everyday life? 3.2. Define condensation? 3.3. Explain the three states of matter and their inter-conversion. 3.4 CRQ # 3*	Understanding, Remembering, Understanding Understanding

4.	"Identify ways of accelerating the process of dissolving materials in given amount of water and provide reasoning (i.e., increasing the temperature, stirring and breaking the solid into smaller pieces increase the process of dissolving)"	Which factor will not affect the dissolving of sugar in water?	Understanding
5.	"Distinguished between strong and weak concentration of simple solutions"		Not found
6.	"Identify observable changes in materials with different properties (e.g., decaying, burning, rusting)"	6.1. The change of milk into yoghurt is:	Understanding,
		6.2. Why did a person paint his iron gate?	Understanding
		6.3 What is rusting and which type of change is this?	Understanding,
7.	"Differentiate between physical and chemical changes with examples"	7.1 Which one is not a chemical change?	Understanding,
		7.2 Give an example of chemical change in which carbon dioxide is produced?	Understanding,
		7.3 CRQ # 2*	Understanding
		7.4 Investigate Q #1*	Understanding

Analysis of Chapter 6

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Identify natural and artificial sources of light"	Not found	Not found
2.	"Justify that light emerges from a sources and travels in a straight line"	Investigate Q # 2	Understanding
3.	"Investigate luminous and non-luminous objects in daily life"	CRQ # 2	Applying
4.	"Identify and differentiate between transparent, opaque and	4. 1 How does light travel in air?	Understanding,

	translucent objects in their surroundings"	4.2 What is transparent object? Write the name of three transparent objects?	Remembering
5.	"Investigate that light travel in straight line"	CRQ # 3*	Analysing
6.	"Explain the formation of shadows"	Can you be a winner while running with your shadow? Give the reason also.	Understanding
7.	"Predicts the location, size and shape of a shadow from a light source relative to the position of objects"	When is your shadow the shortest and the longest in the sunlight?	Understanding
8.	"Demonstrate that shiny surfaces reflect light better than dull surfaces"	8.1. Which object reflects maximum light? 8.2 The moon is non-luminous like our earth. How does it look luminous to us?	Understanding, Understanding
9.	"Describe and Demonstrate how sound is produced by a vibrating body"	Investigate Q. #1*	Understanding
10.	"Identify variety of materials through which sound can travel"	When water comes in the way of sound travelling through air:	Understanding
11.	"Identify the speed of sound differs in solids, liquids, and gaseous medium"	Speed of sound is maximum in:	Remembering
12.	"Define and describe the intensity of sound with examples"	12.1When a train is moving away from you; will the intensity of its sound increase or decrease? 12.2 CRQ# 1*	Understanding Applying
13.	"Define noise and its harmful effects on human health"	13.1Which of the following sounds is called noise? 13.2 CRQ # 4*	Understanding Analysing
14.	"Appreciate the role of human beings in reducing noise"	Not found	Not found

Analysis of Chapter 7

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Explain the phenomenon of static electricity in everyday life"	CRQ # 4 *	Applying
2.	"Describe charges and their properties"	A balloon is charged by rubbing it with a woollen cloth. Why does it stick to a wall when brought near it?	Understanding
3.	"Differentiate between conductors and insulators in daily life"	Current can easily pass through:	Remembering
4.	"Describe flow of electric current in an electric circuit"	4.1The flow of current in an electric circuit is controlled by: (Remembering)	Understanding
		4.2 Why does a bulb light up in a closed circuit?	Understanding
5.	"Describe and design the electric circuit and explain its components"	You are given a bulb. What other components are required to light it up?	Understanding
6.	"Recognize that magnet can be used to attract some metallic objects"	6.1 Why does an iron nail stuck to a magnet attract another nail?	Understanding,
		6.2 CRQ # 3* 6.3 Investigate Q #1*	Applying Applying
7.	"Describe and demonstrate that magnets have two poles and like poles repel and opposite pole attract"	7.1 How many poles are there on ring shaped magnet?	Remembering,
		7.2 A freely suspended bar magnet always stays along:	Understanding
		7.3 Which one is a true statement? 7.4 CRQ # 2 *	Applying
8.	"Identify earth as huge magnet and demonstrate it with experiment"	CRQ # 1*	Understanding
9.	"Describe the working of magnets compass"	How are directions known using a magnet compass?	Applying

10.	"Explain different types of magnets (permanent, temporary magnet and electro-magnet)"	Not found	Not found

Analysis of Chapter 8

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Describe the structure of earth (e.g., crust, mental and core) and the physical characteristics of these distinct parts"	1.1 What is the outer layer of the earth called? What is its importance in our life?	Understanding
		1.2 The outer layer of the earth is called:	Remembering,
2.	"Describe the sources of water on earth"	2.1What part of the earth's surface consists of oceans? Why can we not drink sea water?	Understanding
		2.2 Where is the water found in the form of solid, liquid and gas (vapours)?	Understanding
		2.3 The amount of fresh water on the earth is:	Remembering
		2.4 CRQ # 1*	Remembering
		2.5 Investigate Q # 1*	Remembering
3.	"Identify similarities and differences among the different types of soil"	3.1 What are the main types of the soil?	Remembering
		3.2 Which type of soil is good for electromagnet growth of plants?	Understanding
		3.3 What is the role of living organisms in the soil?	Understanding
		3.4 Which soil is useful to make pottery? What are its properties?	Analysing
		3.5 CRQ # 2*	Analysing
		3.6 CRQ # 3*	Understanding
		3.7 CRQ # 4*	Analysing

4.	"Investigate the composition and characteristics of different soils"	4.1What is important in the natural manure?	Understanding,
		4.2 Which matter is obtained from decayed plants and insects?	Analysing

Analysis of Chapter 9

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Define the term 'space' and emphasize the need to explore it"	1.1 Countless shining lights seen at night on the sky are:	Remembering
		1.2 The first artificial satellite was sent into space in:	Remembering
2.	"Recognize the role of NASA (National Aeronautics and Space Administration) in space exploration"	First man to step on the moon:	Remembering
3.	"Define the term 'satellite' and describe its importance"	Moon is the natural satellite of the earth. Is the earth also a satellite of some bigger object? What is the object?	Creating
4.	"Describe the natural satellites of the planet of solar system"	Not found	Not found
5.	"Define artificial satellites and explain their importance in exploring the earth and space"	Not found	Not found
6.	"Recognize the key milestones in space technology"	Not found	Not found
7.	"Describe the uses of various satellites in space i.e. geostationary, weather, communication and Global Positioning System (GPS)"	7. 1 How long does it take for a geo-stationary satellite to complete one orbit?	Remembering,
		7.2 The system locates the position of an object on the earth surface is:	Remembering

	7.3 Write five benefits which we get from artificial satellite.	Understanding
	7.4 Why does a geo-stationary satellite appear to be stationary?	Understanding
	7.5 CRQ # 1*	Understanding

Analysis of Chapter 10

Sr. No.	Learning Outcomes from Curriculum	Assessment plan (questions) from textbook	Alignment with revised Bloom's taxonomy
1.	"Enlist the practice safety procedures while carrying out the activities"	Not found	Not found
2.	"Make a model of Foot Bridge and bookshelf"	2.1 What do you need to make a model of a footbridge?	Applying
		2.2 CRQ # 2*	Applying
3.	"Use spirit level/water level to level different objects (table, picture, frame etc.)"	What is the difference between the functions of spirit level and plumb line?	Analysing
4.	"Use a plumb line to install a flag pole vertically"	4. 1 We check the horizontal surface level by using a;	Understanding,
		4.2 What does a mason use to keep a wall vertical?	Understanding,
		4.3 You have to install a picture frame on the wall. How can it be kept straight horizontally as well as vertically?	Applying
5.	"Prepare LED light strings working with 12 volts battery"	5.1 What is an LED?	Remembering
		5.2 CRQ # 3 *	Applying
		5.3 Investigate # 1*	Applying
6.	"Make a musical instrument from easily available resources"	CRQ # 2*	Applying
7.	"Make moveable wagon, bus, trolley etc."	Not found	Not found

8.	"Use first aid box to dress a wound"	8.1 Saline water is used for:	Remembering,
		8.2 Sterilized gauze is used:	Remembering,
		8.3 What is meant by first aid?	Understanding
9.	"Practice shifting a person to hospital"	Not found	Not found
10.	"Practice earth quake, fire and flood drills"	The emergency phone call number is:	Remembering

Discussion

In Pakistan, like other developing nations, textbooks are a reliable source of information. Textbooks are essential for passing on knowledge to the following generation. The goal of this study was to match the SNC of general science with its textbook for grade V (SNC, 2020). Because the textbook authors did not adhere to the curriculum's guidelines, approved textbooks have certain flaws (Saher & Kashif, 2020).

Curriculum gives authors guidance on how to write things like skill-based activities, inquiry-based learning, constructed response questions, and assessment tasks, among other things. All of these factors must be considered while creating and releasing textbooks. The curriculum offers teachers a comprehensive plan for classroom assessment in the form of teaching methodology and assessment approach. The SLOs in the SNC document and the textbook are entirely relevant, and the majority of the content is found in relation to the SNC's required standards. There was an imbalance between LOTs and HOTs in relation to the evaluation items in the textbook exercises. All six levels of updated Bloom's taxonomy's cognitive domains should be homogeneous. Textbooks are assessed using predetermined standards that were previously outlined in the SNC document.

According to the current study, there was alignment between the SLOs at the start of each textbook chapter. For the most part, the textbook's material also lined up. To some extent, learning activities were aligned. In particular, the textbook's learning exercises matched the cognitive abilities of elementary school pupils. The SNC document provided 39 lesson plans with activities, while the textbook used 30 lesson plans with activities. The textbook's typographical properties were essentially decent. There were certain assessment tasks that had no SLOs listed in the textbook. There is a lack of some explanation for some themes and subtopics.

The purpose of the current study was to examine how well the Single National Curriculum (SNC) and the relevant level V general science textbook align. The results showed that there is a strong correlation between the SLOs outlined in the curriculum and the learning outcomes that students gain from each chapter of the textbook. Partially matched with the SLOs described in the SNC paper were the elements in the textbook evaluation tasks. This finding was aligned with earlier research conducted by Mahroof and Saeed (2021).

The research's findings revealed certain discrepancies between the curriculum and textbook. While learning projects and evaluation items in textbook exercises were partially connected to the new curriculum, the textbook's content was effectively matched with the new curriculum. The practice worksheet's items mostly evaluate the first two cognitive levels rather than all levels equally. There were not many things to investigate applying, constructing, and assessing. The study discovered that there is no equilibrium between LOTs and HOTs. Thus, it is the duty of textbook authors to create their works in accordance with curricular requirements. They require instruction in developing evaluation items that are distributed evenly throughout the six cognitive levels. Additionally, they ought to keep a balance between higher- and lower-order thinking abilities.

Conclusion

The SNC document and general science textbook standards, benchmarks, and SLOs are mostly in line with each other. Parts of the textbook's assessment exercises corresponded partially with the curriculum's SLOs. The textbook only displays a horizontal arrangement between chapters 1 and 2. The last eight chapters of the general science textbook are not horizontally organized because they combine physics, chemistry, biology, and astronomy. Basic ideas are covered in the content of each of the three strands that comprise all of these disciplines. Items in assessment exercises do not accurately gauge students' learning abilities because of a misalignment between the curriculum and the relevant textbook. Fewer things come from higher order cognitive abilities like remembering and understanding.

Teachers hardly consult the SNC document, and textbook authors have an obligation to ensure that their works are aligned with curriculum requirements. It is necessary, therefore, for Ministry of Federal Education & Professional Training (MFE&PT) and Punjab Curriculum & Textbook Board (PCTB) to establish clear standards for textbook appraisal. In order to maintain a balance between LOTs and HOTs, assessment exercises using higher order thinking skills (HOTs) should also be

included in the textbook. When creating the questions on an assessment sheet that is provided at the conclusion of each textbook chapter, it is imperative to have a balance between HOTs and LOTs.

Recommendations

i) One should apply textbook material to everyday life. Students' problem-solving abilities should be strengthened for application in real-world situations. To do this, the author should include pertinent exercises covering various concepts in each of the textbook's chapters.

ii) PCTB needs to establish the standards that textbook publishers and authors adhere to, in order to guarantee curricular compliance. Content selection must be based on SLOs. Presenting the several studies on textbook alignment could be helpful in resolving this problem.

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