
AN ANALYSIS OF SINGLE NATIONAL CURRICULUM OF GENERAL SCIENCE AT PRIMARY LEVEL WITH THE LENS OF 21ST CENTURY SKILLS

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ABSTRACT

21st century skills are regarded as the capabilities and the competencies which are considered as essential for improving the ways of thinking and learning and for success in the modern contemporary world. The study directed at investigating the integration and inclusion of 21st century skills in recent curriculum reforms i.e Single National Curriculum (SNC) at Primary Level via document analysis. The research followed method of qualitative thematic analysis for scrutiny of General Science Curriculum at Primary Level. The investigation thoroughly examined the content of the General Science Curriculum (Grade 5) via document analysis to seek its provision for insertion and inclusion of 21st century skills in the teaching-learning process. The investigation also sought narratives of curriculum developers and experts regarding incorporation of 21st century skills in the curricular reforms through interviews. The research conducted thematic analysis to scrutinize the SNC document and to further analyse the semi-structured interview data. The study found that sufficient consideration is being given for integrating 21st century skills in SNC in the subject of science but there is an acute need of raising sufficient awareness and professional capacity building of teachers regarding their enclosure in the education mainstream. Insufficient teacher training and scarcity of teaching learning resources are the major challenges in this regard.

KEYWORDS

Single National Curriculum (SNC), 21st century skills, reforms in education

INTRODUCTION

Due to ongoing economic crisis, Pakistan is in desperate need of some intellectual revolt that can elevate its economy. In order to leapfrog from labor concentrated economy towards knowledge-based economy, Pakistan ought to concentrate on the inclusion and development of 21st century skills in its education sector. Pakistan Vision 2030 also emphasizes the pivotal part of knowledge in economic development. For this purpose, schools must revamp and refurbish themselves to help young students in their preparation and survival for the modern competitive world. For this, schools can integrate 21st century skills in their learning system in order to benefit and prepare students for their future life.

Many countries undertook range of reforms regarding curriculum restructuring, classroom pedagogies and assessments procedures with the intention to refine standards of education and enabling their youth to embrace the challenges and demands of 21st century. The policy makers, educationist, blue-ribbon panels, and leaders from prominent business universally assented for paradigm change in teaching-learning process, i.e shift from rote learning to the development of higher cognition skills which are now denoted as 21st century skills. Knowledge-based society of today's world demand active participation of people that possess and practice these 21st century skills to meet the challenges of progressive, technology-focused, globalized and persistently modifying world (Fisser et al., 2015).

21st century skills are an extensive and overarching notion that involves multiple sets of personal, social, life and career skills. Voogt & Roblin (2012) characterized 21st century skills as "modern competencies" which are gradually becoming more and more demanding in young generation for the employment by the companies, industries, and society. They further uphold that the concept of 21st century skills is all-embracing that incorporates skills and attitude in addition to knowledge which is essential for youngsters to empower them and make them valuable and beneficence for the society in a way that they can play their part to the knowledge economy (Voogt & Roblin, 2012).

Chalkiadaki (2018) declared that 21st century skills are professional competencies and proficiencies that comprise of critical thinking, innovation and creativity, developed cognition and metacognition, problem-solving, teamwork, environmental literacy, global citizenship, collaboration, self-control, acceptance, adaptability, accountability, communication in national and international languages, self-regulation, digital and information literacy, leadership, cultural awareness, autonomy, socialization and physical well-being. Chalkiadaki (2012) also mentioned many significant frameworks for different categories of 21st century skills like ATC21 (2012), P21 (2007), OECD (2005), and EnGauge (2003).

The idea of 21st century skills emerged from the start of new millennium and is in constant growth as the world is changing constantly. Due to the increased globalization and elevated networking of today's world, careers are becoming more and more complicated. For a successful job career, youngsters would need to flourish and nurture their 21st century skills, especially their proficiencies in critical thinking, creativity and imagination, problem solving, leadership, collaboration, digital and technological literacy.

4Cs (creativity, critical thinking, collaboration, and communication) classified as learning and innovative skills are being identified and highlighted as the prominent skills by world famous P21 framework that recommend inducting and nurturing these skills with the main disciplines. Saxena (2015) asserted that 4Cs are epitomized and elevated as "super skills" which are necessary for achievement of youngsters in their school, in professional career and in everyday life. The proclamation regarding significance of 4Cs emphasis that mastery of these skills not only elevates students' competences in main subjects but also deliver improved learning outcomes (P21, 2015b). In existing era of 21st century, the idea of 4Cs is considered as the essential fragment of teaching and learning process. The "4Cs are redesigning teaching and learning by renovating the students' learning opportunities being provided at school (Gerald, 2015). Procurement and development of 4Cs in early classes is very essential as it offers a strong foundation for advanced level of education and enables students to get admission in reputable universities. Skills especially 4Cs facilitate individuals in getting auspicious jobs, help in completing thought-provoking job assignments and ultimately support their success in the modern challenging world". Similarly, Lin (2014) declares the importance of 4Cs as: "The inclusion and implementation of 4Cs in the current education scenario has become inevitable, and it must be underscored". Furthermore, Kivunja (2014) emphasized the drive of 21st century skills especially 4Cs is a "learning paradigm shift" and "key for students' success in this challenging economy". Many of the educationalists and influencers recommended the need for and implication of 4Cs. These 4Cs are taken as prerequisites for 21st century teaching-learning process. Gerald (2015) emphasized that school is considered as the main stage where students are exposed with meaningful learning experiences in order to transform their potential so that it can stipulate a strong base for their admittance in reputable universities, induction into a decent career and future success in the competitive world. After conducting a research project, Scott (2015) concluded and emphasized that there is a broad gap between the employment market and how schools are preparing students. Sadly, schools are incapable of catering to the requirements of the employers. Schools are not planning and preparing the students to face the real-world challenges. Schools lack competent staff with essential knowledge and skills that can enable students to meet the challenges and stresses of the job market. Employers have objections that the new inductees lack necessary skills thus they always require on-job

mentoring and training to work properly. Dearth of skills and challenges of employment market demand shift in the traditional learning. Consequently, a significant gap is being anticipated in demand and supply of competent and skilled workforce in future. Ever-changing global market, progression in information technologies, international competition, globalization, online banking, online trading and marketing, climate changes, natural catastrophes, economic and political challenges are the challenging features of this millennium. Only a person who can face these trials can endure in this competitive world. In order to be successful in handling such challenges, one has to acquire essential skills besides necessary knowledge.

Review of relevant literature conceded that the notion of 21st century skills is not very new, yet their innovative application and integration particularly in the field of technology, expect teachers to deliberate and shift towards a new learning paradigm in education. Curricular reforms integrated with skills are also identified as an ideal plan to enable and accelerate the acquiring of 21st century skills. Additionally, the literature suggested exploring the relevant curriculum documents and narrative of curriculum experts in order to anticipate barriers in implementation of 21st century skills in education sector.

The study was limited to content analysis of Single National curriculum (SNC, 2020) in subject of general science curriculum at primary level and to the narratives of 05 science curriculum experts who were being involved in the process of curriculum development. Among various 21st century skills the research has delimited its investigation to thinking and innovation skills i.e 4Cs (creativity, critical thinking, collaboration, and communication) only.

RESEARCH OBJECTIVES

1. To examine the document of SNC in subject of science in connection with 21st century skills at primary level.
2. To analyse the narratives of curriculum designers in connection with inclusion of 21st century skills in SNC.

RESEARCH HYPOTHESES

RESEARCH METHODOLOGY

The study adopted qualitative thematic analysis to scrutinize the incorporation of 21st century skills in SNC focusing on content of class 5 general science. The study comprised of two phases. At first, the researcher examined the document of class 5 Single National Curriculum in subject of science. In the second phase, 05 science curriculum specialists were interviewed to pursue information about inclusion and

integration of 21st century skills in the new curriculum document. The second phase triangulated the findings of first phase. Semi-structured interview protocols were developed in the light of literature review. The protocols were validated by panel of experts and later piloted as well. The interviews with the curriculum developers were audio-taped and then inked down in verbatim. The typed interview transcriptions were sent back to the research participants for member-check for the purpose of corroboration and to ensure the credibility of data.

DATA ANALYSIS

The research conducted an extensive qualitative document analysis of SNC using thematic analysis approach to analyse the inclusion of 21st century skills in the recent curriculum reforms. The findings of document analysis were triangulated by scrutinizing the data from semi-structured interviews of curriculum developers.

FINDINGS

Findings from Document Analysis of Single National Curriculum

Bowen (2009) proclaimed that document analysis is a method of examining and reviewing documents to evaluate its associated meaning on a certain topic. Krippendorf (2004) asserted that document analysis is a systematic study of text and subject matter from the perspective of a researcher or author. In the first phase of this study document analysis of Single National Curriculum was conducted following thematic analysis approach.

It is being claimed that the National Curriculum (2020) focused upon the development of scientific literacy and skills among students. The slogan of this hyped initiative was promotion of active learning that ultimately contributes towards knowledge economy. The curriculum document explicitly cited the idea of “Life Skills Based Education (LSBE)” which concentrates on creativity and critical thinking. The selected 21st century skills i.e 4Cs were scrutinized in the document Single National Curriculum (2020) as described underneath.

Impression of 21st century skills in SNC

The document review of Science Curriculum at primary level features its configuration with the global education standards of 21st century. The General Science Curriculum aimed to improve and nurture higher cognitive skills of students as it repeatedly mentions the terms of imagination, innovation, curiosity, and critical thinking in particular.

The primary goal of Single National Curriculum (SNC) is to develop spirit of wonder and curiosity about spectacles of science. The thought of flourishing critical thinking and creativity among students has been adapted from curriculum of Malaysia. The

conviction of generating ideas, prediction, discovery, relating connections, visualizing, generalizing, establishing analogies, synthesizing, formulating hypothesis, and formulating or adapting something in your context has been utilized to stimulate students.

SNC aims to inspire young students to create new learning opportunities for solving their problems by utilizing science and technology in their daily life. SNC urges learners to discover their abilities and inclination in order to create jobs and variety of careers in this rapidly changing era of science and technology.

The various strands of SNC refer to the inquisitive nature of young children and implies that due to this curiosity, youngsters are inclined to observe and ask questions. It is recommended in SNC that their curiosity should be nurtured by providing them with an enabling environment and satisfying their queries. SLOs demanding students to “suggest some measures for protecting yourself”, “plan and run a campaign”, “keep and scrap book”, “create signs and device symbols” verges to foster creative thinking skills among children. Activities like designing and making certain models also engage students’ creativity and innovation. Addition of projects at the end of each chapter also provides stimulus to increase students’ curiosity and critical thinking at planning and designing level. Furthermore, reporting and presenting the project also tends to flourish collaborative and communication skills of students. Inclusion of notion like “observe”, and “investigate” in open ended questions and “think-tank” also provoke students’ creativity and critical thinking. The recommendations portrayed in SNC for the textbook writers also encourage students’ involvement in higher cognitive skills that can lead to quality education.

Secondly, critical thinking is contemplated as the cornerstone of curricular reforms and a lot of workshops were conducted as how to integrate and embed it in the teaching learning process through curriculum. The SNC clearly asserts in its introduction that the intention of teaching science is to make students learn about how to observe, think rationally, investigate and search for solving problems. Through science, we can support our students in addressing science and relevant environmental, economic, societal, and ethical issues critically and rationally. SNC prominence that critical thinking is one of the most significant and sought after skills that pupils should develop in school. It proclaims that the curricular amendments are intended to improve the higher thinking cognitive skills among learners.

The chapter of “Strands, Standards and Benchmarks” in SNC offers considerable opportunities to the students for investigating diversities and assess how different living beings intermingle with each other and with the environment. It stimulates learners to reflect upon their investigations on different concepts of science. Moreover,

SNC firmly asserts the development of critical thinking skills among students by encouraging them in making predictions, designing their activities, and planning the investigation. Science should enable students to search for several answers to their problems, to recognize their difficulties and suggest plan for improvement.

SNC firmly advocates endorsement of scientific literacy among students through age-appropriate critical thinking which is being furnished in SLOs. It anticipates students to employ in-depth investigation for understanding the relationship among science, technology, society, and environment (STSE). It urges students to take charge of their learning, should be enquirers, and foster towards lifelong learning. SNC envisages that the learners ought to be authorized to be critical and analyst of their learning after taking responsibility for it. Students should act like an objective researcher and use their critical thinking in finding evidence and making conclusions. SNC incites and urges students to re-contemplate, deliberate, and rationalize their learning for acquiring science processes skills. The assessment strategies illustrated in SNC offer adequate weightage (about 20%) for the reasoning and higher order thinking based test-items.

SNC directs textbook writers that adequate range of activities should be incorporated in the science book that can develop students' high order cognition. Science learning should enable students to induce their queries and develop their understanding gradually from basic to advanced levels. The SNC specifically mentions critical thinking skills like "attributing", "grouping and classifying", "comparing and contrasting", "prioritizing", "sequencing", "detecting bias", "analyzing", "evaluating", "value judgment" and "drawing conclusions".

Though scientific literacy primarily relies on the procurement of science process skills nevertheless keeping in view the global interdependence and ones' contribution for a stable future is another unavoidable aspect of scientific literacy which is also taken under consideration while formulating the curricular reforms. SNC proposes appropriate prospects to the students for working in collaboration, and for sharing and discussing their learning experiences. SNC intends to make students learn responsible and empathetic behaviors. Several activities that encompass "planning and designing", "brainstorming", "conducting and compiling" are indicated in the curriculum that should be performed in collaborative groups of students. Projects given in each unit are also recommended to be assigned in groups so that students can develop their models and complete assignment in collaboration. The intention is to make students responsible of their distinctive part in a group task so that they can contribute their role for completing project activity. Hence, students can get optimum benefits of their potential and abilities, respect each other's' opinion, and can learn as per their desirable learning styles.

Single National Curriculum advocates active learning whose foundations lie in constructivism and social constructivism. Social constructivism encourages collaboration and interaction between teacher and students and within peers for optimum learning. Accordingly, teacher considered as the “more knowledgeable other” and fellow learners jointly work to establish community of active learning. For this purpose, SNC particularly references concepts of “cooperative learning”, “collaborative learning”, “project-based learning” and “problem-based learning”. Active learning in SNC is extended through “paired/group discussions”, “dialogues”, “role plays” and “group work”.

Single National Curriculum intends to familiarize students with suitable and age appropriate scientific vocabulary required for communicating the scientific concepts. Every concept included in SNC involves students’ engagement in multiple kinds of communication skills like oral and written presentations, labelled diagrams graphs and illustrations. Moreover, students are anticipated to design and initiate certain campaign like raising awareness on different societal, climatic, and environmental issues. Many SLOs embrace students planning and exhibiting different models and projects that foster their communication skills.

Scientific literacy also encircles learning as how to communicate and present the investigation and conclude the results in front of some audience. Role-play, discussions, debates, and oral demonstrations are made essential part of teaching-learning approaches of SNC. Teachers are expected to inspire and involve students in elucidating and communicating their thoughts and key learning in their own words. SNC further recommends students to make self-assessment of their learning and communicate it effectively to both the teacher and the parents. Scientific communication has been made essential fragment of scientific learning and is recommended to be flourish through “oral and written presentation”, “explaining models/charts”, “drawing labelled diagrams”, “peer assessment”, “role-plays and performances”, “exhibitions”, “practical reports”, “research projects” and their “reports”. SNC recommends that the students should be able to organize, manage and infer their classroom learning meaningfully.

Findings from Semi-Structured Interviews of Curriculum Developers

The research conducted semi-structured interviews with the curriculum developers to probe and investigate their narratives and opinion regarding their perception and thoughts on inclusion of 21st century skills in the curriculum reforms. The researcher developed metrics framework for engraving the participants’ responses. The data analysis unfolded and emerged following major themes which are as follows:

Theme 1	Theme 2	Theme 3
SNC provision for inclusion of 21st century skills	SNC execution and development of 21st century skills	Implementation Barriers for inclusion of 21st century skills

Figure 1 Themes relating to 21st century skills in the document of SNC

The account of participants’ lived experiences during curriculum development with respect to incorporation of skills is described as underneath:

Proclamations of Curriculum Developers on Inclusion of 21st century skills in SNC

Majority of the curriculum developers asserted that the thinking and innovation skills (4Cs) have been specifically focused and targeted for inclusion during SNC development. As SNC is an assortment of STEAM and STEM so it particularly concentrated on critical thinking and creativity through employing activity based active learning.

One of the research participants orated that the most significant aspect is that the revisions in curriculum should be in harmony with the modern trends and inclinations. This is why the curriculum reforms mentioned SDGs when it refers to quality education. SNC emphasized creativity and innovation, critical thinking, flexibility, and global citizenship. After conducting numerous workshops in partnership with UNESCO, it was decided that the 21st century skills should be integrated in the form of cross-cutting themes in the new curriculum. Furthermore, during the review process it was ensured that these skills should be particularly incorporated in the content of curriculum, in subsequent textbooks, in teachers’ training modules and in assessment frameworks. The respondent proclaimed that the development of higher order thinking skills is contemplated as the most important consideration in curriculum reforms. The participant further delineated that the inculcation and expansion of positive thinking in the early years of student make him good problem solver, responsible citizen, good leader, and an individual who takes correct decisions for the benefit of society and humanity at large. Furthermore, Pakistan’s commitment to adhere to the achievement of Sustainable Developmental Goals (SDGs) also make inclusion of 21st century skills quite relevant.

However, another research informant affirmed the idea that insertion of cooperative and collaborative learning, problem-solving approach and experiential learning appeared to put both teachers and students under pressure regarding skill development among students.

The research participants endorsed that the skills of collaboration and communication were also deemed crucial and focused during curriculum development. The curriculum

developers endorsed that the science content writers have been fixed to include hands-on activities and projects involving thinking and innovation skills along with each science unit. Students are expected to acquire these skills by engaging in challenging activities and completing projects. The teacher can assign these activities in pairs or in groups. If attributed in groups, the students of different abilities should be made part of a single group. In this way, students share their ideas and skills beside sharing the materials only. They learn to work in cooperation with empathy. Likewise, the communication skills of students can be nurtured by engaging and connecting them in different practical scenarios. Hence, students learn to value and appreciate other's viewpoint and also can make their opinion logical and understandable for others. Their confidence level and self-regulation also upsurge when they are provided with such opportunities.

One more curriculum designer supplemented that this time the focus of curriculum developers faculty was to expand the thinking canvas of students instead of merely refining the content. For this purpose, several international curricula were reviewed for instance i.e Malaysia, Australia, USA, Singapore, and UK in order to explore how these countries teach science and many strategies were adopted from their curricula. From the review of these curricula, we discovered that these countries emphasized a lot on the acquisition and development of skills among students and try to inculcate them at a very early age. After that it was decided that our curriculum content, classroom instructions and assessment strategies should also encompass high order thinking skills. This is the reason that 21st century skills are made part of science curriculum initiating it from primary level. The integration of these skills is made through STEM and STEAM. Enclosure of skills was also in accordance and adherence with the international commitments to accomplish the Sustainable Developmental Goals (SDGs). Therefore, it was an intentional attempt to integrate and address these skills in both SLOs and teaching strategies. In preceding curriculum (2006), the prime focus was more on cognition but in new curriculum reforms we have tried to connect cognition along with affective and psycho-motor domain and teachers would be able to assess psychomotor domain of students by project-based learning.

Proclamations of Curriculum Developers on SNC Execution and Development of 21st century skills

The curriculum reforms in shape of Single National Curriculum brought the inculcation of creativity or critical thinking in school education sector. These skills are being addressed in SLOs as well as in teaching strategies. The curriculum developers affirmed that we may foster creativity in children by indulging them in various projects. The students can think about real life scenarios as how they can create some devices or apply certain concepts and how can they make their life easy. But for that the teacher has to instigate their curiosity and has to provide students with a

challenging environment so that they can think critically. The students can work on their own by using the low-cost material provided. In this way, their concepts become clear, their imagination and thinking skills are developed. They think analytically and apply their concept in the practical life.

One of the respondents expressed that the development of SNC was related more to the science process skills. Therefore, the key consideration necessary for the students was that their observation skills must be sharp. The children must be able to predict. Thus, we motivated and sensitized the teachers that their classroom teachings should be started with prediction. The main purpose of curriculum was that the observation skill must be improved in children by resembling it to daily life, and they can draw their conclusion. Therefore, such type of activities and skills are being tried to promote in curriculum which increases curiosity and creativity of children. The informant asserted that a deliberate attempt was made to enforce communication skills among students. Consequently, the students not only work with their hands, but they also try to present their work/project in front of others that nurture their communication skills. One of the research respondent extended her narrative that we need to relate the scientific concepts with the reality. For instance, when a teacher is teaching students about plants, then instead of opening and reading from the book, the teacher can take students outside the class in the garden or can bring some plants in the class for students' observation. The teacher can ask the students to compare the real plants with the pictures illustrated in the book. The teacher can facilitate students in making comparison and help in recognizing different parts of plants. In the same way, lot of activities have been incorporated in SNC that provide students with diverse experience of collecting material from their school, home or other surrounding. The information narrated in the science book should be linked with the real life situations. The teacher has to transform his role as a facilitator support instead of giving directions. The teacher-centered approach has been lessened in the SNC and student-centered approach has been focused.

Another research respondent augmented that the 21st century skills are stressed as the benchmarks when standards of curriculum were planned and designed to improvise skills among the learners. He further added that it is not the content only that matters but how you teach and assess that subject matter that makes the real difference. Thus, while designing the activities and assessment strategies, some guidelines for the teachers were also furnished to ensure proper execution and inclusion of skills. Students should be taught and tested in a way that they can utilize their critical thinking or creativity. Our teaching and examination system should be in accordance with the latest global trends as we are living in a rapidly changing world and for our survival and to remain relevant, we have to keep our pace with it. We have to prepare our children for tomorrow's job market probably for 2038 or 2040. So, if we are unable to

solve today's problems, then we don't even know regarding the kind of challenges which we may encounter in future. Hence, it has become very imperative that we consider problem solving and creative skills.

One of the research informant declared that the students' engagement is ensured in each and every learning pursuit and at all grounds. Similarly, Information and Communication Technology (ICT) is being integrated in SNC to facilitate the teachers. During the discussions, we decided to get help from the educational websites that provide educational resource material like worksheets and quizzes to teachers without any cost. Hence, the relevant links to these websites have been provided with each unit. The teacher can utilize these links according to the topic he/she wants to teach. Furthermore, teacher can also consult the learning resource material as well.

One of the curriculum expert explained that as activity-based learning is endorsed in SNC, the students should be immersed and experienced plenty of hands-on activities. Students can be involved in material collection, in completing certain projects and then presenting their work as a team. Small activities in real life scenario can be allocated as projects, for instance collecting data regarding BP or diabetic patients. In this way the students can be involved in pragmatic research activities as they would take history of patients, would ask questions regarding their eating habits, activities, and lifestyle for exploring different reasons behind these ailments. Similarly at advance level, use of certain medical instruments and taking measurements can be taught to students. All the 4Cs are focused and developed in such activities.

One of the curriculum developers responded that the Single National Curriculum encompasses the initiation of all the necessary skills for the students at the beginners' level. For this purpose, distinct chapter of teaching-learning strategies is supplied in the curriculum document for assisting the teachers. The participant asserted that active learning has been focused on connecting and developing students' new learning with the preceding understanding. The concept of active learning has been supported with the notion of problem solving, cooperative learning, project-based learning, experiential learning activity-based learning and collaborative learning. The teachers can engage students in inquiry-based questions, can embrace whole classroom instruction or can employ demonstration technique and the students can practice it later. Paired and group discussions, presentations, debates, and role playing can be utilized to inculcate and flourish skills among students. Choice of activities and strategies is kept flexible for teachers as per classroom situation, available resources and needs of students.

One other research participant affirmed that as far as ICT is concerned it should be submerged and integrated with other thinking skills. The teacher in a class can integrate

ICT in his lesson by using internet research as every activity is included in curriculum. It is very necessary that students indulge in internet research work. The students can be asked to use computer in making power point presentation. Here, children should work in collaboration. First, they will collect data individually and then will compile data in group and make presentation on a given topic. But I am talking about the ideal situation while ground realities are different. The teacher should also have computer literacy to make students work like this, it is absolutely essential. In Pakistan unfortunately, teachers do not want to learn new things and they do not have these twenty first century skills. The same can be applied by the student at home. This approach is called mainly called "remote collaboration" and for this the knowledge of computer is necessary. Documents can be shared through Google drive. I do it very often with my faculty. I create documents and PowerPoint Presentations and share it via Google drive. It is free of cost. There is collaborative chat as well.

Proclamations of Curriculum Developers on Implementation Barriers for Integration of 21st century skills

On the theme regarding challenges and barriers in amalgamating and incorporating skills in the primary school education, the curriculum experts interviewed in the research study contributed their narratives as follows.

Initiation of blended learning project and STEM learning is being commenced at elementary and secondary level. The primary section is being ignored in this regard. If the Primary section is being overlooked which is the foundation level to the higher classes, then how can system nurture these skills at secondary level? How can system prepare them for SLO based learning and assessment. It is happening because unfortunately education is not our priority and has never been. Our only priority is just to get some share out of the foreign funding, under-cover of some educational projects. There are lots of funds available but unfortunately these are not being used effectively. One of the curriculum expert affirmed that there are many challenges that can be encountered in the execution process. One of the most important is time management. To cope up with this challenge, it is recommended that the teacher should plan the activities in groups and should utilize higher achiever to facilitate slow learners. The activities should be well-planned and structured in accordance with the classroom size, students' strength, availability of resources and time available. Cost effective and easily available materials should be used. However, executing the activities is more challenging than designing. Therefore, every teacher should scheme the implementation plan as per their suitability.

Even after the 18th constitutional amendment no organization is held responsible for teachers' training in ICT institutes and no proper mechanism was established for training till now. There are many training organizations like AEPAM, FCE or NCC

etc are arranging different training sessions for the stake holders but there is no quality assurance of these trainings. This flaw was attended, and the federal government established an independent training department that would conduct teachers' training and refresher courses on daily basis but as such no section or training wing is established till now. Ministry has all the powers and the funding; we don't have resources to do it on our own.

DISCUSSION

Based on the data analysis and findings of the investigation, conclusions were drawn as under:

It is found that these skills are considered and given sufficient importance while developing the content of SNC. But sufficient awareness and teachers training is lacking on part of school education sector for their successful execution and integration at the classroom level.

SNC was an ambitious claim of the then government that claimed the vision and potential of meeting modern global trends in education. It was considered as a shift from rote teacher directed learning to active student-centred learning. It stressed on learning through activities and projects, enclosure of information and communication technologies, problem and inquiry-based learning, experiential learning, and inclusion of 21st century skills to cope up the challenges of contemporary and rapidly changing world. Document analysis uncovered that most of the 21st century skills along with ICT, as claimed were adequately integrated in SNC. The content, teaching- learning approaches and assessment strategies declared in SNC were in appropriate harmony for the development and integration of higher-level thinking. However, the fragment of prescribed activities appeared very rigid and fixed. To foster students' creativity and imagination the activities' part may be flexible and adaptable both for the teachers and the students. Putting too many instructions lead to choke students' imaginative and novel tendencies.

The SLOs described in SNC generally cover primary cognition up to analysis level. It was discovered that only 2-3 SLOs of every chapter targets higher order thinking skills of students, which is still to the analysis level. Majority of the students' learning outcomes were based on knowledge, comprehension and understanding level.

It was concluded that the SNC in subject of science at primary level was too burdensome for the primary school students of 9-11 years of age. It would tend to drain the children in term of remembering and covering too much of syllabus. Furthermore, the children would also likely lose their natural curiosity, interest, and passion in investigating science.

It was found that the lowest possible standards of learning were marked as maximum for implementing and translating the curriculum in classroom. In competing with the modern world and particularly comparing with the private sector schools, the standards and quality of public sector was not enhanced.

Education has always been politicized in the country and the slogan of SNC was another political agenda of the then government. Pakistan is in dreadful need to make education objective by relieving it from this political domination and undue hegemony.

RECOMMENDATIONS

The research findings and conclusions lead to following recommendations.

1. The SNC may be reviewed periodically as per its claim to be a “living document”. It may be kept more adaptable and pliable for both the teachers and students when it comes to selection of activities, resources, and teaching strategies as per their convenience and practicability.
2. Additional SLOs that can address higher order cognition may be added in revised SNC that can attract and engage students with scientific phenomenon. Students should be provided with more chances to “differentiate”, “analyse”, “reflect” “critically examine”, “plan”, “demonstrate”, “generate”, “modify” or “evaluate” the science content.
3. The educational authorities while formulating policies, approving strategies, and allocating resources need to be more considerate on primary level education as it provides foundation for higher education levels. Age-appropriate skills at the early school level would instigate students and transform them into a lifelong learner.
4. System level reforms are required as by only changing the curriculum, we cannot get desirable results. We need to revamp the whole system that includes supplying sufficient funds and resources, capacity building of teachers, changes in classroom practices and refurbishing the assessment system.
5. Every child has the right towards quality education, which is inclusive, unbiased, can nurture their critical thinking and foster their imaginative and creative tendencies. Pakistan is in the pressing need to focus building the knowledge economy which is possible only by expanding the rational thinking, analytic reasoning, and scholastic capabilities of our youth so that they can meet the global challenges and we can rise as a progressing nation in the 21st century.

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