Royal Education Council
Paro, Bhutan

Annual Report 2019

Published by

Royal Education Council, Shari, Paro
P.O. Box 1243,
Shari, Paro–12001, Bhutan
Website: http://www rec.gov.bt

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ISBN 978-99936-0-476-1

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Acronyms, Abbreviations, and Glossary

Acronyms

ACC	Anti-Corruption Commission
BCSEA	Bhutan Council for School Examinations and Assessment
BCSR	Bhutan Civil Service Rules and Regulations
CTAB	Curriculum and Technical Advisory Board
CS	Central School
DAHE	Department of Adult and Higher Education
DCRD	Department of Curriculum Research and Development
DDC	Dzongkha Development Commission
DEO	Dzongkhag Education Officer
DSE	Department of School Education
DYS	Department of Youth and Sports
EMD	Education Monitoring Division
ES	Environmental Science
FYP	Five Year Plan
JDWNRH	Jigme Dorji Wangchuck National Referral Hospital
JNEC	Jigme Namgyel Engineering College
HSS	Higher Secondary School
KGUMSB	Khesar Gyelpo University of Medical Sciences of Bhutan
LSS	Lower Secondary School
MoE	Ministry of Education
MSS	Middle Secondary School
NSCF	National School Curriculum Framework
OECD	Organisation for Economic Cooperation and Development
PBE	Place Based Education
PCE	Paro College of Education
PS	Primary School
RCSC	Royal Civil Service Commission
SCE	Samtse College of Education
TPSD	Teacher Professional Support Division
TEO	Thromde Education Officer
RD	Research Division
REC	Royal Education Council
RNR	Renewable Natural Resources
RGoB	Royal Government of Bhutan
RUB	Royal University of Bhutan
TVE	Technical and Vocational Education
WFP	World Food Programme

Preface

In the pursuit of its vision, the Royal Education Council (REC) works continuously towards education innovation and transformation. Each year the Royal Education Council carries out activities that take it a step closer to realisation of the vision by fulfilling its mandates in curriculum development, professional development, educational research and educational technology.

This report provides a brief outline of the major activities carried out during the 2018-2019 Financial Year (FY).

The report is presented in four parts: Curriculum Development, Professional Development, Educational Research and Programmes and Services. It is a compilation of activity reports by the curriculum developers, training developers, programme officers, and research officers. The initial part of the report covers the organisational administrative structures and its related functions.

We share this report with the relevant stakeholders to inform them of the achievements of REC in the last financial year and for efficient future collaborations.

The Vision, Mission, Mandates and Core Values

Vision

A leading centre of excellence for education innovation and transformation.

Mission

Provide leadership in Curriculum, Professional Development, and Educational Research to innovate and improve mainstream school education system through vibrant institutional culture and competent professionals.

Mandates

The Royal Education Council (REC) as the national epicentre for education innovation and transformation shall determine the national school curricula and teacher professional development programmes and strive to improve the overall mainstream education system.

Therefore, the REC is mandated to:

* review, innovate, and develop relevant curriculum and teaching learning materials for school education.
* develop and provide teacher professional development programmes for efficient implementation of school curriculum.
* conduct research in curriculum and instruction, assessment and evaluation, teacher education and educational policies.
* innovate and strengthen educational technology to support design and delivery of curriculum, professional development and educational research.
* provide forum to facilitate academic and professional discourses at national and international levels.
* provide technical expertise and work in collaboration with relevant national and international stakeholders.

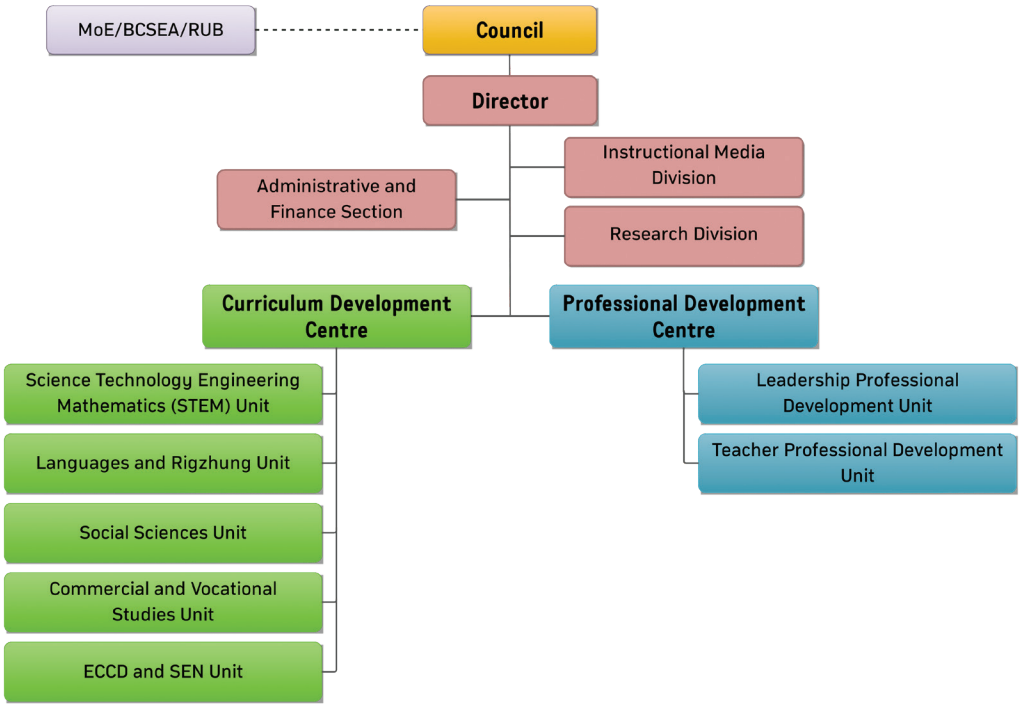
Core Values

The REC shall be guided by the following core values:

* **Excellence:** We shall strive to maintain the highest form of standards in all our professional endeavours.
* **Integrity:** We shall act with honesty, fairness, and transparency.
* **Professionalism:** We shall uphold right work ethics, professional conduct, and commitment.
* **Team-work:** We shall work on the principle of cooperation and collaboration.
* **Innovation:** We shall be innovative and creative to fulfil the changing needs of the education.
* **Accountability:** We shall be fully accountable for our actions in fulfilling our roles and responsibilities.

Further, as civil servants, we shall be guided by the set of values specified in the Bhutan Civil Service Rules and Regulations (BCSR).

REC Organisational Structure



The Council

The REC is governed by a Council- the highest decision making body mandated to provide overall guidance and strategic directions. It ensures that REC's major plans and programmes adhere to the national policies, regulations and developmental goals.

Members of the Council are appointed through a government Executive Order. All members are ex-officio members with the Prime Minister as the Chair. Any change in the membership are subject to approval from the Cabinet.

The Council comprises of:

1.	Hon'ble Prime Minister	Chairperson;
2.	Minister, MoE	Vice Chairperson;
3.	Secretary, MoE	Member;
4.	Vice Chancellor, RUB	Member;
5.	President, KGUMSB	Member;
6.	Commissioner, RCSC	Member;
7.	Director General, DSE, MoE	Member;
8.	Secretary, BCSEA	Member; and
9.	Director General, REC	Member Secretary.

The functions of the Council include, but are not limited to the following:

* The Council shall provide overall guidance and strategic directions to the REC.
* The Council shall deliberate and provide directions to matters forwarded by the Curriculum and Technical Advisory Board (CTAB).
* Identify and mitigate principal risks to the services of REC and oversee the implementation of appropriate systems to manage the identified risks.

Centres and Divisions

Curriculum Development Centre

The Curriculum Development Centre (CDC) determines the national curriculum for the mainstream school education in the country. The centre carries out the following responsibilities:

* Review, innovate, and develop school curriculum and teaching learning materials.
* Provide monitoring and professional support services for effective curriculum implementation.
* Conduct research in curriculum and instruction, and assessment and evaluation, in collaboration with Research Division (RD).
* Conduct orientation on revised or new curriculum, and provide professional development programme, in collaboration with Professional Development Centre (PDC).
* Diversify school curriculum as per the national needs.

Professional Development Centre

The PDC determines professional development programmemes for teachers and school leaders for effective implementation of the curriculum. The centre carries out the following responsibilities:

* Identify, develop and deliver need-based professional development programmes to support capacity development in collaboration with the CDC.
* Conduct orientation programmes on revised and new curriculum, in collaboration with CDC.
* Conduct research in innovative pedagogies and integrate in the curriculum in collaboration with the CDC and RD.
* Provide monitoring and professional support services for implementation of professional development programmemes;
* Set professional standards for entry into various teaching and school leadership levels;

* Develop professional code of ethics for teachers and school leaders.
* Institute mechanism for registration and licensing of teachers, and implement registration and licensing, if required.

Research Division

The RD shall spearhead educational research, and support research related to development of quality curriculum, effective professional development programmemes, and formulation of curricular policies. The RD shall carry out the following responsibilities:

* Identify, design, and conduct research on educational policies and practices.
* Provide technical support on conducting research on curriculum and professional development.
* Facilitate professional development on research theory and practice at school, cluster, dzongkhag, regional, and national levels.
* Provide relevant platforms, such as educational journals, seminars, and conferences, for dissemination of research.
* Engage in joint research endeavours, and carry out research commissioned by national and international institutions.
* Serve as the secretariat for the Research and Ethics Committee for the REC.

Instructional Media Division

The Instructional Media Division (IMD) shall design and produce teaching learning materials to support the effective delivery of the curriculum. The IMD shall carry out the following responsibilities:

* Design and produce teaching learning materials in print, graphics, audio, video, animation and multimedia to support school curricular needs, in collaboration with subject experts.
* Research and recommend on instructional resources and instructional technologies (hardware and software) to support teaching and learning.

* Assist in the integration of instructional technologies andbest practices in the curriculum.
* Collaborate with e-learning industry on design and development of instructional learning solutions.
* Design and deliver innovative educational technology programmes to support capacity development of REC professionals, teachers and school leaders.

Curriculum and Technical Advisory Board

The Curriculum and Technical Advisory Board (CTAB) is the apex decision making body to provide professional and technical guidance. The CTAB shall recommend and/or approve curriculum matters, research activities and professional development programmes in terms of quality and relevancy.

The Board shall comprise of the following ex-officio members:

1.	Minister, MoE	Chairperson;
2.	Secretary, MoE	Vice Chairperson;
3.	Secretary, DDC	Member;
4.	Director General, DSE,	Member;
5.	Director General, DYS, MoE	Member;
6.	Director General, DAHE, MoE	Member;
7.	Secretary, BCSEA	Member;
8.	Director General, Academic Affairs, RUB	Member;
9.	President, SCE, RUB	Member;
10.	President, PCE, RUB	Member;
11.	Director, REC	Member;
12.	Dean, PDC, REC	Member;
13.	Dean, CDC, REC	Member Secretary;

Relevant subject committee chairpersons shall be invited to attend the board meeting as members. The membership shall be reviewed as and when required. The relevant officials from REC shall attend the Board Meetings as non-members.

The functions of the CTAB shall be to:

1. Review, deliberate and propose a way forward on issues related to school curriculum, teacher professional development and research.
2. Recommend/Approve plans and policy proposals on curricular matters including teaching learning materials and other relevant issues concerning the school education.
3. Approve subject committees and chairpersons.

1. Curriculum Development

1.1. Curriculum Framework Development

Simply stated, a curriculum framework provides a broad outline of content areas, implementations procedures and assessment for a particular subject. The curriculum framework developed by the REC for each subject contains the following features :

* Introduction
* Rationale
* Guiding principles
* Goals
* Strands – content and process
* Standards – Key stage and each strand
* Learning objectives – topics in each class
* Enabling conditions – professional and physical
* Assessment

From the above, the following three attributes stand out in the frameworks:

* *Guiding Principles* are anchored to the Vision of His Majesty the King, the Constitution of Bhutan, national goals and aspirations, objectives and policies, the principles of Gross National Happiness, age-old Bhutanese values and culture, universal educational theories and practices, child psychology, 21st-century skills, among others. The overall aim of the Bhutanese education system is to nurture 'nationally rooted and globally competent' citizens.
* *Process Strands* stress more on the acquisition of values, skills (critical thinking, creativity, communication, collaboration, etc.) and application of knowledge the learners acquire such as entrepreneurship, rather than learning the content knowledge. The process strands emphasise on the principle of 'learning how to learn rather than learning what to learn'.

* *Enabling Conditions* ensure that all resources including conducive physical infrastructure, adequate trained teachers, and adequate teaching-learning materials are in place for effective implementation of the curriculum as intended.

1.1.1. Media Studies Curriculum Framework

The workshop for the Media Studies Curriculum Framework Development was conducted in Gelephu LSS from January 19 - 28, 2019 with 10 participants.

The objective of the workshop was to draft a curriculum framework for media studies. The ultimate goal of the curriculum was to ensure that the school graduates get adequate knowledge, skills, attitudes, beliefs and values which not only enable them to play a successful role in society, but also help them to pursue their interests in media and media related areas in future.

The curriculum framework on media studies was drafted following the framework for development of a new curriculum. The framework will be refined incorporating feedback from stakeholders.

1.1.2. Bhutan Civics Curriculum Framework

The workshop to review the draft Bhutan Civics Curriculum Framework for classes VII - XII was conducted from February 1 – 12, 2019 at Kuenden Boutique Hotel, Depsi, Thimphu with nine participants and five facilitators.

The review was carried out as one of the activities of the 'History and Civics Section' following recommendation from meetings at REC (including the CDC meeting). The rationale for the recommendations was based on the premises that the existing curriculum was written in 2008 - about 11 years ago when democracy was introduced in Bhutan and the governance approach changed with the new political parties forming the government. The recommendations took into account of how the new governance impacted citizen participation. Further, the National School Curriculum Conference of 2016 reported current textbooks being lengthy and monotonous for young learners. It also pointed out that marks allocated for assessment was rather too small for otherwise heavy and almost irrelevant curriculum.

Therefore, the workshop reviewed and finalised the draft curriculum framework for classes VII - XII to suit learners' changing context. It was also intended to develop

skills in learners who can critically analyse politics, laws and policies, the functioning of the state, market and civil society organisations and their contribution in the governance of the country.

A 1-day validation workshop was conducted on March 29, 2019 at Hotel Kuenden Boutique in Thimphu to finalise the civics part of the history and civics curriculum framework. The workshop was attended by 13 participants and facilitated by four professionals from REC.

1.1.3. Values Education Curriculum Framework

The activities related to values education curriculum were carried out in line with the recommendations of the CTAB and in connection to the latest rationalised curriculum and instructional periods sent to schools. The three most significant activities carried out were a technical review workshop, a consultative meeting, and presentation to multi-sectorial stakeholders for policy related feedback and recommendations.

A technical review workshop was conducted at Taktsang Paradise, Paro, from May 23 - June 9, 2019 to review the technical aspects of the draft framework. Key REC professionals, values education subject committee members from ACC, DYS, PCE, and schools participated in the workshop. The detailed technical review focused on key-stage competencies, the values contents, relevance, authenticity, practicality, and values alignment with broader curricular goals, school education mission, and the national vision.

The reviewed competency-based values education curriculum framework was presented to the professionals and stakeholders from relevant ministries, autonomous agencies, universities, Dratshang Lhentshog, Dzongkhag Education Officer, and teachers. The objective of the presentation was to incorporate wider feedback and recommendations for promoting impactful values education in schools and beyond through holistic and strategic approaches.

1.2. Textbooks, Manuals and Teaching Learning Materials

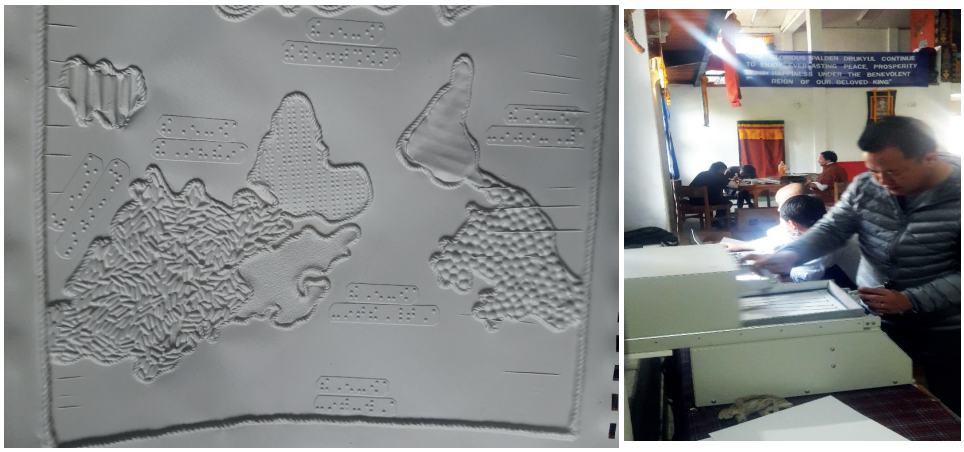
1.2.1. Transcription of Textbooks and Curriculum Materials into Braille

A 20-day programme on transcription of textbooks and curriculum materials into Braille was organised from January 10 - 29, 2019 at Rangjung CS, Trashigang to enable children with visual impairment access educational resources that are suitable to their learning needs.

16 participating teachers from Muenselling Institute in Khaling, Trashigang carried out the transcription of textbooks for English, science, mathematics, Dzongkha, history and social studies into Braille. The transcribed materials were supplied to Muenselling Institute, Khaling LSS and Jigme Sherubling CS as well as to other teachers who had submitted requisition for the materials.

As a follow up plan, Muenselling Institute will ensure that all transcribed materials are recorded into an inventory and follow all record keeping protocols. Relevant officials from REC will conduct a 2-day orientation programme on the transcribed textbooks and curriculum materials.

1.2.2. Development of Tactile Graphics



Maps developed into tactile graphics

Children with visual impairment learn better if teaching learning materials are adapted to suit their learning needs. Development of tactile graphics is an effort

towards making teaching and learning experiences enjoyable, relevant and effective.

14 participants including teachers with vision impairment, subject groups from Muenselling Institute, Khaling LSS and three curriculum developers from REC who had expertise in the development of curriculum materials into tactile graphics developed the tactile materials in Trashigang MSS from March 6 - 12, 2019. Tactile Graphics developed for use in classes PP - VI include drawings, maps, diagrams, graphs, etc. for geography, science and mathematics.

1.2.3. Accountancy Textbook for Class XII

The workshop to write accountancy textbook for class XII was organised at Sarpang CS from December 31, 2018 - January 19, 2019. Three resource persons and seven teacher participants drafted all chapters of the textbook including learning activities in accordance with the curriculum framework.

The class XII accountancy textbook was developed for implementation in the 2020 academic year following the implementation of class XI textbook in 2019. The draft textbook was refined during a 5-day workshop conducted in Wangdue from April 22 - 26, 2019. During the workshop, the content was improved, and sample question paper developed.

1.2.4. Geography Textbook for Class IX

The workshop to develop geography textbook for class IX was conducted from December 22, 2018 - January 6, 2019 at Pelrithang MSS, Gelephu. Beginning 2016, review and reform of geography curriculum commenced and curriculum framework for the subject developed. In line with the framework, textbooks for classes VII and VIII were developed in 2017 for implementation in 2019 and 2020 respectively. To ensure continuity and progression, class IX textbook was drafted in the 2018 - 2019 FY for implementation in 2021. 16 participants and four facilitators were involved in drafting the textbook. The best practices and 21st century skills were also incorporated in the new textbook.

1.2.5. TVET CBLM and Guidelines for Assessment

The workshop on TVET Competency Based Learning Material (CBLM) and Guidelines for Assessment was organised in Norbuling CS, Sarpang from December 24, 2018 - January 20, 2019. The workshop was organised to refine CBLM for

classes IX and X and draft CBLM for classes XI and XII aligned with the curriculum framework and the National Certificate II that are offered in Technical Training Institutes and Institute of Zorig Chusum.

At the end of the workshop, three resource persons and 38 participants completed content mapping as planned; CBLM for classes IX and X were refined and finalised; assessment guidelines were refined and finalised; costing for equipment and materials was worked out; and CBLM for classes XI and XII were partially drafted.

1.2.6. Infusing EVS Concepts in the English Curriculum for Classes PP to III

The National School Curriculum Conference, 2016 recommended strengthening primary education with special focus on literacy and numeracy in the lower primary classes. The 18th National Education Conference, 2017 endorsed the recommendation and passed further resolution to infuse EVS concepts into the language curriculum without losing the essence. The aim of infusing EVS concepts was to enrich and contextualise PP - III English curricula through Place Based Education (PBE).

The infusion of EVS concepts for classes PP - III was implemented in two phases. The first phase, which was carried out in the 2017-18 FY, involved the development of teaching learning activities for classes PP and I. Teacher's manual for classes PP and I were also developed in the first phase and implemented accordingly. The second phase involved the development of teacher's manual for classes II and III. It was completed in the 2018 - 19 FY.

In order to prepare the teachers' readiness, all primary English teachers were oriented in 2017 on the revised curriculum and PBE principles.

The revised curriculum is currently being implemented in schools with the support from English Section of the Language Unit, REC.

1.2.7. World History Textbook for Class IX

To improve the quality and relevance of the history curriculum, review and reform of history began in 2016 with the development of framework for the subject. Textbook development for classes VII and VIII commenced in 2017. It was planned for implementation in 2019 and 2020 respectively.

To maintain continuity and progression, development of textbook for class IX was conducted in 2018 – 2019. The review was done well ahead of time so that the revised curriculum would be ready for implementation in the academic year of 2021. The workshop was organised in Losel Gyatso Academy, Gelephu from December 25, 2018 - January 6, 2019.

1.2.8. Health and Physical Education

Aligning with the draft school curriculum framework and the recent rationalised curriculum and instructional periods, a strategic plan of activities on HPE curriculum for 2018 - 2023 was drawn as a result of a multi-organisation meeting held on October 5, 2018 at Hotel Holiday Home, Paro. The REC, DSE, DYS and PCE have agreed to expedite their support in their specific roles for progressive execution of HPE activities in schools.

Strategic plan of activities (2018 - 2023)

<table>
<tr><th>Year</th><th>Plans</th><th>Actions</th></tr>
<tr><td>2018-19</td><td>Strengthen HPE curriculum and implementation practices in class PP to VI</td><td>• Refinement of curriculum materials- REC
• Training of primary HPE teachers- DYS
• Circular on HPE period allocations- DSE</td></tr>
<tr><td>2019</td><td>Development of HPE curriculum and teacher preparation for classes VII and VIII</td><td rowspan="8">For class VII to XII
• Development and piloting of curriculum materials - REC
• Identification and recruitment of full - time HPE teachers for class VI to XII - HRD (MoE), RCSC
• HPE teacher preparation- REC, TPSD, DYS, PCE</td></tr>
<tr><td>2020</td><td>i. Introduction of HPE in class VII and VIII</td></tr>
<tr><td></td><td>ii. Development of HPE curriculum and teacher preparation for classes IX and X</td></tr>
<tr><td>2021</td><td>i. Introduction of HPE in classes IX and X</td></tr>
<tr><td></td><td>ii. Need analysis study on the introduction of optional HPE curriculum in classes XI and XII</td></tr>
<tr><td>2022</td><td>i. Development of optional HPE curriculum and teacher preparation for classes XI and XI
ii. Pilot test optional HPE curriculum in class XI and XII</td></tr>
<tr><td>2023</td><td>Introduction of optional HPE curriculum in classes XI and XII</td></tr>
</table>

i) A multi-sectorial workshop

A multi-sectorial workshop on technical review of the HPE curriculum framework was conducted in Punakha from April 2 - 14, 2019. It was coordinated by School Health and Nutrition Division and funded by UNICEF Office, Bhutan. Facilitated by the REC curriculum specialist, professionals from JDWNRH, KGUMSB, PCE, UNICEF, WFP, School Sports Division, and HPE teachers participated in the workshop.

The output of the workshop included the completion of revision of competency-based HPE curriculum framework for classes PP – XII. The revised curriculum highlight core intellectual abilities, skills abilities, and values judgement abilities for health and wellbeing. The contents of the framework are also aligned with professional and academia requirements for entry into various vocational and tertiary education systems, both nationally and internationally.

ii) Revision of activities for classes PP - VI

With the revised competency-based HPE curriculum, lesson activities for classes PP - VI were reviewed and designed under thematic areas of essential learning experiences necessary for achieving competencies expected of learners at progressive key-stages. The key emphases of the thematic activities were on authentic learning experiences, competency development, and attitude and behavioural changes indispensable for active and healthy living. Lesson activities integrated concepts and skills of nutrition, hygiene, sanitation, active living, values, life skills and intra-personal and inter-personal competencies for health living.

1.3. Training and Orientation on Curriculum and Curriculum Materials

1.3.1. སློབ་གྲྭ་ལྟ་ཞིབ་དང་རྒྱབ་སྐྱོར།

སྤྱི་ལོ་༢༠༡༨ ལས་༢༠༢༡ ཚུན་གྱི་ སྤྱབ་འབྲས་དང་འཁྱིལཕ་དང་ ནུབ་ཕྱོགས་དང་ལྷོ་ཕྱོགས་རྩོང་ཁག་ལུ་ ཡོད་པའི་ སློབ་གྲྭ་ཚུ་གི་ ལེ་གསུམ་གྱི་སྐྱགས་ཚད་ སྤྱི་སྟེམས་འབད་ལྟཕ་དང་ སྤྱབ་འབྲས་ བརྒྱ་ཆ་༤༠ ལས་ཉུངམ་འབད་པོན་ཡོདཔ་དང། ཤེར་ཕྱོགས་རྩོང་ཁག་ཚུ་གི་སློབ་གྲྭ་ མང་ཆེ་བ་གིས་ སྤྱབ་འབྲས་ བརྒྱ་ཆ་༦༠ ལས་ ཕ་༥ཚུན་པོན་སྟེ་ དྲག་ཤོས་པོན་ནུག་ཟེར་ཞུ་ནི།

དེ་འབདཝ་ལས་ སྤྱབ་འབྲས་དེ་སྤེ་པོན་མི་འདི་ གཅི་ལས་བརྟེན་ཏེ་ཕྱིན་ན་ དབྱེ་ཞིབ་འབད་ནི་དང་ དེ་དང་འབྲེལ་བའི་ རྒྱབ་སྐྱོར་འོས་འབབ་དང་འཁྱིལ་ཏེ་འབད་ནིའི་དོན་ལུ་ ཤར་ཕྱོགས་དང་ ནུབ་ཕྱོགས་ ལྷོ་ཕྱོགས་ལུངཕྱོགས་ཀྱི་ སློབ་གྲྭ་ཚུ་ཁག་ ཁལ་གཅིག་ དེ་ཅིག་གི་ནང་ལུ་ སྐད་ཡིག་དང་ རིག་གཞུང་ལས་ ཚན་ནང་ལས་ རྩ་གཞུང་རྩོམ་སྒྲིགཔ་གསུམ་ ལྟ་རྟོག་དང་རྒྱབ་སྐྱོར་འབད་བདཝ་ སོང་ཡོད།

1- རྩོང་ཁའི་རྩ་གཞུང་ལག་ལེན་ལམ་ལུགས་ཚུལ་མཐུན་ཡོད་མེད་ལྟ་རྟོག་དང་རྒྱབ་སྐྱོར་འབད་ཡོད།
2- སློབ་རིམ་༡ ཝ་དང་༡༠ བའི་ རྩ་གཞུང་བསྒྲུབ་ཞིབ་ཀྱི་ གོས་འཆར་ལེན་ཡོད།
3- ཏེ་བའི་བཀོད་རིས་ བསྒྲུབ་ཞིབ་འབད་ཡོད་མི་གི་དོགས་མེལ་འབད་ཡོད།
4- ལྟབ་སྟོན་མཁོ་ཆས་ཚུ་ ཚུལ་མཐུན་མཁོ་སྒྲུབ་འབད་ཡོད་མེད་ ལྟ་རྟོག་འབད་ཡོདཝ་དང་ མཁོ་སྒྲུབ་འབད་ཀྱི་ལམ་ལུགས་ཚུ་ གསལ་བཤད་འབད་ཡོད།
5- རྩོང་ཁའི་ཆོས་ཚན་སློབ་སྟོན་དང་འབྲེལ་བའི་ དོགས་མེལ་འབད་ཡོད།
6- ལྷོགས་སྤྱབ་ཞན་སུ་འབད་ཐོན་མི་འདི་ གཅི་ལས་བརྟེན་ཏེ་འཐོན་ཞིན་ན་ དབྱེ་དཔྱད་འབད་ཡོད།
7- རེས་གཟའ་ཉིམའི་ ངལ་གསོ་ལུ་བརྟེན་ཏེ་ རྩ་གཞུང་ནང་དོན་མར་ཕབ་ འབད་གཏེ་སྤེ་ར་འབད་གཅོད་གསལ་མེལ་འབད་ཡོད།

ལྟ་རྟོག་ཚུ་ ཚུལ་མཐུན་འབད་ཚར་བའི་ཤུལ་ལུ་ སྤྱབ་འབྲས་སྐྱན་ཞུ་ཚུ་ བསྡུ་སྒྲིག་འབད་དེ་འབྲེལ་ཡོད་དབང་ཁཅོན་དང་སློབ་གྲྭ་ཚུ་ལུ་ཕུལ་ནི་འབད་ཡོདཔ་དང་ རྩ་གཞུང་བསྒྲུབ་ཞིབ་གི་ལྟ་དང་ ཞལ་འཛོམས་ཚུ་གི་དོན་ལུ་ཡང་ ལག་ལེན་འཐབ་ནི་འབད་ཡོད་ཟེར་ཞུ་ནི་ཨིན།

ལྷ་ཞིབ་འབད་བར་སོང་ཡོད་པའི་སློབ་གྲྭའི་ཐོ།

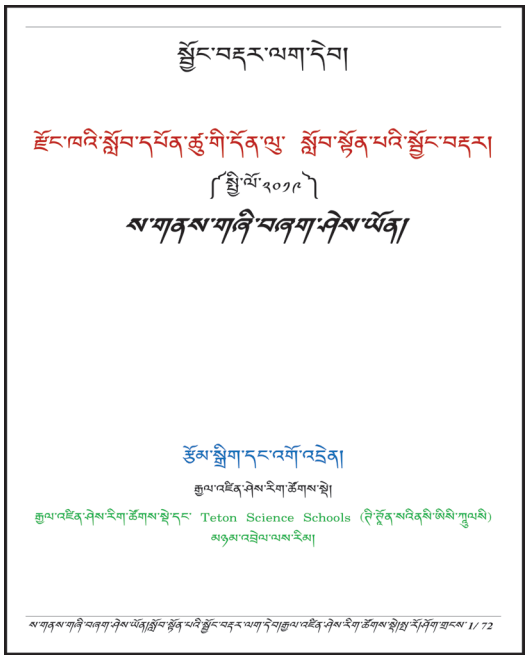
དིམ་ཚང	ལྷ་རྟོག་པ། རོ་རྗེ། བདེ་ཆེན་དབང་འདུས།
༡	ཨི་ཞེལ་སི་འབྲིང་རིམ་གོང་མ།
༢	སྐལ་སྐྱིད་འབྲིང་རིམ་གོང་མ།
༣	ལྷུན་རྩེ་འབྲིང་རིམ་གོང་མ།
༤	གཉུང་རྩེ་འབྲིང་རིམ་གོང་མ།
༥	འཇིགས་མེད་ཤེས་རབ་གླིང་།
༦	བསམ་ལྡེའུས་འབྲིང་རིམ་གོང་མ།
༧	དགེ་ལེགས་ཕུག་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།
༨	དཔལ་རི་ཐང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།
༩	མནྟལ་སྒོང་སློབ་གྲྭ་ཉེ་བ།
༡༠	འགྲམ་ཕུག་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།
༡༡	ཚོན་རིག་པའི་འཐུང་གནས།

སྤྱི་ལོ་༢༠༡༧ དང་ ༢༠༡༨ ཀྱི་རིང་ལུ་ རང་སོའི་ལྟ་གི་འཆར་གཞི་ནང་ཚུད་ཡོད་རྒྱུ་ མ་དཔྱལ་མེད་པའི་དཀའ་ངལ་དང་ གློ་འབྱུར་གཞུང་འབྲེལ་གྱི་ ལས་སྣ་ལེ་ཤ་འབད་དགོཔ་ཚུ་ལུ་བཏེན་ཏེ་ ལྷ་རྟོག་དང་རྒྱབ་སྐྱོར་འབད་བར་ ལྷོད་མ་ཚུགས།

སློབ་གྲྭ་ཚུ་ནང་ ལྷ་རྟོག་དང་རྒྱབ་སྐྱོར་ཚུ་འབད་བར་འགྱོ་བའི་སྐབས་ ལས་རིམ་འདི་ལུ་བཏེན་ཏེ་ སློབ་དཔོན་ཚུ་གི་ རྩ་གཞུང་ལག་ལེན་ལམ་ལུགས་ནང་ ཕན་ཐོགས་འབྱུང་ཚུགས་རྒྱུ་ ཁོང་རའི་ དུས་རྒྱུན་སློབ་གྲྭའི་ སློབ་སྟོན་གྱི་ལྟ་ལུ་ བར་ཆད་དུམ་གྲ་རེ་འབྱུངཝ་ཡོདཔ་ལས་ སློབ་གྲྭ་ཚུ་ནང་ འགྱོ་ནི་ལུ་ མཚོན་སྣང་འབྱུངཝ་ཡོདཔ་དང། ལམ་ཐག་རིངམོ་དང།། ལམ་མ་ཤེསཔ། དེ་ལས་ ལམ་གྱི་གནས་སྟངས་ཟོག་དྲགས་ཚུ་ལུ་བརྟེན་པའི་དཀའ་ངལ་ཚུ་བྱུངཡོདཔ་དང། ལ་ལུ་ཅིག་གི་མཐོང་སྣང་ལུ་ རྩ་གཞུངལག་ལེན་ལུ་ ཕན་པའི་ ལྷ་ཞིབ་དང་རྒྱབ་སྐྱོར་མེན་པར་ ཉིན་འཐུས་དང་འགྲུལ་འཐུས་ལུ་བརྟེན་ཏེ་ མ་དཔྱལ་བཟོ་ནིའི་ ལས་རིམ་ཚིན་པས། ཟེར་བའི་ སྐྱེན་བརྗོད་ཚུ་ལུ་བརྟེན་ཏེ་ དེ་སྦེ་འགྱོ་ནི་ལུ་ མཚོན་སྣང་སྤྲོམ་ར་འབྱུངམ་མས་ཟེར་ཞུ་ནི།

1.3.2. ས་གནས་གཞི་བཞག་ཤེས་ཡོན་གྱི་ཐབས་ལམ།

ས་གནས་གཞི་བཞག་ཤེས་ཡོན་གྱི་ཐབས་ལམ་ཐོག་ལས་ ཡོན་ཏན་ཁྱེན་ནེའི་ལམ་ལུགས་འདི་ གལ་ཆེཤ་ཅིག་ཞིནམ་བཞིན་དུ་ སྤྱི་ལོ་༢༠༡༨ལོ་ལས་ གཞི་རིམ་རྩོང་གའི་རྩ་གཞུང་ནང་ལག་ལེན་འཐབ་ནི་འགོ་བཙུགས་ཡོདཔ་ཞིན། ཞིན་རྒྱུང་ སློབ་སྟོན་འབད་མི་ མངའ་ཤོས་ཅིག་ལུ་ས་གནས་གཞི་བཞག་ཤེས་ཡོན་ཟེར་མི་འདི་ གཅིག་བརྒྱམ་ཅིག་ལུ་གོཔ་ཞིན་ན་ གོ་བརྡ་སྤྲོད་ཐབས་ཀྱི་ སྤྱོད་བརྡར་ཅིག་ བྱེན་མ་ཚུགས་པར་ ལུས་ཡོད། དེ་འབདཝ་ལས་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་གྱི་ཐོག་ལས་ དོན་སྒིན་ཅན་གྱི་སློབ་སྟོན་གྲྭབ་འབྲས་འབྲུང་ནེའི་དོན་ལུ་ སློབ་དཔོན་ཚུ་ལུ་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་སྤྱོད་བརྡར་གྱི་དོན་ལུ་ ཉིན་གྲངས་༤ འབད་མི་ སྤྱོད་ཚན་ཅིག་ ལེགས་ཤོམ་འབད་རྩོམ་སྒྲིག་དང་བཅོ་བཀོད་འབད་ནེའི་དོན་ལུ་ ཞལ་འཛོམས་འདི་འགོ་འདྲེན་འཐབ་ཞིན།



སྤྱོད་བརྡར་ལཱ་དེབ།

རྩོང་གའི་སློབ་དཔོན་ཚུ་གི་དོན་ལུ་ སློབ་སྟོན་པའི་སྤྱོད་བརྡར།

[སྤྱི་ལོ་༢༠༡༨]

ས་གནས་གཞི་བཞག་ཤེས་ཡོན།

རྩོམ་སྒྲིག་དང་འགོ་འདྲེན།

རྒྱལ་འཚིན་ཤེས་རིག་ཚོགས་སྡེ།

རྒྱལ་འཚིན་ཤེས་རིག་ཚོགས་སྡེ་དང་ Teton Science Schools (ཏེ་ཏོན་སའི་ཉིན་ཤིས་སྐུལསི།)
མཉམ་འབྲེལ་ལས་རིམ།

ས་གནས་གཞི་བཞག་ཤེས་ཡོན།/སྤྱོད་པའི་སྤྱོད་བརྡར་ཡག་དེ་བརྒྱལ་འཚིན་ཤེས་རིག་ཚོགས་སྡེ།/ཐུ་ཤོག་ཐྲབ་ཤུ། 1/ 72

གཞི་རིམ་སློབ་དཔོན་ཚུ་ལུ་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་སྐོར་ལས་ སྤྱོད་བརྡར་ལེགས་ཤོམ་ཅིག་ བྱེན་ཏེ་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་ཟེར་བའི་ཐོག་ལས་ ཤེས་ཡོན་ཚུ་ ཐོག་ཐའི་ཨིན་ཏང་ཨིན་ཟེར་ བརྟག་དཔྱད་བཏང་ནི་ཨིན།

1. དོན་ཚན་དང་འབྲེལ་བའི་གོ་དོན་གསལ་བཤད་ཀྱི་ བཤྱད་བརྟན་བཅོ་ཡོད།
2. ལྟ་བ་ཚུ་ལུ་གོམས་འདྲིས་ཚུད་ཐབས་ཀྱི་ སྤྱོད་ལྟ་ བཅོ་བཀོད་འབད་ཡོད།
3. སློབ་དེབ་ཀྱི་དོན་ཚན་ཚུ་ ས་གནས་གཞི་བཞག་གི་ ལྟ་བ་ཚུ་དང་འབྲེལ་བ་བཅོ་སྟེ་ སྟོན་ཐངས་ཀྱི་ སྤྱོད་ལྟ་བཅོ་ཡོད།
4. སྤྱོད་ཚན་འདི་ མཐའ་དཔྱད་ཞུན་དག་ འབད་དེ་ མཁོ་འདོད་སྐྱེད་མི་ སློབ་

དཔོན་སློབ་ལྷུ་ དགོས་མཁོ་དང་འཁྲིལ་ཏེ་ བཀྲམ་དོ་ཡོད་པ་མ་ཚད། པི་ཏེ་སི་ལས་ཚན་གྱི་ ཞིང་ལི་ཤ་གྱི་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་གྱི་ སྤྱོང་ཚན་དང་གཅིག་ཁར་ པར་སྐྲུན་ནང་བཏང་ཡོད།

སྤྱི་ལོ་༢༠༡༧ དང་ ༢༠༡༨ གྱི་རིང་ལུ་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་འདི་གི་སྐོར་ལས་ གཞི་རྩ་ ༤ འབད་མི་ཅིག་དང་ གཞི་རྩ་༡༠ འབད་མི་ཅིག་ དཔེ་གཞི་དང་སྦྱགས་ཏེ་ རྩོད་ཐའི་ནང་ སྐད་སྐྱུར་འབད་ཡོད།

དེ་སྦེ་སྐད་སྐྱུར་འབད་ཡོད་མི་འདི་ སློབ་དཔོན་ ༣༩༠ དེ་ཅིག་ལུ་ གཞི་རིམ་རྩོད་ཐའི་ རྩ་གཞུང་ གོམས་འདྲིས་སློབ་སྦྱོང་དང་གཅིག་ཁར་ ཐེན་ཚད་ཀྱི་རིང་ལུ་ སྤྱོང་བརྟན་ཅིག་ཡང་ཅིན་ཡོད། ཞིན་རྒྱུང་ རྒྱབ་ཁྲལ་དང་ གོ་དོན་ཁ་གསལ་ཆེད་ཐའི་ཁར་ སྤྱོང་བརྟན་ཅིན་ནི་དོན་ལུ་ སྤྱོང་ལྟ་དང་བཅས་པའི་ སྤྱོང་ཚན་ཁ་གསལ་ཅིག་ སོ་སོ་འབད་བཟོ་བཟོཕ་ཆེད་པར་ ལུས་ཡོད།

སྤྱོང་ཚན་འདི་ བཟོ་བཀོད་འབད་བའི་སྐབས་ གཞི་རྟེན་གཱ་ར་ ཞིང་ལི་ཤ་ནང་ འབད་ཕ་ལས་བརྟེན་ཏེ་ གོ་དོན་ཚུལ་བཞིན་ལེན་ནི་ལུ་ཁག་བཏང་ཡོད་པ་དང་ སྐད་སྐྱུར་འབད་བའི་སྐབས་ཡང་ གོ་དོན་སྟོན་ཚུགས་པའི་ འོས་འབབ་ལྟན་པའི་ མིངཚིག་མེད་པར་ གསར་བཟོ་འབད་དགོ་པའི་གདོང་ལེན་བྱུངཡོད་པ་དང་། རྒྱབ་རྟེན་ཚུ་ཡང་ ཀ་ར་ཞིང་ལི་ཤ་ནང་ཞིནམ་ལས་ དེ་ཚུ་གཱ་ར་ སྐད་སྐྱུར་འབད་ནིའི་དུས་ཚོད་མ་མོེབ་པའི་ དཀའ་ངལ་ཚུ་བྱུངཡོད།

དུས་ནུ་ལས་ཕར་ཡང་ མ་དཔྱལ་དང་དུས་ཚོད་ཚུ་མོེབ་པ་ཅིན་སྤྱོང་ཚན་འདི་གི་མོེག་ལུ་ གཞི་རིམ་རྩོད་ཡོདཔ་ལུ་ ཉིན་གྲངས་༤ གི་སྤྱོང་བརྟན་བྱེད་ནི་དང་། ཞིང་ལི་ཤ་ནང་ཡོད་པའི་ ས་གནས་གཞི་བཞག་ཤེས་ཡོན་དང་འབྲེལ་བའི་ རྒྱབ་རྟེན་ལེགས་ཤོམ་བཏུབ་མི་ཚུ་ སྐད་སྐྱུར་འབད་ནིའི་ འཆར་གཞི་ཚུ་ཡོད་ཅིན།

1.3.3. Orientation of New Accountancy Curriculum

The orientation workshop on new accountancy curriculum was organised from January 24 – 31, 2019 in Sonamgang MSS. It was facilitated by five resource persons and 55 teachers attended the workshop. A second round of orientation mainly targeting newly upgraded schools (where accountancy was offered) was conducted from March 25 - 29, 2019 at Gelephu with 18 participants including an Education Monitoring Officer attending the workshop.

Orienting teachers on the new curriculum is critical for successful implementation of the curriculum, especially with accountancy where Bhutanese Accounting Standards, components of taxes and practical applications of ICT in accounting are incorporated. The orientation workshop covered familiarization of textbooks of classes XI and XII, types of assessment, competency questions and application of ICT in accountancy.

The accountancy textbook for class XI was implemented in 2019 academic year. Class XII textbook will be subsequently implemented in 2020. The REC will support teachers through school visits and providing online resources.

1.3.4. Orientation of Geography Textbooks for Classes VII and VIII

Workshops to orient teachers of the revised classes VII and VIII geography textbooks were conducted in three regions: Tashigang (January 10 - 14, 2019), Gelephu (January 18 – 22, 2019), and Wangdue (January 25 - 29, 2019). The orientation workshops were facilitated by five resource persons. 60 teachers who participated in the workshop were required to train other teachers in their respective dzongkhags.

To improve the quality and relevance of the geography curriculum, curriculum framework for the same was developed. Review of the existing geography curriculum was also initiated in 2016. Classes VII and VIII geography textbooks were developed in the 2017 - 18 FY in accordance with the curriculum framework. The orientation was organised to prepare teachers to implement the new curriculum more effectively. The implementation of the curriculum will be monitored and supported to ensure effective implementation.

1.3.5. Piloting of Digital Textbook

Following the development of a prototype digital textbook for class V ICT curriculum, 10 schools from across the country were identified to pilot test the prototype. The schools were selected on the basis of their readiness in terms of ICT infrastructure including the availability of the Internet and their interest to test the prototype in their classrooms.

In preparation for it, a 4-day workshop for ICT teachers from the pilot schools was conducted in 2019 in Gelephu. During the workshop, participants were introduced to the prototype digital textbook and its concept, purpose and features. Participants were also asked to discuss the modality of using it in their classrooms and challenges they foresee in its use. Further, participants were given a rigorous crash course on the installation and use of a content management system to host the digital textbook and give students access to it.

Monitoring of pilot schools was done as a follow-up of the workshop. Besides observing in-practice use of the digital textbook, the team provided onsite technical support related to server and access during the monitoring. During the visit, preliminary data consisting of anecdotal records were collected to study the effectiveness and efficacy of digital textbook. The findings from this report will be used to improve the digital textbook.

1.3.6. Content Curation of Digital Teaching Learning Resources

The prototype of curated online content of class XI world history was developed as a proof of concept in 2018 to supplement printed textbooks. As a proof of concept, the prototype was developed by technical people. Therefore, a consultative workshop with history teachers and subject experts from REC was organised to review and validate the content curated for the prototype in May, 2019.

During the workshop, the group agreed that the content curation approach is best suited to support subjects using textbooks. However, for textbook-less world history curriculum, the prototype was re-purposed to support students and teachers in doing oral history projects. It was pointed out that although it was an enriching learning experience, many students and teachers found doing oral history research project demanding and requiring support.

Considering the usefulness of curated online content in making learning enjoyable and engaging, the group suggested for continuation of future activity to support classes VII - X history curriculum, which hitherto, is being rewritten and implemented based on the new world history curriculum framework.

2. Professional Development

2.1. Professional Development Programmes

The Education Professional Development Centre (EPDC) consists of three units: Teacher Professional Development Unit, Leadership Professional Development Unit, and Professional Standards Development Unit. The centre determines professional development programmes for teachers and school leaders for effective implementation of the school curriculum.

2.1.1. Module for PBE Approach for School Leaders

One of the recurring recommendations from the field visit and study conducted on the 'Status of PBE implementation' in schools was to train school leaders for effective implementation of PBE. The participants pointed out that for the principals/ vice principals to render full support to teachers, they have to understand the magnitude and positive impact it has on student learning outcomes. Hence, a 5-day training package was developed at Dekiling LSS, Sarpang from December 22 - 31, 2019. The package was compiled and printed into a resource book for teachers.

2.1.2. Training of Trainers on PBE Approach

A total of 45 principals/vice principals were trained on PBE concept. Principles were also trained on how to roll out the programme to the rest of the principals/ vice principals in their dzongkhags and how to plan and implement PBE as a Whole School Approach. The programme took place at Bajo HSS, Wangdue and Dekiling LSS, Sarpang simultaneously from January 3 - 7, 2019.

The 5-day training began with a field trip to the nearby locality to understand the ecology, economy, culture and the governance of the place. The trainers were grouped into three smaller teams and they were led by local guide who responded to the questions. This experience was used in the next session to enhance their concept on place.

The training covered 10 principles of PBE such as inquiry, design thinking, learner-centeredness, interdisciplinary approach, connections, community as a classroom, partnerships, real world challenges, local to global, and content rich. The methods of delivery applied were hands-on, participatory, engaging, discussion-based, indoors & outdoors, inquiry-oriented, and student-centered. The training also prepared the trainers to conduct dzongkhag/cluster-based or school-based in-

service programmes on PBE, the support of which was to be provided by the REC. The 5-day workshop aimed to model best practices in PBE and teacher professional development.

The 45 principals/vice principals under Bumthang, Trongsa, Gasa, Punakha, Wangdue, Tsirang, Dagana, Zhemgang, Sarpang Dzongkhags, Gelephu and Phuntsholing thromde who have been trained on PBE approach are currently implementing PBE as a Whole School Approach in their schools. To support the initiative, the Teacher Training Resource Book was developed and 150 copies were printed and supplied to respective schools.

Mentoring and coaching services to 45 principals in the 45 schools were also carried out.

2.1.3. Performance Based Assessment Based on PBE

Teachers using the PBE approach are wrestling with the challenge of assessing students' performance without the use of paper and pencil tests. Although, paper and pencil tests enable teachers to test what learners know through term tests and standardized norm-referenced testing, there is a need to shift the practice of assessment to assess what learners can do in preparation for not just for a job but for life-long learning. This module will address this shift in paradigm from testing what learners know to what learners can do in the face of real world challenges that start from the local community.

A comprehensive 5-day Performance Based Assessment Training Module based on PBE for teachers teaching classes PP - VI was developed from March 5 -15, 2019 at Kuenden Boutique, Thimphu by 20 writers. The draft is ready to be integrated in the curriculum of classes IV - VI.

As a follow up, curriculum officers of English, social studies, science and mathematics will be invited for another sitting to find ways to integrate performance based assessment in their respective subjects.

3. Educational Research

3.1. Executive Summary of Status of Disaster Risk Reduction in Bhutanese Schools

Context

The Constitution of the Kingdom of Bhutan, 2008, mandates the government to ensure that a minimum of 60 percent of the country's total land is maintained under forest cover for all time. All developments in Bhutan are guided by the Gross National Happiness (GNH) philosophy that emphasises both economic growth and non-economic aspects of wellbeing. The four pillars of GNH are good governance, sustainable socio-economic development, cultural preservation and environmental conservation.

Earthquakes are a possibility. The Indian tectonic plates are moving northwards to the Eurasian tectonic plates thereby pushing the Himalayas upwards on collision. From 1937 to 1998, Bhutan experienced about 30 earthquakes measuring 4.5 to 6.75 on the Richter scale (World Bank, 2009).

Climate change is a reality and glaciers are retreating fast. There are 677 glaciers and 2,794 glacial lakes of which 25 have been labelled as potentially dangerous. A partial breach of the Lugge Tso on October 7, 1994, caused catastrophic flood along its path downstream claiming 22 human lives and severely damaging houses and infrastructures (Royal Government of Bhutan, World Bank, United Nations, 2009).

The distinct seasonal pattern of spring (March to May), summer (June to August), autumn (September to November) and winter (December to February) has become unpredictable with frequent weather variation. Seasonal strong winds that cause cyclones, a hazard that was unheard of in a faraway country from the sea, is becoming a climatic feature. Dengue fever and malaria are advancing into central Bhutan. In the dry winter months, forest fires are an annual event. Drought and other seasonal hazards are slowly affecting more people of Bhutan.

Rationale

The primary purpose of education is to prepare learners for life. No human is immune to disasters. As a result, it is imperative that schools cover components of disaster risk management and climate change adaptation so

as to enable learners to live a safe and sustainable life. Throughout the history of humankind, disasters have caused deaths, suffering and economic losses. Although these disasters are in most cases beyond human control, vulnerability is generally a result of human activity.

Objective

The following are the objectives of the study:

1. To determine what Bhutanese students should know and do at the end of schooling (on Disaster Risk Management (DRM).
2. To identify gaps in the DRM policies and curriculum.
3. To recommend strategies to mainstream DRM into the school curriculum.

Methodology

Mixed methods research was used with a convergent parallel design. Both data sets (quantitative and qualitative) were concurrently gathered, independently analysed and then interpreted to derive the overall findings. While survey questionnaires were used to collect the quantitative data from the school students and teachers, focussed group discussion with identified teachers and students was used for collecting qualitative data. Further triangulation of the data was done by way of desk review of pertinent policies and other relevant documents. Survey questionnaires and focus group discussion questions were pilot tested in three schools of the western region prior to the nationwide rollout.

Findings of the study

1. Opinion on school building safety

When teachers and students were asked on the safety of the school building, an equal number of 28 percent of teachers and students reported the school building to be safe. 53 percent of teacher and 58 percent of students were not sure and 19 percent of teachers and 14 percent of students felt that the school building was not safe.

2. Mocks drills conducted in school

More than 95 percent of teachers and students reported that the school conducts mock drills on earthquake. About 30 percent to seven percent of teachers and students said mock drills are conducted on fire and windstorm.

3. Awareness of DRM documents

17 percent of teachers and 13 percent of students were aware of the Disaster Management Act of Bhutan, 2013. Some 12 percent of teacher and six percent of students were aware of the National Disaster Risk Management Framework, 2006. 23 percent of teachers and 16 percent of students were aware of the Disaster Management and Contingency Plan, 2016, developed by Ministry of Education and 72 percent of teachers and 57 percent of students were aware of the School Contingency Plan.

4. Recommendation on DRR curriculum by teachers and students

During the survey, 72 percent of students and 58 percent of teachers recommended that there be a separate DRR curriculum. And 81 percent of students and 83 percent of teachers recommended integration of DRR with the existing curriculum.

Recommendations

1. Integrate Disaster Risk Management into relevant subjects

Countries such as Bangladesh, Cambodia, India, Indonesia, Iran, Maldives, Lao People's Democratic Republic (PDR), Nepal, Pakistan, Malaysia, Philippines, and Sri Lanka have either integrated Disaster Risk Management into the school curriculum or are in the process of integration (UNICEF, 2009). The method of integration differed either as a separate subject at a specific level or integration with existing curriculum.

The recommendation made by the respondents of the study suggests integration. Further, the success stories of the best practices across the globe advise integration with existing curriculum. Therefore, as a way forward for Bhutan, it is recommended that the integration approach be adopted.

2. Adopt region specific DRR strategies based on vulnerability and risk assessments

Risk of hazards differ from place to place due to the geographical setting of the country. Hence, to effectively prepare students for disaster it is imperative that region specific DRR strategies and activities be applied.

3. *Institute inclusive approach to provide awareness and capacity building programmes*

No human is immune to disaster. Hence, there is a need to institute an inclusive approach to providing awareness and capacity building programmes so as to build a resilient society.

4. *Ensure strict compliance of building codes for school construction and/or retrofit and maintain existing structures*

It is the sovereign responsibility of the State to protect its citizens. About 28 percent of the population, consisting of students and teachers, spend most of their time in schools. Therefore, it is of utmost importance that the school structures be disaster resilient. This demands for strict compliance of building codes and retrofitting and maintaining of existing structures.

5. *Strengthen linkage between the central, dzongkhag and local level*

The study highlighted poor coordination between the Central, dzongkhag and local level in the DRR activities and programmes. Significant number of teachers and students were not aware of the existing DRR policies and role of agencies. There is a need to strengthen the linkage between the central, dzongkhag and local level for effective coordination and implementation of DRR activities and programmes.

3.2. Rationalized Environmental Science Curriculum for classes IX – XII

The REC in collaboration and support from the Royal Society for Protection of Nature (RSPN), Bhutan Trust Fund for Environmental Conservation (BTFEC), National Environment Commission (NEC), Bhutan Save the Children, World Wildlife Fund (WWF), Ugyen Wangchuk Institute for Conservation of Environment (UWICE) developed and implemented the environmental science (ES) for classes IX - XII since 2015. Envisaged to make environmental education meaningful for students in terms of continuity and encourage students to pursue specialization in environmental studies, it is hoped that the learning approach to environmental science provides numerous opportunities for learners to gain deeper understanding about the environment and its relationship of biotic with the abiotic for the wellbeing and sustainability of the natural world. The activity packed learning experiences in this subject is to build an environmentally knowledge-based society for the 21st century by enhancing the environmental knowledge, skills and values and attitude of Bhutanese school children. The curriculum ensures that every student takes responsibility in their learning. It also instils positive attitude and values for the environmentally literate citizens who would become future leaders or policy/ decision makers.

This initiative also contributes to curriculum diversification geared towards encouraging youths to pursue environment related studies in higher education as the choice of learning, and paves way to career opportunities in the field of environmental sciences.

Rationale for revision

The ES curriculum was developed and implemented on a yearly basis. Upon the completion of the ES textbook for class XII in 2017, several shortfalls in terms of alignment of topics, concepts and environmental skills; relevance of a few topics and missing of important topics; extent of chapters and activities; scope for hands-on environmental practices, etc. became evident. The monitoring report of the RSPN reverberates similar evidences, mainly in terms of grammatical syntaxes, conceptual clarity, and learning activities challenges.

Based on the National Curriculum Conference, 2016 and feedback from schools, the following observations were submitted:

i. Syllabi for classes IX and X are vast and difficult to cover through activity based learning.

ii. Elaborative context texts make the textbook content laden.

iii. Environmental information needs conformation with the environmental development.

iv. There are too many learning activities, a few of which are not feasible due to lack of equipment and time.

A few evidences from the school monitoring activities by RSPN and REC indicate that the subject has great potential in changing the belief and practices of youth towards the protection and conservation of our environment. This presented an urgent need to concretize environmental contents, skills and values to enrich students' general education and prepare them as lifelong learners. Several rounds of consultation with professionals from relevant environment related stakeholders convened to streamline the ES content and learning activities from classes IX - XII.

Revision of ES curriculum

Based on the above issues and challenges, a review of ES textbooks from classes IX to XII was perceived crucial. Major rationalization was carried out in the winter of 2018 to:

i. remove redundant texts and learning activities.

ii. remove irrelevant content and chapters.

iii. update the obsolete information.

iv. make difficult learning activities doable.

v. reduce excess questions in topic and chapter end exercises.

vi. correct syntactical errors.

vii. delete or replace irrelevant illustrations and pictures.

Based on the feedback, ES textbooks for classes IX - X have been revised through broad based consultation with relevant stakeholders and teachers in the winter of 2018. Approximately 26 professionals from diverse environmental related agencies were engaged. The revised edition of ES textbooks for classes IX - XII shall be implemented from 2020 academic session. Therefore, in order to phase out the use of old ES textbooks, schools are advised to procure new sets of ES textbooks for these classes.

Benefits of the revised ES textbooks

The revision work was carried out being mindful of curricular errors and challenges schools face in teaching the subject. Some of the salient features and benefits of the new edition ES textbooks include, but are not limited to:

i. Minimized heavy information teaching and learning, because the emphasis is on learning fundamentals, rather than the information on environment.

ii. Removal of a few redundant chapters by incorporating fundamentals of those chapters in other closely related chapters. Therefore, textbooks have lesser burden on students.

iii. Allotment of more time for teachers and students to carry out life related environmental learning activities, including researches on the environment and nature.

iv. Inclusion of contemporary environmental concepts related to their locality and the society.

v. Inclusion of learning activities where students can carry out the activities comfortably.

The REC is aware that there are numerous challenges in implementing ES curriculum as a new subject. We are in the process of exploring ways and means of making environmental learning interesting and meaningful. Towards this, we will continue exploring collaboration with relevant agencies, both in-country and ex-country, in implementing exciting environmental programmes and activities, such as summer environment camp, youth environmental summit, nature exploration, environmental seminar and conferences in future, including supporting schools with environment related reference books and equipment.

Lastly, REC hopes that our teachers and students enjoy learning about the fundamentals of environment through the revised textbooks and derive greater benefits from the revised textbooks.

3.3. Rationalization of School Curriculum

Background

The conventional teacher-centred and rote learning form of education served us well through ages. However, as the education system in Bhutan embraces the 21st century education framework and principles, it warrants a paradigm shift in curriculum design and development, including the pedagogy, commensurate the competency based learning. An approach, which underscores that learning in the 21st century, is for the development of competencies through active engagement of learners in learning experiences, guided by formation and utilisation of 'working knowledge'. This empowers learners to take responsibilities of their learning and develop 'portable skills or soft skills,' such as critical thinking, creativity, communication and collaboration, vital for all as individuals with unique talent and competencies. The current culture of curriculum design and practices in schools, however, do not render condition to facilitate realisation of the national aspiration of nurturing 'nationally rooted and globally competent' citizen.

Amongst others, it has always been a concern for the REC on the extent, relevancy and quality of the curriculum in all subjects. Thus, in order to facilitate quality learning for the 21st century education, the REC has initiated major curriculum reform in all subjects.

Rationale

The Bhutan Education Blueprint 2014-2024 indicated that the existing curriculum was 'heavy'. This was echoed as one of the major pointers in the National School Curriculum Conference, 2016 that the curriculum was 'vast'. These findings led to the need for curriculum "thinning" [Resolution 3.1.10 (IV)]. In response to these findings, the REC started the rationalization of the existing curriculum by reviewing and screening out the obsolete and irrelevant content, and updating them with the most recent information and also rectifying errors in the textbooks. Therefore, some portions of the syllabi from several subjects have been dropped. The rationalization or thinning of curriculum is one of the important considerations made while developing new textbooks based on new curriculum frameworks.

The curriculum rationalization process also aligns very well with Resolution 13 of the National Education Conference, 2018 of "doing away with the Saturday classes". The paragraph 13.4 of the resolution requires 'REC to work on curriculum thinning and review of time allocation for each subject'. This resolution has further facilitated REC to expedite the curriculum rationalization and review the time and period allocation for each subject.

Rationalization of the school curricula is based on the following strategies:

i. Review the goals and outcomes of each subject to identify topics, chapters, learning activities, exercises and assessment.

ii. Develop rationalized syllabus for each subjects ensuring conceptual linkages and progression within the chapter or topic in the textbooks.

iii. Minimize lexical density in text by reducing heavy textual materials from the textbooks.

iv. Remove topics, learning activities or assessment items which are redundant, overlapping irrelevant or inappropriate.

v. Delete irrelevant or inappropriate illustrations or diagrams and examples from the text.

vi. Update and align the content width and depth with the teaching time available for each subject.

vii. The revised syllabi for each subject are categorised and compiled under four subject classifications, namely STEM, social sciences, language, and TVET and commercial studies.

The review of the instructional time allocation is based on the following criteria:

i. Maintain the instructional time requirement at the international standard.

ii. Maintain gradual increase of instructional time across key stages.

iii. Reduce the instructional time for each subject across the grades based on the doing away of the Saturday classes.

iv. Allocate time for personal development learning areas such as HPE, Arts Education, Values Education, CGC, TVET programmes (clubs and PVOP).

v. Non-curricular activities and programmes are to be conducted outside the instructional hours.

vi. Calculate 150 actual curricular instructional days (excluding examination days in June and November months) in an academic year based on 5 working days per week.

vii. Calculation of instructional time is based on eight periods a day of 40 minutes each, which is equivalent to 5.33 hours in a day.

Conclusion

Instructional time refers to the actual contact time in the classroom. This is the minimum time available for delivery of the curriculum, including assessment. Instructional Time equals to number of days multiplied by number of periods per day times duration of one period (40 minutes). The rationalization of the curriculum is based on 150 days of the actual instructional time. Therefore, the total instructional time in hours is 150x8x40 = 800.

Instructional days are the total number of days within which the curricular activities are conducted. Within these days, a maximum of 5.33 hours (320 minutes) are available for actual classroom instruction per day. This calculation is based on eight periods a day of 40 minutes each. The average instructional time in the Organisation for Economic cooperation and Development (OECD) countries ranges from 799 to 915 hours per year. This includes all the educational activities that happen in the school in a day. However, the calculation of instructional time for the rationalized curriculum is based on the actual contact time for curriculum delivery, which has resulted in more instructional time than in OECD countries.

Lastly, it must be noted that the instructional time and days are but a suggested guide. Thus, it is envisaged that schools will make adjustment in instructional time as deemed applicable.

3.4. A Needs and Situational Analysis on Digitising School Textbooks in Bhutan

Background

Keeping abreast with the technological developments in the country, the MoE has drafted and implemented iSherig, Education ICT Master Plan 2014-2018. One of the major project envisioned in the Master plan is the digitization of school textbooks. Accordingly, Instructional Media Division, REC conducted a situational and needs analysis to better inform and prepare for the development of digital interactive textbooks and implementation of the same in schools.

Purpose

The purpose of this study was to determine system readiness to implement digital interactive textbooks in schools. The study comprises of five integral dimensions of digitizing textbooks: a needs analysis of teachers' PD requirements, students' readiness in using a digital interactive textbook, infrastructure readiness, cost comparative of printed textbooks versus digital devices, and comparison of students' backpack weights against the international recommendations.

Methods

Data was collected from 2,684 participants comprising of parents, principals, teachers, and students. Principals, teachers, and students' data were collected through researcher-administered questionnaires. Students' body weight and their backpack weights were gathered in collaboration with the school administrators and teachers and parents' data was collected using online google forms.

Using purposive sampling, 60 schools across the country were selected. 30 schools from the population were in rural areas, 16 schools from semi-rural locations, four from semi-urban, and 10 from urban areas. More primary schools were chosen for the study since the plans to pilot the project in primary school and introduction of literacy with ICT curriculum in primary schools began at the same level.

Summary of participants in the study				
	MSS	LSS	Primary	Total
Principal	15	15	30	60
Teacher	75	75	150	300
Student	600	600	840	2040
Parent				284
Total Participants				2684

Findings

Summary of the main findings from the study are:

* The computer student ratio in autonomous and central school is 1:11, whereas in schools which are neither autonomous nor central school, it is 1:33.
* Only 38% of the school participated in the study have some policy on the usage of electronic devices in the school but they are not clear-cut and uniform.
* The bandwidth and reliability of Internet facilities in schools need improvement to support online learning using digital interactive textbooks.
* Majority of teachers support the concept of digitizing school textbooks provided Internet and computer facilities in the schools are improved.
* The primary (classes IV, V and VI) students carry school backpack of 18.23% of their body weight, more than the international recommendation of 15%.
* 79% of the parents surveyed are willing to procure electronic device if we transition from traditional printed to digital interactive textbooks.
* In general, teachers are fairly competent in technological skills to use digital interactive textbooks. However, there appears to be variation among the participants.
* Majority of students in classes IV, V and VI do not have the necessary word processing skills.
* Students from urban schools have a greater technological competency as compared to their counterparts in semi-urban, semi-rural, and rural schools.
* The cost of providing the printed textbooks individually was found to be cheaper than buying an electronic device for digital interactive textbooks.

Recommendations

The following are some recommendations based on the study findings:

* Piloting in selected schools is necessary to further validate its effectiveness for teaching-learning vis-à-vis cost of procurement.
* School infrastructure needs to be improved in terms of computer student ratio and Internet bandwidth.
* Professional development on the use of digital textbooks is necessary.
* Policy on use of ICT including electronic devices needs to be relooked, standardized, and instituted in schools.
* The possibility of procuring electronic devices on a cost-sharing basis with parents needs to be explored.s

3.5. Executive Summary of the Needs Assessment on Differentiated Curriculum for Science and Mathematics

Background

The visionary leaderships of our successive monarchs and the Royal Government of Bhutan have continued to bestow the highest significance in education. This has resulted in significant progress in the Bhutanese Education System. Before the introduction of modern education, monastic education was the main form of education that served the social, economic and spiritual needs of the country. The inception of modern education system in Bhutan dates back to 1914 when 46 students were sent to mission school in Kalimpong in India and subsequent establishment of modern school in Haa in the same year (Tobgye, 2012). The introduction of the first five-year plan in 1961 contributed enormously to the enhancement of modern education system.

Ever since the introduction of modern education, the Bhutanese Education system focused on providing free universal primary education. Today, Bhutan emphasises on providing free education that is relevant to the changing needs. It is geared towards the achievement of full development of human personality as reflected in Article 9, Clause 15 and 16 of Constitution of the Kingdom of Bhutan. As enshrined in the Constitution, the free education is guaranteed up to class X for all school going children. Consequently, the school going children are given ample opportunity to learn all the disciplines offered in the schools so as to test their ability and to decide their choice of stream accordingly.

In the current education setting, all students study the same curriculum content, irrespective of their ability and interest till class X. Therefore, all the Bhutanese students irrespective of their ability and interest study the same mathematics and science curriculum till class X. While this arrangement provides level playing field for students to compete for the higher study opportunities, provision of curriculum choice and flexibility as per students' need, ability and interest for the technical subjects like mathematics and science will help in better nurturing their interest and ability. It is noted that lack of differentiated curriculum in the schools at the moment bars many of the mediocre students from developing interest and inclination towards learning technical subjects that are heavily loaded with complex concepts and information. As a result, the overall aptitude and appetite for these subjects are affected, thus stereotyping those subjects as most difficult. Developing differentiated curriculum upholds the provisions of the constitution besides catering to the diverse learning needs of the students.

Understanding the benefits, a series of discussions were held involving all the stakeholders of education to deliberate on the issue. Accordingly, the first National School Curriculum Conference, 2016, thoroughly deliberated on this issue and endorsed to develop a diversified, differentiated and inclusive curriculum (Dukpa, 2016). Similarly, the 18th National Education Conference, 2017 and CTAB meeting 2018 further endorsed the proposal and directed to conduct the needs assessment on differentiated curriculum in mathematics and science.

Besides ensuing the Constitution of Kingdom of Bhutan, the move was also initiated as a response to the requirements envisioned in various education related provisions like education for GNH and Bhutan Education Blueprint 2014 - 2024. Educating for GNH was launched as a nation-wide programme in 2009 and brought changes in the Bhutan's education system. Educating for GNH programme that brought dramatic change to the Bhutanese education system through infusion of GNH values in the curriculum also emphasizes on providing inclusive education that ensures equal educational opportunities to all. One such move is the introduction of differentiated curriculum that creates avenue for students to choose the content based on their potential and interest. This provides avenues to learn basics of the subjects that are fundamental to pursuing any goal in latter part of life and foster advanced and focused content learning for the students deciding to pursue career driven by the mathematics and science subjects.

The Bhutan Education Blueprint 2014-2024 strongly recommends for curriculum diversification and offering multiple education pathways. This is done with the view that the diversified curriculum prepares students for a variety of career opportunities. The effective education pathways provide continuing education for learners who need educational contents and programmes in order to remain current in the topics of their discipline. Further, the education pathways ensure students to take up predetermined educational journey from early childhood to tertiary education. Differentiating curriculum in science and mathematics make learning programme less burdensome while ensuring excess to the basic information offered in these two disciplines. Introducing differentiated curriculum in Bhutanese education system provides curriculum choice that also garner strong interest from students with high level of interest and aptitude.

Objectives

The specific objectives of the study were as follows:

* Determine the need for differentiated curriculum in science and mathematics.
* Ascertain the Bhutanese students', teachers' and stakeholders' perceptions on the current status of the science and mathematics school curriculum.
* Ascertain the Bhutanese students', teachers' and stakeholders' perceptions on differentiated curriculum in science and mathematics.
* Identify the challenges and opportunities in differentiated curriculum in science and mathematics education.
* Recommend the way forward for science and mathematics curriculum.

Methodology

Mixed method research was used with survey questionnaire as a tool to collect the quantitative data and the focus group discussion and one-on-one interviews to collect qualitative data. A convergent parallel design was adopted as this design ensured concurrent gathering of both the data sets, allowed independent data analysis and meaningful interpretation to derive the overall findings and interpretation of the study.

Probability Proportional to Size (PPS) sampling procedure was used to determine the sample size that is representative of the actual population of Bhutanese students and teachers. Only classes VIII, X and XII students were considered as it is the exit level of LSS, MSS and HSS, with the understanding that these classes would be representative of the respective level of schooling. As for the teachers, only science and mathematics subject teachers was considered given the scope of the study primarily related to these two subjects.

Data Source	Quantity
Teacher and student survey questionnaire	As per the sample formula (449 Class 8 students; 446 Class 10 students; 442 Class 12 students; 443 Teachers = Total 1780)
Focus group discussion	11 students, FGD 37 teachers, FGD One CST faculty, FGD
One-on-one Interview	7 eminent members (Former Minister of Education, Secretary of MoE, VC of RUB, Director General, DSE President PCE, Dr. Jagar Dorji, BCSEA Controller) DEOs, Principals

Findings of the Study

In the old didactic system, it was generally believed that everyone is endowed with the virtues of being equally capable. However, with the accruing degree of research in education, it has been found that not everyone can be measured via single construct of ability test (Corno et al., 2002). In this light, it is wrong to believe that students come to the class with same preferences and equal potential. A classroom is endowed with diversity in learning. Therefore, taking students into one basket, that too, through one stream is a false promise of equity. Each student comes to the class with differing interests, learning styles, abilities, and choices.

Several terminologies such as ability grouping, streaming and tracking are used in literature to explain the case of differentiation. The term streaming is commonly used in countries like the United Kingdom and Singapore. Meanwhile, countries such as the United States of America use the terms like tracking and ability grouping to express streaming in schools.

The practice of differentiated curriculum is common in countries such as Australia, Belgium, Brunei, France, Germany, England, Hong Kong, Singapore, the Netherlands, the United States, New Zealand, and Wales. However, in reality, the application may differ dramatically in the extent to which the schools follow the ability grouping with differentiated curriculum.

The practice of differentiated curriculum has ensued heated debate in the history of education. Those with opposing views on differentiation claim that streaming, tracking, or ability grouping widen the achievement gap between high ability and low ability group learners. While those in favour of differentiation state it to be providing better learning opportunities to the learners which eventually lead to higher achievement gains.

The study ascertained many positive attributes of the Bhutanese science and mathematics curriculum such as it being more contextualised, exploratory and participatory, better conceptual progression than compared to the past curriculum. However, overall, both curricula were said to be prescriptive and rigid, with significantly more content than the period allocated to teaching, mainly examination driven and less connections to real life situations. Ultimately, the lower ability learners are overstretched while high ability ones are underutilized.

46 percent of teachers would prefer to teach the science curriculum in its existing form while 22 percent of teachers would prefer to teach the subject that is of lower standard. About 32 percent of teachers would prefer to teach higher standard science compared to the existing curriculum. At least 62 percent of the teachers

suggested that differentiation be implemented by class VII, while 39 percent of teachers suggested that it should be implemented from class IX onwards.

When it comes to students' preference, 47 percent of the students would prefer to learn the existing science curriculum, while 32 percent of students would prefer to study the subject of lower standard and 21 percent of students would prefer to study science that is higher in standard. 59 percent of students suggested that this choice be implemented from class VII onwards and 41 percent of students wanted it from classes IX onwards.

46 percent of teacher would prefer to teach the existing mathematics curriculum while 29 percent of teachers would prefer to teach mathematics which is lower in standard compared to the existing curriculum. However, 25 percent of teachers would prefer to teach mathematics that is higher in standard compared to the existing curriculum. 65 percent of the teachers suggested that this choice be provided by class VII while 35 percent of teachers suggested it to be implemented from class IX onwards.

48 percent of the students would prefer to learn the existing science curriculum, while 35 percent of students would prefer to study the subject that is lower in standard and 17 percent of students would prefer to study higher standard science. 65 percent of the students suggested that this choice be implemented from class VII onwards and 35 percent of students wanted it from classes IX onwards.

Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was used as a tool to better understand the internal strengths and weaknesses, and highlight external opportunities and threats in the event differentiated curricula were to be introduced in Bhutan. The draft SWOT analysis was presented to all REC professionals and the selected officials from the MoE for feedback and improvement. The table shown below is the final outcome of the SWOT analysis which was presented during the 19th National Education Conference 2017 held in Phuntsholing.

INTERNAL	**STRENGTH** 1. Provides flexibility to learners based on their interest, ability, aptitude and choice of career. 2. Allow teachers to adopt whole-class teaching methods (homogeneous ability). 3. Learners' individual needs are addressed thereby enabling them to progress at their own pace. 4. Promotes greater collaboration and active participation among learners. 5. Provides content learning that is apt to learners' intellectual level thereby reducing failures. 6. Allows effective targeting and matching of resources to learners' needs.	**WEAKNESS** 1. Contributes to social segregation. 2. Low ability learners are denied the support and stimulation of their more-able counterparts. 3. Criteria to determine choice/ placement – whether the learners would be mature enough to make the right choice; peer-teacher and parent-pressure while choosing; how will school management decide on the placement. 4. Contributes to more experienced and highly qualified choosing to teach the higher ability groups. 5. Homogeneous grouping does not prepare learners to fit into the diverse society.
EXTERNAL	**OPPORTUNITY** 1. Produce competent scientist, innovators and technologist. 2. Better preparation for higher education. 3. If differentiated curriculum is carefully implemented, there is opportunity for differentiation in other learning areas. 4. Provide equity science and mathematics education.	**THREAT** 1. Perceived fairness on learners in terms of the provision for basic education (social stigma). 2. High ability students may opt for lower in standard curriculum. 3. If differentiated curriculum is not carefully implemented, its use in one subject area may force it to be imposed in another subject area.

Recommendation

Differentiated curriculum to be implemented in science and mathematics

Educators are professionally mandated to ensure all students meet the established educational standard of the country. Numerous reports such as Education in Bhutan: Findings from Bhutan's Experience in PISA for Development (BCSEA & OECD, 2019), National Education Assessment (BCSEA, 2016), Bhutanese students attitude towards mathematics (Dukpa, 2014), Annual Status of Student Learning (ASSL, 2010), Quality of School Education in Bhutan: Reality and Opportunities (REC, 2009), have consistently illustrated that the majority of Bhutanese students are not meeting the minimum educational standard in all subjects with the highest variation in mathematics and science. Despite these results and findings, the debate

on quality of education in Bhutan continues. The primary goal of differentiated curriculum is to elicit student responses commensurate with their potential and interest by making the curriculum attuned to the differences in their learning styles. Further, differentiated curriculum is also based on the concept of multiple intelligences and brain-compatible research to enable maximum student growth and individual success. Students have different strengths, interest, talents, and choice of career and they themselves know it. As educators, we would be only fooling ourselves if we continue to believe all student learn in the same way, using the same content and material, and should be taught and assessed in the same way. It is time, schools and the education sector recognise, nurture and celebrate this difference.

Nation-wide advocacy on differentiated curriculum to better plan and prepare for implementation

Given that there are different schools of thought on differentiated curriculum and its benefits among different stakeholders in Bhutan, there is an urgent to need advocate on the intent and purpose of differentiated curriculum and on the need to begin with mathematics and science subject. To ensure that the conversation is contextualised and meaningful, pilot testing of the differentiated curriculum in some selected schools would be imperative. However, proper planning and consultation among the key stakeholders such as MoE, REC, BCSEA, and RUB is a must to ensure the best options are pursued in the interest of realising the national goal of GNH.

Strengthen professional development of teachers to teach and school leaders to lead effectively in an effort to enhance student learning

Research has shown that teaching and school leadership matter and that they have a significant impact on student learning. For teachers and school leaders to be effective, it is imperative that they avail and/or receive continuous professional development to keep abreast with emerging needs and issues. Professional development refers to activities that develop an individual's skills, knowledge, expertise and other characteristics of an individual (OECD, 2009). Further, professional development has been documented to be most effective when it occurs in the daily life context where educators can immediately apply what they have learnt in the classroom and school. Hence, teachers and school leaders should be meaningfully engaged in an ongoing cycle of improvement.

Finalise, endorse and implement the education pathway with clear roles and responsibilities of key agencies such as MoE, REC, BCSEA, and RUB to ensure seamless implementation.

The introduction of differentiated curriculum demands the education pathway or structure to be restructured to enable vertical and horizontal mobility of students so that they are able to reach their full potential and realise their career of choice. This would entail clear roles and responsibilities of key agencies such as MoE, REC, BCSEA and RUB, to ensure seamless implementation. Hence, finalisation of the education pathway through a multi-party consultation is essential for shared ownership and effective implementation

4. . Programme and Services

4.1. Proceedings on the Seminar on Best Practice of Schools

The seminar on best practice of schools themed "The way of the toppers: What makes them different" was successfully organised on June 15, 2019 in Paro. Following the seminar, a follow up visit to schools was carried out to discuss about the seminar experiences and support incorporation of changes in their write up.

The final write up from schools, write up from the Education Monitoring Division and independent views on the opportunities and challenges of the School Performance Management System were collected and compiled as the seminar proceedings. The proceedings of the seminar was published.

4.2. STEM OLYMPIAD

Introduction

The National STEM Olympiad is an annual programme, devoted to improving the quality of science education, encourage student interest in science and a platform for recognition of outstanding achievement in science education by both students and teachers. The Science Olympiad tournaments are rigorous academic interscholastic competitions that consist of team events as well as individual scholastic works. These challenging and motivational events are well balanced between the various science disciplines of biology, earth science, chemistry, physics, mathematics and technology. There is also a balance between events requiring knowledge of science and mathematics concepts, process skills, problem-solving skills and recreational activities.

Generating knowledge and understanding through STEM equips people to find solutions to today's economic, social and environmental challenges and achieve the national goal of sustainable development and greener societies. The STEM subjects provide greater scope to mitigate the emerging national and global issues in terms of food security and the well-being of people and the world at large. Therefore, the theme for the National STEM Olympiad 2019 was "Artificial Intelligence for Sustainable Farming".

Rationale

Like the previous two Olympiads, the National STEM Olympiad 2019 was a 3-day programme at the national level for the best 16 schools across the country. Unlike other years, this year there were three major highlights.

* Students were exposed to designing robots through coding. The exposure to coding and thereby designing robots was related to but outside the normal school syllabus in mathematics and science.
* Same robotic kits were provided to all the 20 selected school in the second round. This served as a platform for students to exhibit their team work in the development of robots as well as compete amongst other schools to finally recognise outstanding robot designs.
* Shift of venue to Mongar MSS from the capital for the final level competition unlike the previous two years. The rationale to take the Olympiad to Mongar was basically to expand the reach of such an event beyond the capital to encourage students in STEM areas and their participation in a scientific endeavour in creating and innovating robotic designs.

The Olympiad was organised with the following broad objectives:

* provide a platform for teachers and students to showcase their robot design works, and develop an appreciation of the contribution of STEM subjects to sustainable framing.
* provide a platform for teachers and students to showcase their innovation and creativity and appreciate the contribution of STEM subjects for livelihood.
* provide opportunities for students to experience hands-on STEM applications through collaboration and discussion.
* challenge students to come up with innovative and creative ideas to solve problems related to sustainable farming.
* provide opportunities for participants and guests to interact with STEM phenomenon and models.
* make learners understand that science and technology are indispensable for environment, health, livelihood, and well-being.
* Instil in learners the positive attitude and values for science and technology.
* make learners understand that the body of knowledge of science is a human construct.

Timeline of the Olympiad

Schools develop proposals	: March 11 - April 2, 2019
Last day of receipt of proposals	: April 2, 2019
Evaluation and declaration of results	: April 12, 2019
Deployment of trainers and robotic kits to selected schools	: April 13-20, 2019
Development of robots by selected schools	: May 21, 2019
Evaluation of robots at the school leve	: May 14 - 20, 2019
Declaration of the result of evaluation	: May 22, 2019
Main event	: May 29 - 31, 2019

Day 1 Inauguration and league round robot competition

Day 2 Symposium

Day 3 Quarter-final, semi-final and final of robot competition and award of prizes :

School Level Proposal Development and Selection

The school-level proposal development and selection happened at two stages:

Stage 1

All MSS and HSS were to develop at least three proposals and submit the best proposal (one proposal only) to REC by March 26, 2018 along with the score sheet and selection process for all proposals.

The challenge during this stage was in writing and submitting the proposal which demand collaboration of ideas within the given span of time. It generally involves planning, design, creation, innovation, and teamwork that would test the aptitude, knowledge, and skills of the participants. It provides a platform for students to showcase their inner talents. Participants develop leadership and organisational skills besides being able to synthesise concepts and knowledge from different STEM subjects into a single coherent argument.

Of all the proposals submitted by schools, 20 best proposals from 20 schools were selected by a panel of judges. The selected schools were provided with same robotic kits by FabLab Bhutan along with a trainer each to design a robot within four weeks.

One of the lessons learnt was that schools sent only one proposal with no evidence that the proposal sent was the best of the at least six proposed at school level.

Stage 2

During this stage, 20 selected schools developed and constructed robotic prototypes. The prototype/model developed by each of 20 schools were assessed by a pool of evaluators using standard assessment criteria and tool by visiting the respective school which carried 80 percent weight. A cognitive test was also administered to the six participating students which comprised of 20 percent weight.

A student team making their presentation during evaluation in one of the schools

By the end of this level, 16 best schools were selected to participate and compete at the National level STEM Olympiad at Mongar MSS, Mongar.

The National Level Olympiad

The National level STEM Olympiad culminated at Mongar MSS from May 29 – 31, 2019.

The programme comprised of both competitive and non-competitive events. The competitive event was the competition amongst the robots designed by different schools on Day 1 and Day 3. The non-competitive part comprised of activities related to science by the REC, The FabLab Bhutan, Jime Namgyel Engineering College (JNEC) and the RNR Research Office at Wengkhar, Mongar. The symposium was also a non-competitive event.

Day I: Opening of the Olympiad

His Excellency the Hon'ble Minister of Education graced the opening of the Olympiad.

Hon'ble Education Minister Inaugurating the National STEM Olympiad, 2019

The Hon'ble Minister detailed out the importance of STEM education for Bhutan and encouraged all members of the audience to disseminate ideas of artificial intelligence to the community to reap the benefits of such a development that is rapidly expanding in the world. His Excellency stressed that Bhutan cannot afford to stay behind.

Major Highlights of Day I

Fun activities/awareness programme

Events happening around are explained by science. The fun corner provided opportunities for visitors and participating children to engage in hands-on experiments, mathematical puzzles and awareness programmes. They observe and reflect, and apply scientific ideas to make explanations of how science works.

The challenges in the corner are presented with problems and procedures to guide participant in solving problems with the materials provided. When questioned, the students handling the fun activates could also provide the explanation to the problems.

The fun activities were basically put in place to:

* To stimulate visitors to engage in hands-on fun activities.
* To develop an understanding of how science works.
* Realise doing science if fun and recreational.

Along with the fun activities, FabLab Bhutan, JNEC and RNR Wengkhar also showcased prototypes related to artificial intelligence and farming.

Competition based events

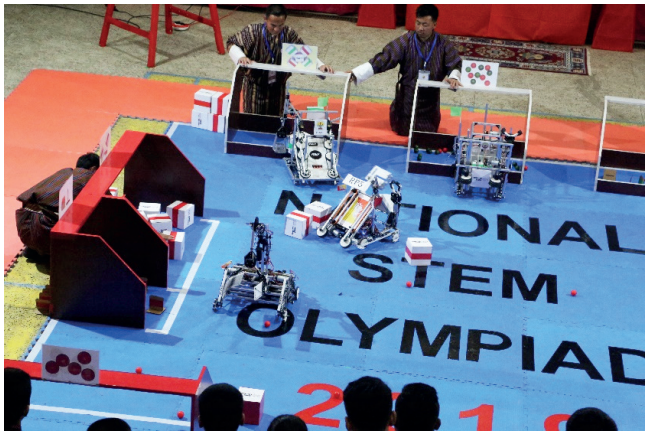
Unlike the first two years, this year the competition was between the robots designed by the 16 selected schools. The competition comprised of the league round and knockout round.

The robotic competition was organised to:

* generate excitement about science and its possibilities through hands-on experiences.
* help children to relate and apply the scientific concepts to their day to day lives.
* apply STEM to visualise and solve problems pertaining to everyday life.
* understand the importance of science for the well-being of the society and the environment.

Process of the competition

Competition amongst the robots developed by the 16 schools by putting the schools in four pools and competing in the league round. Eight schools qualified for the knockout round played as quarter final, semi-final and final.



The first competition

Day 2: Symposium

While the showcase of the robots and the fun activates continued, the major highlight of Day 2 was the Symposium.

It was a platform created for a discussion on some subjects or expression of opinion on a topic or issues before an audience. The symposium served as a forum for informing the audience, crystallizing understanding and in general helping listeners to arrive at decision, judgment, and understanding.

One guest speaker, six student speakers and five teacher speakers presented their research papers. The theme for the symposium this year was, "Artificial Intelligence for GNH". The Director General of the Department of School Education graced the Symposium as the Chief Guest. Mr Pedup Dukpa, Senior Research Officer of the REC moderated the proceedings.

The five teacher participants during their presentations

The Chief Guest congratulated all the presenters for the job well done. He especially thanked and spoke highly of students because this was a showcase of the capacity of the Bhutanese students. He urged all students to continue to explore solution to major problems facing the world today through STEM education. He opined that the system should support our teachers in advancing STEM education in the country.

Objectives of the symposium

* Provide a broader understanding of contributions made by science in fostering peace and development.
* Provide an opportunity for participants to discuss and understand the challenges in the field of science and technology.
* Develop diverse perspectives and prospectus of science in fostering peace and development.
* Create a platform for teachers and students to contribute their scholarly works at the national level.

The six student presenters

The title of the presentation of each presenter is given below. The research papers presented were selected through a thorough process by a panel of evaluators. All the presenters were awarded a STEM Olympiad memento and Nu 7000.00 each along with the travel expenses reimbursement.

SN	Title of the Paper	Presenter
1	IOT Based Hydroponic System for Smart Home Framing	Thinley Namgyel, Teacher, Loselling MSS
2	Integrating Digital Technologies in Education	Jambay, Teacher, Tashitse HSS
3	Descriptive Analysis of AI in the Educational Domain of GNH	Sherab Jatsho, Teacher, Yangchengatshel MSS
4	AI for Gross National Happiness	Sonam , Shari HSS
5	GNH as a means to instilling ethical values in AI	Tobgay, Wangbama CS
6	Guest Speaker	Dean, Academic Affairs, GCICT
7	Use Me: Smart Dustbin	Tandin Penjor, Student, Zhemgang CS
8	Automatic Guarding Mechanism in Modern Farm Land	Ngidup Dorji, Student, Tashitse HSS
9	AI for firefighting in conserving environment	Karma Chophel, Student, Tashitse HSS
10	Saving farmers and agriculture products from wild animals using AI	Tenzin Dorji, Student, Tashitse HSS
11	Smart Drive Bus	Mohan Ghalley, Punakha CS
12	Health a stepping stone towards GNH	Yeshi Jamtsho, Jigme Sherubling CS

Day 3: Culmination of the Olympiad

The National STEM Olympiad concluded on the May 31, 2019. The Vice Chancellor of the Royal University of Bhutan graced the closing as the Chief Guest.

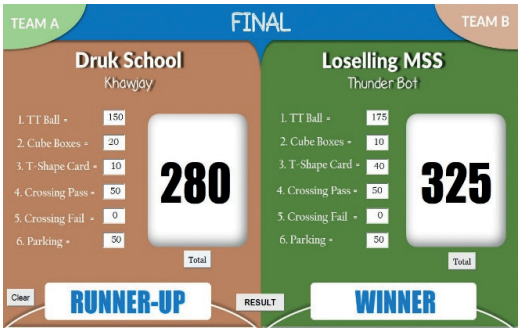
The major high lights of the final day were as follows:

* Quarter-final, semi-final and final of the Robotic Competition
* Award of the prizes.
* Cash prizes and certificates were awarded to the winners and the finalists.

The Vice Chancellor of the RUB checks out a fun activity

Result of the Robotic Competition

Loselling School bagged Winner's Trophy and Nu 75,000/-. Druk School was the First Runner's Up to take home Nu 50,000/-. Dechenchoelling HSS was the Second Runner's Up and took home Nu 30,000/-. The remaining 13 finalists were awarded a consolation prize of Nu 10,000 each.



All the participants who presented papers in the symposium were awarded a cash incentive of Nu. 7000/- along with other travel benefits and certificates.

Loselling MSS with the Winning Trophy

Certificates and mementos were also awarded to the host school, the judges and the trainers.

The Chief Guest in his address congratulated all the participants and informed that while all are winners, because of the process of the event someone has to lose and someone has to win. Dasho Nidup Dorji acknowledged the REC's and the MoE's efforts in organising such an event and encouraged students to take up STEM education because the benefits always outweigh the challenges especially for Bhutan.

Audience

The organisation of such an event at Mongar attracted a lot of interest amongst the schools. Schools in and around Mongar and Tangmachu arranged the transportation for teachers and students so that they could be a part of the event. About 5000 people visited the event.

Hands-on experience with robots

Conclusion

All in all, the National STEM Olympiad was a grand success.

The REC as the main organiser put on record the wonderful contribution made by all the parties in making the Olympiad a grand success. We acknowledge the efforts put in by the MoE, the FabLab Bhutan, Dzongkhag Administration, Mongar and staff and students of Mongar MSS. Of course, there are lessons to be to be taken care of if future Olympiads are to be made more attractive, encouraging and an enriching learning experience.

4.3. National School Curriculum Framework

The NSCF has been developed to actualize the curriculum transformation initiatives of the Royal Government of Bhutan. Its purpose is to provide a comprehensive and holistic education services in basic education, primary education, secondary education, and inclusive education. The framework outlines the vision for the school curriculum, the guiding principles of school education, the key essential learning areas that are to be covered at all levels of education, the expected learning outcomes at different key stages of education, and the number of subjects to be studied at different class levels. The document also identifies appropriate pedagogical practices, assessment approaches, and enabling conditions that will facilitate the effective implementation of the national curriculum.

This framework is expected to support the national aspiration of making our youths locally rooted and globally competent. We are confident that all educators at all levels of education and training will anchor their provision of educational services on this framework.

This draft framework is the outcome of deliberations from national curriculum conferences, reviews of National Education Framework 2012, Bhutan Education Blueprint 2012-2024, and several other studies. The Framework is aligned to the Constitution of Bhutan, Vision 2020, the National Education Policy 2017 (draft), His Majesty's Vision for Bhutan, and other policy documents that express the aspirations of the country. The NSCF is guided by the values and theoretical approaches and guiding principles that are accepted and practiced across the world. The first draft of the NSCF has been completed. The final draft once completed by the end of June, 2019, will be put through extensive stakeholder consultations for improvement in 2019 - 2020 before it is implemented

4.4. Corruption Risk Management

Following the ACC's National Integrity Assessment dissemination to REC employees on June 21, 2018, the Director, REC expressed his views to conduct Corruption Risk Management (CRM) in REC owing to numerous audit memos. CRM is a tool for identifying the potential risks of corruption, their causes and solutions to minimize such risks in agencies. It is one of the most pursued anti-corruption tools for preventing the corruption proactively in the agencies.

The ACC agreed and the CRM exercise was conducted on October 8 and 9, 2018 with all the staff of REC. Prior to the workshop, a survey was conducted to study the case and a commencement meeting was held with the Management on October 4, 2018 to present the overview on CRM and overall programme for CRM workshop in REC. A strategic interview was also conducted with the Director, Dean, Chief and Unit Heads at REC. The exit meeting of the CRM was conducted on October 22, 2018 where the findings and way forward were presented.

As required, the REC submitted an action plan based on the recommendation of the CRM report.

Annexure I

Instructional Days and Time 2019								
Sl No	**Month**	**No of Days**	**No of Saturdays & Sundays**	**No of Holidays**	**Net Instructional Days**	**Instructional Time Minutes 40 x 8 x Net instructional days**	**Instructional Time (Hours)**	**Remarks**
1	January	31	0	31	0	0	0	
2	February	28	8	5	15	4800	80	
3	March	31	10	0	21	6720	112	
4	April	30	8	1	21	6720	112	
5	May	31	8	1	22	7040	117.33	
6	June	30	10	1	19	6080	101.33	
7	July	31	0	31	0	0	0	
8	August	31	9	0	22	7040	117.33	
9	September	30	9	1	20	6400	106.67	
10	October	31	8	1	22	7040	117.33	
11	November	30	9	3	18	5760	96	
12	December	31	0	0	0	0	0	*Board examinations time*

Total	365	79	75	180	57,600	960	*Including examinations time*
				150	**48,000**	**800**	*Excluding 30 days examinations (mid term and annual)*

Note

1. The maximum number of instrutional days available including examinations time is **180 days.**
2. The maximun number of instructional days available for curriculum delivery excluding examination is **150 days**.
3. The rationalization of the curriculum is based on 150 days of the actual instructional time.
4. Instructional days are the total number of days within which the curricular activities are conducted. Within these days, a maximum of **5.33 hours** (320 minutes) are available for actual classroom instruction per day. This calculation is based on **8 periods a day of 40 minutes each.**
5. Instructional time refers to the actual contact time in the classroom.
6. This is the minimum time available for the delivery of the curriculum including assessment. Instructional Time equals to the Number of days X Number of periods per day X duration of one period (180 x 8 x 40).
7. The average instructional time in the OECD countries ranges from **799** to **915** hours per year. This includes all the educational activities that are conducted in the school in a day. However, our instructional time calculation is based on the actual contact time for curriculum delivery, which has resulted in more instructional time than in OECD countries.

Annexure 2

Subject wise Instructional Time														
Subjects/Class		**PP**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
Dzongkha	Time (minutes per week)	280	280	320	320	280	280	280	240	240	200	200	240	240
	Time Per Year (Hrs)	140	140	160	160	140	140	140	120	120	100	100	120	120
English	Time (minutes per week)	280	280	320	320	280	280	280	240	240	200	200	240	240
	Time Per Year (Hrs)	140	140	160	160	140	140	140	120	120	100	100	120	120
Maths	Time (minutes per week)	240	240	280	280	280	280	280	240	240	200	200	240	240
	Time Per Year (Hrs)	120	120	140	140	140	140	140	120	120	100	100	120	120
Science	Time (minutes per week)					240	240	240	280	280				
	Time Per Year (Hrs)					120	120	120						
Social Studies	Time (minutes per week)					160	160	160						
History	Time (minutes per week)								160	160	120	120	240	240
	Time Per Year (Hrs)								80	80	60	60	120	120
Geography	Time (minutes per week)								160	160	120	120	240	240
	Time Per Year (Hrs)								80	80	60	60	120	120
Biology	Time (minutes per week)										120	120	240	240
	Time Per Year (Hrs)										60	60	120	120
Physics	Time (minutes per week)										120	120	240	240
	Time Per Year (Hrs)										60	60	120	120
Chemistry	Time (minutes per week)										120	120	240	240
	Time Per Year (Hrs)										60	60	120	120
ICT Literacy	Time (minutes per week)					40	40	40	40	40	40	40		
	Time Per Year (Hrs)					20	20	20	20	20	20	20		

Economics/ AgFS/TVET/ES/ Buddhist Studies/ Arts Education	Time (minutes per week)										120	120	240	240
	Time Per Year (Hrs)										60	60	120	120
Accountancy/ Commerce/ HPE/ Rigzhung/ Business Maths/ Computer Studies/Media Studies	Time (minutes per week)												240	240
	Time Per Year (Hrs)												120	120
HPE	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40		
	Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20		
Values Education	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40	40	40
	Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20	20	20
Arts Education	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40		
	Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20		
Library	Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20	20	20
TVET Programme	Time (minutes per week)					40	40	40	40	40	40	40	40	40
	Time Per Year (Hrs)					20	20	20	20	20	20	20	20	20
CGC & Life Skills	Time (minutes per week)								40	40	40	40	40	40
	Time Per Year (Hrs)								20	20	20	20	20	20
Time in Hours (Per week)		16	16	18	18	24	24	24	26.6	26.6	26.6	26.6	26.6	26.6
Time in minutes (Per week)		960	960	1080	1080	1440	1440	1440	1600	1600	1600	1600	1600	1600
Note: 3 periods for practical for both 11 and 12 (Biology, Chemistry, Physics; Geography, Arts, Accountancy-Commerce)														

Annexure 3

Subject wise Time and Suggestive Period Allocation														
Sl No	**Subjects/Class**		**PP**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
1	Dzongkha	Time (minutes per week)	280	280	320	320	280	280	280	240	240	200	200	240	240
		Period per week (40 mins)	7	7	8	8	7	7	7	6	6	5	5	6	6
		Time Per Year (Hrs)	140	140	160	160	140	140	140	120	120	100	100	120	120
2	English	Time (minutes per week)	280	280	320	320	280	280	280	240	240	200	200	240	240
		Period per week (40 mins)	7	7	8	8	7	7	7	6	6	5	5	6	6
		Time Per Year (Hrs)	140	140	160	160	140	140	140	120	120	100	100	120	120
3	Maths	Time (minutes per week)	240	240	280	280	280	280	280	240	240	200	200	240	240
		Period per week (40 mins)	6	6	7	7	7	7	7	6	6	5	5	6	6
		Time Per Year (Hrs)	120	120	140	140	140	140	140	120	120	100	100	120	120
4	Science	Time (minutes per week)					240	240	240	280	280				
		Period per week (40 mins)					6	6	6	7	7				
		Time Per Year (Hrs)					120	120	120						
5	Social Studies	Time (minutes per week)					160	160	160						
		Period per week (40 mins)					4	4	4						
		Time Per Year (Hrs)					80	80	80						
6	History	Time (minutes per week)								160	160	120	120	240	240
		Period per week (40 mins)								4	4	3	3	6	6
		Time Per Year (Hrs)								80	80	60	60	120	120
7	Geography	Time (minutes per week)								160	160	120	120	240	240
		Period per week (40 mins)								4	4	3	3	6	6
		Time Per Year (Hrs)								80	80	60	60	120	120

8	Biology	Time (minutes per week)										120	120	240	240
		Period per week (40 mins)										3	3	6	6
		Time Per Year (Hrs)										60	60	120	120
9	Physics	Time (minutes per week)										120	120	240	240
		Period per week (40 mins)										3	3	6	6
		Time Per Year (Hrs)										60	60	120	120
10	Chemistry	Time (minutes per week)										120	120	240	240
		Period per week (40 mins)										3	3	6	6
		Time Per Year (Hrs)										60	60	120	120
11	ICT Literacy	Time (minutes per week)					40	40	40	40	40	40	40		
		Period per week (40 mins)					1	1	1	1	1	1	1		
		Time Per Year (Hrs)					20	20	20	20	20	20	20		
12	Economics/AgFS/ TVET/ES/Buddhist Studies/Arts Education	Time (minutes per week)										120	120	240	240
		Period per week (40 mins)										3	3	6	6
		Time Per Year (Hrs)										60	60	120	120
13	Accountancy/ Commerce/ HPE/ Rigzhung/Business Maths/ Computer Studies/Media Studies	Time (minutes per week)												240	240
		Period per week (40 mins)												6	6
		Time Per Year (Hrs)												120	120
14	HPE	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40		
		Period per week (40 mins)	1	1	1	1	1	1	1	1	1	1	1		
		Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20		
15	Values Education	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40	40	40
		Period per week (40 mins)	1	1	1	1	1	1	1	1	1	1	1	1	1
		Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20	20	20

16	Arts Education	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40		
		Period per week (40 mins)	1	1	1	1	1	1	1	1	1	1	1		
		Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20		
17	Library	Time (minutes per week)	40	40	40	40	40	40	40	40	40	40	40	40	40
		Period per week (40 mins)	1	1	1	1	1	1	1	1	1	1	1	1	1
		Time Per Year (Hrs)	20	20	20	20	20	20	20	20	20	20	20	20	20
18	TVET Programme	Time (minutes per week)					40	40	40	40	40	40	40	40	40
		Period per week (40 mins)					1	1	1	1	1	1	1	1	1
		Time Per Year (Hrs)					20	20	20	20	20	20	20	20	20
19	CGC & Life Skills	Time (minutes per week)								40	40	40	40	40	40
		Period per week (40 mins)								1	1	1	1	1	1
		Time Per Year (Hrs)								20	20	20	20	20	20
	No of Periods of 40 minutes (Per week)		24	24	27	27	36	36	36	40	40	40	40	40	40
	Time in Hours (Per week)		16	16	18	18	24	24	24	26.6	26.6	26.6	26.6	26.6	26.6
	Time in minutes (Per week)		960	960	1080	1080	1440	1440	1440	1600	1600	1600	1600	1600	1600

Note: 3 periods for practical for both 11 and 12 (Biology, Chemistry, Physics; Geography, Arts, Accountancy-Commerce)