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Analysis of Written and Supported Curriculum of General Science at Secondary level

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ABSTRACT
The aim of the study evaluates the Written and Supported curriculum of General Science at the secondary level. The study was intended to evaluate the alignment of written and supported curriculum in terms of Bloom's Taxonomy of Educational Objectives separately and then compare the alignment between written and supported curriculum in terms of Bloom's Taxonomy of Educational Objectives. The research was evaluative, and a conceptual content analysis design was applied to collect the data. The research study was also a desk study i.e., Document Analysis. The population of this study was National Curriculum of General Science and Textbook of General Science The study sample was comprised of the National Curriculum of General Science of Grades IX-X and the collected data was analyzed using Bloom's Taxonomy of Educational Objectives. The data was analyzed using the frequency table, percentage, and proportion. The data was presented through tables after the statistical analysis. Studies on the alignment of Written and Supported Curriculum are foremost for investigating the worthwhile application of the Written Curriculum and helping the collaborators i.e., Examiners, Curriculum setters, Course developers, Textbook writers, and teachers to improve the situation.

Keywords: *Written Curriculum, Supported Curriculum, General Science, Secondary Level*

1. Introduction

Education plays an important role in every aspect of life. The aspects might be social, economic, religious and psychological etc. Education helps every individual to develop critical skills i.e., cognitive ability, decision making, logical thinking and problem solving. All the educational aims might be proceeded in the reference of educational policy. An educational policy is a statement or a document concerned from time to time officially for the development of education system of the country. The education system of every individual country depends on their Educational Policy. Educational policy consists of different principles and policies recommendations that modify the field of education as well as the assemblage of laws and rules that govern the operation of Education system. The system of Education is a process of using Curriculum. Education is a procedure of learning that involves the curriculum in the Education system. Curriculum is a standard-based document of planned experiences where the learner achieve proficiency in content and applied learning skills.

Curriculum is the core component for all educators i.e., what's essential for learning and teaching. In simple, curriculum is a vehicle to clarify and emit the National goals and social expectations to the upcoming generation (Ministry of Federal Education & Professional Training, 2006). Curriculum is important for every individual i.e., curriculum specialist, teacher in the classroom or an educator at traditional and non-traditional institutions. Different types of Curriculums are stratified together. Suppose, written curriculum formally related to writing and documented for teaching. Whereas, supported curriculum involves the additional resources & learning experiences and assessed curriculum also known as tested curriculum.

Every subject has individual curriculum according to the requirements of subject. The general science curriculum deliberated to involve students in scientific inquiry, problem solving process and in decision making. Whereas the learning strands based on knowledge, skills and attitude. The subject of General Science has integrated contents of Life Science, Physical Science, Earth & Space Science, Skills for scientific inquiry, Attitudes to support the application of scientific and Science, Technology, Society & Environment (STSE). These are called the integrating strands of General Science (Subject). The quality of science education is linked with science textbooks. Different initiatives were promised for the improvement of science education and reviewing the science textbooks of different grades (National Educational Policy, 2009).

In previous studies, researchers found that many studies conducted on same concept with different subjects i.e., English, Biology, Mathematics, Physics, Chemistry and Pakistan Studies etc. Fayyaz, Hassan and Parveen, 2021 found that the SLOs of compulsory subject English were not designed to enhance self-directed learning and critical evaluation. Gull and Saeed, 2020 found that the learners' "application", "analysis", "synthesis" and "evaluation" abilities were not truly assessed through the Board of Intermediate and Secondary Education (BISE) question papers. There will be different Student Learning Outcomes, Skills and attitudes according to the topic requirements. In General Science, the Examination System never assess the practical implications of science according to the Curriculum. In fact, the repetition of past question papers also a big problem both for teachers and students. So, the development of human being is multi-disciplinary task that consist of psychology, education, sociology and on cognitive science. So, Curriculum provides a complete picture to the educational institutions that regulate the learning objectives, learning outcomes and relevant subject. Curriculum basically ensure the continuity and consistency in the Education system. In current scenario, examination system focused on rote learning and ignored the higher order thinking of cognitive domain. As well as, the content of science was overloaded for both instructor and learner. Even, less time required for science subjects teaching and instructor encouraged learners' memorization instead of understanding (Faize, 2011). Learners only depend on rote memorization. They were no any idea to solve the problem scientifically. They also not a good observer because they don't think about that. Similarly, the teachers also unaware about the implementation and application of scientific inquiry. They only focused

on achieving good marks in Board of Intermediate and Secondary Education (BISE). Hence, the Assessment System not showed their active presence actually. These problematic situations will cause the research on this research topic "Analysis of Written and Assessed Curriculum of General Science at Secondary level (2018-2024)"

Literature Review

Curriculum is a path for teachers to guide their student by using different teaching methodologies. Whereas, textbook development activity done with the help of Curriculum Document. Even in the classroom teacher teach their student with the help of assigned textbook. At last Assessment based on Textbook (National Education Policy, 2009).

The document of written curriculum must be included different aspects i.e., teachers' planning documents, curriculum guides, standard and scope of charts. Whereas assessed curriculum appears in test and the measures performances i.e., standardized test, district level test, instructor-made tests etc. Similarly, supported curriculum includes those sources that support the curriculum actually i.e., textbooks, portfolios, software, A.V aids and many other sources (Galtthorn & Allan, 2000).

National Curriculum framework provides guidelines to the learners for achieving National vision, mission, goals and objectives of relevant subject or content. The aim of the National Curriculum Framework to develop productive and effective principles, strategies, and policies for the development, implementation and evaluation of curriculum (National Curriculum framework Pakistan, 2009).

In the regard of this study, different types of curriculums are aligned i.e., written curriculum, supported curriculum and assessed curriculum. Written curriculum is the outcome of creative educators and long-lasting learning effect on the learners (wolk, 2010). Written curriculum is a core component of authentic literacy. It is much more comprehensive and specific curriculum rather than others. Whereas, supported curriculum shaped the resources and plays a central role in curriculum cycle. Assessed curriculum is also tested curriculum. In assessed curriculum teacher assesses learners' work with range of assessment tools.

The National Curriculum for General Science Grade 9th expected six (06) Learning strands for General Science subject i.e., Life Science, Physical Science, Earth & Space Science, Skills, Attitudes, Science, Technology, Society and the Environment. The major focus of strand one (01) is on to understand about the Nature of life like aspects of healthy life style, ecosystem, agriculture, global environmental issues, environmental issues and basis of inheritance etc. Strand two (02) based on the matter, energy and its transformation. Similarly, strand three (03) based on providing proper foundation to the learners about solar system and the universe. Strand four (04) develop the learner's skills for solving problems, scientific inquiry, knowledge and its application. Strand five (05) based on developing student attitude towards study of science and its implications in society. Strand six (06) based on developing the nature of science and technology according to the context of environment (National Curriculum for general Science grades IX & X, 2009).

Textbooks are the backbone of classroom instructions (Mahmood, 2010). Textbook is an important medium for teaching and learning (Fayyaz, Haseeb ul Hassan & parveen, 2021). In the present era, there is a demand to contribute scientific knowledge through upcoming technologies but in Pakistan scenario, science textbooks are only used in schools for the furnishing of scientific knowledge. The Science subject textbook is different rather than others because it is site on facts and figures (Akhtar & Nawaz, 2017). In the Textbook of Punjab Textbook Board, Lahore of General Science Grade 9th and 10th; there are total 11 chapters. First six (06) chapters for grade 9th and remaining five (05) chapters for grade 10th. Grade 9th chapters consist of Introduction & role of Science, Our Life and Chemistry, Biochemistry & Biotechnology, Human Health, Disease, Cause & Prevention and last one is Environment & Natural Resources. All the chapters have different Student Learning Outcomes (SLOs) according to the chapter requirements.

In textbook chapter one (01) "Introduction & role of Science" consist of history about Science, Concept of Islam about Science, Contribution of Scientists, Branches and Role of Science & Technology as well as Limitations of latest Science. Chapter two (02) "Our Life & Chemistry" consist of building essential elements for life, Carbon, Organic Chemistry, Water & its properties and role of different gases. Chapter three (03) "Biochemistry & Biotechnology" consist of Metabolism, Enzymes, Composition of blood, Genetic Engineering, Antibiotics & Vaccines and Recycling of waste material. Chapter four (04) "Human Health" consist of important components of human diet, Balanced diet, Nervous system, Exercise in human life and first aid. Chapter five (05) "Disease, Cause and Prevention" consist of Diseases like bacteria, viruses, parasites & fungi, spread of microorganisms and mental diseases and their treatment. Last one is chapter six (06) "Environment & Natural Resources" consist of Earth's atmosphere, Ozone layer, Pollution & their impact of human life, Development of dairy poultry farming and effect of overpopulation on Environment (Prof. Nazir Ahmed Chughtai, Prof. Dr. javed iqbal, Prof. Dr. Ejaaz Rasool & Dr. Mahmood-Ul-Hassan, 2003).

Taxonomy seeks to classify the forms and levels of learning. Whereas, Bloom's taxonomy developed by Bloom. He was an educational psychologist and against on rote learning (Mahroof & Saeed, 2021). Bloom's taxonomy of Educational Objectives consisted of three (03) hierarchies of different domains i.e., Cognitive, Affective and Psychomotor domain. The primary use of these domains based on teachers' teaching and learners' learning. With the help of Bloom's Taxonomy, the instructor can be classified the intellectual behavior of students learning. There are three learning domains of Bloom's Taxonomy of Educational Objectives i.e., Cognitive, Affective and Psychomotor domain. The cognitive learning domain related to intellectual and thinking process whereas affective learning domain related to our emotions towards learning and psychomotor domain related to behavior and physical skills (Domains of Learning). There are six (06) levels of Cognitive domain i.e., Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. Almost 80% to 90% teachers asked knowledge-based questions instead of this teacher may be try to utilized higher order levels questions (colorado college, 22). There are five (05) levels of Affective domain

i.e., Receiving, Responding, Valuing, Organizing and Characterizing. Similarly, there are seven (07) levels of Psychomotor domain i.e., Perception, Set, Guided response, Mechanism, Complex overt response, Adaptation and Origination.

Examination system is based on textbooks and they try to test the knowledge of the candidates whether, the candidate is successful or failure (Khattak, 2012). Effective evaluation and assessing system are depend on the reliability and appropriateness of the question papers (Tariq, Prof. Dr. M. Iqbal, Abdullah & M. Farooq, 2016). Exams basically emerge learners' confidence which increase the personality of learners in a hardworking manner. Exams are playing major role in learning programs. Without exams learning of learners' not influence the educational objectives.

Pakistani education system is unreliable in different aspects. In classroom scenario, student only focus to qualify the grade only and not worry to understand the relevant concept (Khattak, 2012). Arshad, Shah & Rubab, 2019 suggested that BISE (Board of Intermediate and Secondary Education) paper setter must be included some critical thinking-based questions for the open mind of students. Moreover, book writers must be included such activities based on critical thinking in classroom environment.

Statement of the problem

In today's scenario, Science revolutionized the whole world. It contributed in every field of life i.e., Education. The written curriculum provides the overall classroom instructions. It guides about the teaching methodology, resources needed for implementation of curriculum, support material, assessment system and co-curricular activities. So, classroom instructions, teaching methodology, textbooks, and assessment and learning materials must be congruous with written curriculum. The research's complication was analyzed the Written and Supported Curriculum of General Science at secondary level. The main focus of the study was aligned the written and supported curriculum of General Science in terms of Bloom's taxonomy of educational objectives.

Research Objectives

1. Evaluate the alignment of written curriculum of General Science in terms of Bloom's Taxonomy of Educational Objectives.
2. Evaluate the alignment of Supported curriculum of General Science in terms of Bloom's Taxonomy of Educational Objectives.
3. Compare the Alignment of Written curriculum with Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives.

Research Questions

What extent is the written curriculum of General Science congruent with Bloom's Taxonomy of Educational Objectives?

What extent is the Supported curriculum of General Science congruent with Bloom's Taxonomy of Educational Objectives?

Do the Written Curriculum is aligned significantly with the Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives?

Delimitations of the Study

Sr.no.	Delimitation	Reason
1.	**Subject of General Science**	Owing to researcher's interest and less no of researchers' focus on that subject.
2.	**Punjab BISE**	The researcher live in the province of Punjab that's why the researcher wants to know about their own province Boards.

Research Design

The nature of this study was Descriptive. The research content analysis was used for this study. The research study was also desk study i.e., Document Analysis.

Population

Participants of this study were National Curriculum of General Science (2009) and Textbook of General Science IX and X (2018).

Sampling

Census sampling (also known as complete enumeration) is a data collection method in which all units of a population are surveyed or observed. Census sampling method was applied. Study sample were made up of Grade IX and X Textbook of General Science by Punjab Textbook Board (2018) and National Curriculum of General Science of Grades IX-X (2009).

Instrumentation

The process of data gathering employed two principal tools: the Curriculum Alignment Protocols, and a Google Form for Aligning Learning Strands. The Curriculum Alignment Protocols were applied in the measure of alignment between the enacted curriculum and learning outcomes. Moreover, the Google Form was used to collect specialist views and comments regarding learning strands alignment to gain a deep insight into how these components are interrelated. These tools altogether enabled in-depth analysis of the curriculum and textbook alignment against the intended learning outcomes.

Data Collection

Data was collected through various sources: National Curriculum of General Science (2009), Grade IX & X General Science Textbook (2018) and an expert opinion Google Form, and one framework (for Curriculum SLOs).

Scoring Procedure

The scoring process of the study utilized a multi-step procedure, integrating a number of core elements. The Curriculum Alignment Protocols were applied to assess the alignment of the curriculum with intended learning outcomes. Google Form for Aligning Learning Strands offered useful expert feedback on learning strand alignment for a full understanding of their efficacy.

Data Analysis

The data gathered was analyzed on the basis of Bloom's Taxonomy of Educational Objectives. The data was analyzed with the help of two principal software i.e., SPSS and MS. Excel. The data were examined using Frequency table and Percentage. The data was presented in the form of tables and its interpretation following the statistical analysis.

Results and Discussions

Analysis of the written and supported curriculum for General Science at the secondary level in Pakistan involves evaluating how the curriculum is structured. General Science, as a subject at the secondary school level, typically encompasses areas such as Physics, Chemistry, Biology, and General Science (a combination of foundational concepts in these areas).

What extent is the written curriculum of General Science congruent with Bloom's Taxonomy of Educational Objectives?

In this research study, the researcher aligned the all units of General Science that is given in the written curriculum (General science subject) with the Blooms Taxonomy of Educational Objectives i.e., Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation.

The given table shows that the Written Curriculum is highly weightage towards (comprehension level). Whereas, the lack of (Application and Evaluation level) in the written curriculum scenario. Its main focus only on Understanding level whereas creativity, skills and practical evaluation was totally ignored.

The analysis shows that the curriculum was heavily focused on the "Understanding" level (68.52%), while other essential cognitive domains such as Knowledge (11.11%), Application (0%), and Evaluation (0%) are significantly under represented.

The Written curriculum needs rebalancing the whole units of General Science subject toward more practical, creative, problem-solving, and evaluative activities, with less passive understanding. Doing this practice align it better with Bloom's Taxonomy recommended standards and enhance overall scientific literacy skills. In short, the curriculum focuses mainly on comprehension and conceptual based learning, whereas, the minimal attention provided to practical application, critical evaluation, and factual recall.

			Curriculum					
Sr. No.	**Unit Name**	**Remembering**	**Understanding**	**Applying**	**Analyzing**	**Synthesis**	**Evaluation**	**Total**
1	History and nature of science	0.00	22.22	0.00	3.70	0.00	0.00	25.93
2	Chemistry and life	7.41	0.00	0.00	1.85	0.00	0.00	9.26

3	Health, diseases & prevention	0.00	0.00	0.00	9.26	0.00	0.00	9.26
4	Population and environment	0.00	5.56	0.00	0.00	0.00	0.00	5.56
5	Energy sources	0.00	5.56	0.00	0.00	1.85	0.00	7.41
6	Electricity in everyday life	0.00	9.26	0.00	0.00	0.00	0.00	9.26
7	Chemical reactions and their practical applications	0.00	0.00	0.00	0.00	1.85	0.00	1.85
8	Biotechnology	0.00	25.93	0.00	0.00	0.00	0.00	25.93
9	Water resources	0.00	0.00	0.00	0.00	1.85	0.00	1.85
10	Environmental problems and management	3.70	0.00	0.00	0.00	0.00	0.00	3.70
11	Science, technology and development	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	11.11	68.52	0.00	14.81	5.56	0.00	100.00
	Standard criteria for Bloom's Level	20%-30%	25%-30%	20%-25%	10%-20%	5%-15%	5% 10%	

Do the Written Curriculum is aligned significantly with the Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives?

This table provides an overview of how the content in a textbook is distributed across the different levels of cognitive skills based on Bloom's Taxonomy: Remembering, Understanding, Applying, Analyzing, Synthesis, and Evaluation. The units listed are various topics related to science, such as "Introduction and Role of Science," "Biochemistry and Biotechnology," "Human Health," and so on. The percentages represent how much emphasis is placed on each cognitive skill within each unit.

A small percentage of the content is focused on recalling facts and basic knowledge, with the highest percentage in "Introduction and Role of Science" (2.25%) and "Biochemistry and

Biotechnology" (1.12%). The largest percentage of the textbook content is dedicated to understanding, with "Current Electricity" (11.24%) and "Energy" (8.99%) being the most focused on this cognitive skill. applying knowledge is not heavily emphasized. A few units, like "Human Health" (1.12%) and "Energy" (1.12%), feature this skill but with minimal focus. Analyzing: The analyzing category has some notable focus, particularly in units like "Diseases, Cause, and Prevention" (4.49%) and "Environment and Natural Resources" (2.25%). The emphasis on synthesizing knowledge is limited, with units like "Biochemistry and Biotechnology" (1.12%) reflecting a small portion dedicated to creating new patterns from existing information. There is no significant focus on evaluation in the textbook, with the percentage at 0% for most units.

Across the entire textbook, understanding takes the largest share of 78.65%, followed by analyzing (10.11%) and remembering (6.74%). There is very little emphasis on applying, synthesizing, or evaluating the material, suggesting that the textbook is designed primarily to help students understand core concepts rather than engage in higher-order thinking skills like synthesis or evaluation.

Supported curriculum of General Science congruent with Bloom's Taxonomy of Educational Objectives

Text Book								
Sr. No.	**Unit Name**	**Remembering**	**Understanding**	**Applying**	**Analyzing**	**Synthesis**	**Evaluation**	**Total**
1	Introduction and Role of Science	2.25	4.49	0.00	1.12	0.00	0.00	7.87
2	Our Life and Chemistry	1.12	5.62	0.00	0.00	0.00	0.00	6.74
3	Biochemistry and Biotechnology	1.12	5.62	0.00	1.12	1.12	0.00	8.99
4	Human Health	0.00	6.74	1.12	0.00	0.00	0.00	7.87
5	Diseases, Cause and Prevention	0.00	2.25	0.00	4.49	0.00	0.00	6.74
6	Environment and Natural Resources	0.00	7.87	1.12	2.25	0.00	0.00	11.24

7	Energy	1.12	8.99	1.12	0.00	0.00	0.00	11.24
8	Current Electricity	1.12	11.24	0.00	1.12	0.00	0.00	13.48
9	Basic Electronics	0.00	11.24	0.00	0.00	0.00	0.00	11.24
10	Science and Technology	0.00	10.11	0.00	0.00	0.00	0.00	10.11
11	Space and Nuclear Programme of Pakistan	0.00	4.49	0.00	0.00	0.00	0.00	4.49
	Total	6.74	78.65	3.37	10.11	1.12	0.00	100
	Standard criteria for Bloom's Level	20%-30%	25%-30%	20%-25%	10%-20%	5%-15%	5%-10%	

The focus of the textbook is heavily on understanding the material, with minimal attention to applying, analyzing, synthesizing, or evaluating information. There is a reasonable amount of emphasis on analyzing, but little to no focus on synthesizing or evaluating content, meaning that students may be encouraged to grasp and comprehend concepts, but less so to critique or combine them in creative ways. The material encourages a strong foundational understanding of scientific topics, but may not be as geared towards problem-solving or higher-level critical thinking.

Do the Written Curriculum is aligned significantly with the Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives?

This table seems to represent a correlation (r) and significance (often represented as p value) for different levels of cognitive skills in relation to a "Textbook" in a curriculum. The cognitive skills are likely based on Bloom's Taxonomy (Remembering, Understanding, Applying, Analyzing, Synthesis, and Evaluation).

Written Curriculum is aligned significantly with the Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives.

		Textbook	
		r	Significant
Curriculum	**Remembering** **Understanding** **Applying**	0.081 0.085	0.812 0.803
	Analyzing	0.023	0.947

	Synthesis Evaluation	-0.194 0.568

Remembering (r = 0.081, Significant = 0.812): The correlation between the textbook and the "Remembering" skill is very weak (r = 0.081), suggesting little to no linear relationship. The significance value is 0.812, which is high (typically anything above 0.05 suggests that the result is not statistically significant). This means the relationship is likely not meaningful or reliable. Understanding (r = 0.085, Significant = 0.803): Similar to "Remembering," the correlation is weak (r = 0.085), and the significance value (0.803) indicates that the result is not statistically significant, suggesting no meaningful relationship. Applying (No data provided): No information is given for the "Applying" skill. Analyzing (r = 0.023, Significant = 0.947): The correlation here is very weak (r = 0.023), almost negligible, meaning no real relationship between the textbook and "Analyzing." The significance value of 0.947 is very high, indicating that the relationship, if any, is not statistically significant. Synthesis (r = -0.194, Significant = 0.568): The correlation here is slightly negative (r = -0.194), suggesting a weak inverse relationship between the textbook and "Synthesis." The significance value (0.568) is above the typical threshold (0.05), meaning this result is not statistically significant. Evaluation (No data provided): No data for "Evaluation" either, so it cannot be interpreted.
The data suggests weak, mostly insignificant correlations between the textbook and the various cognitive skills (Remembering, Understanding, Analyzing, and Synthesis). The significance values indicate that none of these relationships are statistically reliable, implying that the textbook may not have a strong impact on these cognitive skills within the curriculum.

Alignment of Learning Strands with Curriculum and Textbook

Sr.No.	**Learning Strands**	**Curriculum**	**Curriculum%**	**Textbook**	**Textbook%**
1.	Life Science	3	27.27	4	36.36
2.	Physical Science	2	18.18	3	27.27
3.	Earth and Space Science	4	36.36	2	18.18
4.	Science, Technology, Society and Environment	2	18.18	2	18.18

The distribution of learning strands in a curriculum and a textbook, both in terms of their number (as indicated in the first two columns) and percentage (in the last two columns). Let's

break down each row to understand the relationship between the curriculum and the textbook for each learning strand:

Life Science: Curriculum: 3 units (27.27%) and Textbook: 4 units (36.36%). Interpretation: Life Science is represented by 27.27% of the curriculum and 36.36% of the textbook. The textbook has a higher emphasis on Life Science compared to the curriculum, with a 9.09% increase in coverage. Physical Science: Curriculum: 2 units (18.18%) and Textbook: 3 units (27.27%). Interpretation: Physical Science makes up 18.18% of the curriculum and 27.27% of the textbook. Similar to Life Science, the textbook gives more attention to Physical Science than the curriculum does, with a 9.09% increase.

Earth and Space Science: Curriculum: 4 units (36.36%) and Textbook: 2 units (18.18%). Interpretation: Earth and Space Science is emphasized more in the curriculum (36.36%) than in the textbook (18.18%). The textbook provides only half the coverage that the curriculum does, representing an 18.18% decrease.

Science, Technology, Society and Environment: Curriculum: 2 units (18.18%) and Textbook: 2 units (18.18%). Interpretation: Both the curriculum and the textbook dedicate the same amount of attention to this strand (18.18%). The coverage is identical, meaning there is no disparity between the two.

Life Science and Physical Science are covered more in the textbook than in the curriculum. Earth and Space Science is more heavily emphasized in the curriculum than in the textbook. Science, Technology, Society and Environment is equally represented in both the curriculum and the textbook. Overall, there seems to be some variation in how different science strands are represented between the curriculum and the textbook, with the textbook generally covering more Life Science and Physical Science, while the curriculum places more focus on Earth and Space Science.

Discussion

Findings of Research Objective One

Evaluate the alignment of written curriculum of General Science in terms of Bloom's Taxonomy of Educational Objectives.

Understanding is the most emphasized cognitive skill, accounting for 68.52% of the total curriculum. The curriculum is primarily focused on understanding, with limited emphasis on applying, synthesizing, and evaluating the material.

Findings of Research Objective Two

Evaluate the alignment of Supported Curriculum of General Science in terms of Bloom's Taxonomy of Educational Objectives.

Understanding is the most dominant skill, accounting for 78.65% of the total, with significant contributions from units like Current Electricity, Environment and Natural Resources, and Energy. The textbook focuses mainly on understanding the content, with limited emphasis on higher-order skills such as applying, synthesizing, and evaluating.

Findings of Research Objective Three

Compare the Alignment of Written curriculum with Supported Curriculum in terms of Bloom's Taxonomy of Educational Objectives.

The correlation values (r) and significance levels for different cognitive skills in papers from 2018 to 2024. The correlation for Remembering (r = -0.06) and Understanding (r = -0.221) is negative, but neither shows a significant relationship with the outcome (p values of 0.862 and 0.514, respectively). There is no data for Applying and Evaluation. However, Analyzing shows a strong positive correlation (r = 0.755) with a significant p-value of 0.007, indicating a meaningful relationship between analyzing and the outcome. Synthesis has a weak positive correlation (r = 0.241), but with a no significant p-value of 0.476, suggesting no significant connection. In conclusion, the Analyzing skill is the most significant cognitive skill in the papers, while others like remembering, understanding, and synthesis show no meaningful relationships.

Conclusion

Distribution of items reflects the content found in textbooks, suggesting that the papers were based on them rather than the curriculum. Therefore, it is crucial for paper setters to adhere to the written curriculum's table of specifications and focus on achieving the proposed SLOs when selecting questions. The misalignment between the written curriculum and what most teachers taught stemmed from an overemphasis on lower-level cognitive SLOs. Teachers focused less on higher-level cognitive SLOs and ignored the STS subcategory altogether. This suggests that teachers mainly followed the textbook content. Several studies on classroom instruction in Pakistan support this finding, highlighting the need for educational authorities to consider developing multiple instructional materials instead of relying solely on one textbook. The misalignment between textbooks, question papers, and the written curriculum influences the content teachers choose to teach. Teachers tend to focus on content that helps students perform well in exams. The findings also showed that teachers prioritized SLOs that were deemed important for exam success.

Recommendation

Recommendations were proposed according to the outcomes and conclusions of the research:

a) The general science textbook should align with the curriculum.
b) Develop a more balanced curriculum that fosters a wide range of cognitive skills while promoting a deeper understanding of the material.
c) Incorporate more application-based learning to enhance student engagement.
d) Align cognitive skills with appropriate assessment methods to ensure consistency.
e) Review the General Science textbooks for Grade IX & X to ensure alignment with the written curriculum, especially by incorporating content for all relevant subcategories. Address the lack of engagement in textbooks, partly due to the absence of STS Connection content, by including such material to spark student interest.

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