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A pre-validating process for new programmes of study within the Science subject area for the final cycle of Basic Education in the Democratic Republic of Congo

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IBE Director	Dr. Mmantsetsa Marope
Coordination and Production Team at the UNESCO IBE	Renato Opertti, Hyekyung Kang, Ioanna Siakalli, Anouk Severin
Authors	Jonnaert, P., Fall, O. T., Sampson, S., Malu, R., Antoun, Z., Rabinovitch, L., Sambote, J.[1]
Keywords	Curriculum reform - education system - extended Basic Education - program of study - situated approach

[1] Jonnaert, P. Professor and head of the CUDC of the Université du Québec à Montréal (UQAM); Antoun Z., Fall O.T., Sambote, J. and Sampson S. are assistant researchers at the CUDC – UQAM and at the Université du Québec à Trois-Rivières (UQTR); Malu, R. is head of the Unité technique d'appui (UTA) for the Projet d'éducation pour la qualité et la pertinence des enseignements aux niveaux secondaires et universitaires (PEQPESU) at the Ministère de l'enseignement primaire, secondaire, technique et professionnel (MEPSTP) in the Democratic Republic of Congo.)

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Open Note of the IBE

The IBE has launched the series In-Progress Reflections on *Current and Critical Issues in Curriculum, Learning and Assessment* to open a communal space for a global conversation, collective production and discussion on those issues of high concern for Member States. It intends to support country efforts in mainstreaming challenging issues within the processes of curriculum renewal and development across different levels, settings and provisions of the education system.

Initially, the focus areas of the In-Progress Reflections series encompass, among others,: (i) Early Childhood Care and Education (ECCE) as a foundation of holistic child development and learning; (ii) Reading and writing in early grades to support the development of essential competencies; (iii) Youth Culture and competencies for Youth in the early 21st century (covering formal, non-formal and informal education); (iv) ICT curricula and inclusive pedagogy contributing to relevant and effective learning outcomes; (v) STEM (Science, Technology, Engineering and Mathematics) curricula to foster sustainable development; (vi) Curriculum for Global Citizenship Education (peace, human rights, sustainable development, values, ethics, multiculturalism, etc.); (vii) Assessment to enhance and support learning opportunities; and (viii) Inclusive education as an over guiding principle of education systems.

The series of reflections covers a wide array of knowledge products, among them: discussion papers, policy briefs, frameworks, guidelines, prototypes, resource packs, learning tools and multimedia resources. These materials are discussed, refined, used and disseminated engaging education and curriculum agencies / institutes, and in particular curriculum developers and specialists, development experts, policy makers, teacher trainers, supervisors, principals, teachers, researchers and other educational stakeholders. In addition, they serve as reference materials for the IBE menu of capacity-development training on curriculum, learning and quality education – namely masters, diplomas, certificates and workshops – to forge policy and technical dialogue involving a diversity of stakeholders and to support sustainable country fieldwork.

Through blogs and e-forums, we encourage the audience to actively interact and bring in diverse perspectives. Effectively, the online space for reflection allows us to stay connected, facilitates exchange between experts from different regions of the world, and truly fosters continuous reflection on the issues concerned. The blog is structured to gather diverse resources, which include tools and documents (as previously mentioned) under specific themes to provide a complex and rich set of materials targeted to the specific needs of Member States. The In-Progress Reflections will capture relevant visions, views and comments shared by the audience, and serve as a key resource to support Member States' efforts in mainstreaming relevant findings and effective practices in national policies, curriculum frameworks and developments and in professional practices.

Dr. Mmantsetsa Marope: Director, International Bureau of Education

A pre-validating process for new programmes of study within the Science subject area for the final cycle of Basic Education in the Democratic Republic of Congo

Abstract: This article describes the process for pre-validating new programmes of study within the Science subject area, for the final cycle of Basic Education (7th and 8th years) in the Democratic Republic of Congo. Using a common and well-defined methodology, 84 local experts from five different regions of the country analysed the various programmes of study. This research shows a high level of correlation between the 2,016 choices made by the 84 local experts and the 10,080 instances wherein they either accepted or rejected proposals presented on the Likert Scale. The rate of acceptance of the new programmes of study within the Science subject area, for the final cycle of Basic Education in the Democratic Republic of Congo, was definitely high. The results are somewhat tempered by the combination of qualitative and quantitative data. This article indicates the importance of involving teachers in the process of pre-validating new programmes of study, and the necessity of completing this exercise before programmes are piloted and implemented in classrooms.

Keywords: Curriculum reform - education system - extended Basic Education - programme of study – situated approach

Contents

Introduction

The purpose of this article is to provide a detailed description of the pre-validation process that took place in the Democratic Republic of Congo as part of their comprehensive curriculum reform process. Both in its scope and in its complexity, this reform is unique among education systems. Over the past years, the strong belief that education can become a vehicle for helping the country and its citizens to overcome their difficulties has been formalized into a *Stratégie sectorielle de l'éducation et de la formation 2016-2025*, *République Démocratique du Congo*, (2015), and *Une nouvelle vision de l'Éducation de Base en République Démocratique du Congo*, (2016d). Taken together, these foundational documents introduce major innovations for the entire education system, such as compulsory schooling and free extended Basic Education for all. From this point forward, extended Basic Education will comprise of six years of primary school and two years of secondary school. The final cycle of Basic Education refers to the first two years of secondary education. Certain observable changes are organisational, such as the introduction of extended Basic Education, while others are all-encompassing, such as the will to render school learning more meaningful for students through the implementation of a pedagogical orientation called "the situated approach". The impetus to improve the teaching and learning of Science and Mathematics particularly at secondary and post-secondary levels stems from this context marked by a rapidly changing Congolese education system.

As part of the curriculum reform process, new programmes of study for Science and Mathematics were elaborated. These programmes respect the guidelines established by the new *Education Act*, and challenge traditional viewpoints about how to teach Science and Mathematics in the Democratic Republic of Congo. It is important to note that programmes of study have not been revised since 1980; and textbooks and other pedagogical materials and resources are either obsolete, lacking, or in poor condition. Before implementing the new programmes of study, a pre-validation process was organised. This process resulted in a high level of acceptance of the new programmes of study by the people consulted. Qualitative data on the pre-validation process may have somewhat tempered the quantitative data. The Likert Scale allows researchers to obtain a numerical rate of acceptance, which is then moderated by the nuanced responses conveyed by members of the focus group.

This article describes the pre-validation process and discusses some of the findings. At the outset, a distinction is made between a curriculum and a programme of study. Then, the Congolese education system is described, followed by an explanation of the real-life challenges that guide this reflection. Subsequently, the new programmes of study, the object of this pre-validation process, are explained as well as the general and specific objectives of the pre-validation process and the methodology. Finally, some examples of results are provided, followed by a discussion and a conclusion.

Conceptual Clarification: curriculum and programme of study

The concept of programme of study, which is at the heart of this article, is often used interchangeably with the concept of curriculum. It is thus necessary to make a distinction between the two concepts and the functions served by each.

Curriculum. A curriculum frames and supports a myriad of components that, taken together, enable the realization of an education vision. Expressed otherwise, a curriculum creates a coherent structure through which all education practices and ideas flow. A curriculum is rooted in the historical, social, linguistic, economic, cultural, religious, geographic, and demographic realities of a country. Education policies derive from a curriculum and, at the same time, a curriculum determines the everyday classroom activities of teaching, learning, and evaluation. Understood from this perspective, a curriculum constitutes the interface between the values and guidelines articulated in education policies, and the implementation of these values in classrooms wherein they are reflected through programmes of study. In this sense, a curriculum acts as

a facilitator of educational change (Depover and Jonnaert, 2014). Today, the adoption of a holistic approach to curriculum allows education systems to institute a coherent change process at every level and spanning the entire timeline of the system (Opertti and Ducombe, 2011; Jonnaert, 2016a).

Programmes of study. A programme of study defines, structures, and plans the teaching, learning, and evaluation components of a particular subject area. The content of a programme of study must respect the values and guidelines articulated in the curriculum-related education policies. Programmes of study must first conform to international standards, such as how to logically organise disciplinary content, and then contextualize this content according to local realities. In conformity with established pedagogical directives, a programme of study defines activities for teaching, learning, and evaluation and organises these components within a prescribed time limit (ISU, 2014; Jonnaert, 2015).

This article focuses on the pre-validation process applied to the three programmes of study named below. It is important to first situate these programmes of study within the context of the holistic curriculum that frames the entire education reform process taking place in the Democratic Republic of Congo.

Context

The Democratic Republic of Congo, despite an abundance of natural resources, is one of the poorest countries in the world, and is ranked 171 out of 191 countries on the *Human Development Index* (HDI) (UNDP2, 2016). The trend of education systems around the world is to promote inclusive, quality education based on a diversity of content and learning styles, and the development of subject-specific and cross-curricular competencies (Braslavsky, 2001; Jonnaert, 2011). This is also the case in the Democratic Republic of Congo where economic development continues to be sluggish, in part because of a dearth of competencies in the younger generation of workers. This lack of competencies is particularly pronounced in fast-growing sectors such as agriculture, industrial scale mining, and construction. There is an urgent need for graduates of secondary school and higher education to strengthen the Congolese economy through putting into practice high-level competencies.

Concerned with the necessity of adapting its education system to the economic, social, and cultural exigencies of Congolese society, while at the same time respecting the Sustainable Development Goal 4 (SDG 4), and targets established in the *Incheon Declaration* (UNESCO3, 2015) for an equitable, inclusive, quality education and lifelong learning for all, the Democratic Republic of Congo has embarked on a deep and systematic reform of its education system. The Congolese government's contemporary vision for national education has been formalized into two official documents: (1) *the Education Act n°14/004 of February 11, 2014 for National Education*; and, (2) *the Strategic Regional Plan for Education and Training (2016-2025)*, (SSET). The Education Act envisages the establishment of an education system that offers inclusive and quality education, contributes to the effective overall development of the country, and promotes peaceful active citizenship. It articulates 23 fundamental principles for National Education. The second document is a strategic plan, which outlines educational priorities to be realized throughout the next ten years.

Extended Basic Education is a major innovation introduced through the Education Act. Six years of primary school and the first two years of secondary school will form an eight-year continuum of extended Basic Education. The goal is to enable young Congolese students to build a knowledge base and develop the necessary competencies to act positively in their local communities, in the overall Congolese society, and

[2] UNDP: United Nations Development Program (Human Development Index (HDI) is a composite statistic of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development. A country scores higher HDI when the lifespan is higher, the education level is higher, and the GDP per capita is higher.

[3] UNESCO: United Nations Educational, Scientific, and Cultural Organisation

in the 'global village' that is now the world. At the *End-of-Cycle for Basic Education*, these young people should be ready to pursue further secondary studies, be it professional, technical, or general studies. The implementation of extended Basic Education affects the overall Congolese education system in important ways; notably the two aspects of prolonging compulsory schooling and rendering extended Basic Education free of charge until the end of the second year of secondary school. As a result of these changes, there will no longer be a certification awarded at the end of the sixth year of primary school based on the National Test for the end of Primary School (*Test national de fin d'études primaire* or TENAFEP). An assessment for certification purposes is being created for the *End-of-Cycle for Extended Basic Education*. The final cycle of extended Basic Education (7th and 8th years) has four purposes: (1) to help students integrate learning from the entire continuum of Basic Education; (2) to provide students with guidance and career counselling; (3) to certify students; and (4) to increase teachers' professionalism. The overall goals of this cycle have also changed; the cycle no longer represents the first two years of secondary school but rather the end of Basic Education. (Ekanga, 2015; M'batika, 2012). It is a reform based on the concept of a holistic curriculum and the situated approach to teaching, learning, and evaluation. This pedagogical approach attempts to make school learning accessible and meaningful to all students through learning environments and activities that are contextualized to the local realities of each region of the country (Jonnaert, 2016; Jonnaert, Ettayebi and Opertti, 2008).

The present article specifically examines the teaching of Science and Mathematics in the context of this reform of the Congolese education system. A recent report indicates that existing programmes of study for secondary Science and Mathematics in the Democratic Republic of Congo (DPSDM4, 2016) were last revised during the education reform of 1980. These programmes are outdated in relation to both the evolution of learning in these fields and to the country's current social, cultural, and economic exigencies. The report also points out weaknesses and omissions in textbooks and other didactic material. Pedagogical approaches analysed in the report (DPSDM, 2016) do not encourage students to develop a sustained interest in these disciplines nor do they lead them to discover the meaning of the material. In addition to the weaknesses associated with the programmes of study and accompanying pedagogical materials, the report also points to a general lack of professional training of Science and Mathematics teachers.

Based on the above-mentioned report, the Democratic Republic of Congo received a substantial grant from the World Bank to subsidize the Education project for quality and relevance of teaching at secondary and university level (*Projet d'éducation pour la qualité et la pertinence des enseignements aux niveaux secondaires et universitaires* or PEQPESU). This six-year project (2015-2021) has two primary objectives:

(1) to improve Science and Mathematics teaching and learning at the secondary level; and

(2) to emphasize the importance of technical and vocational training at the secondary and higher education levels (*l'Enseignement technique et la formation professionnelle* or ETFP).

Responsibility for this project is shared by two separate ministries, Ministry of Basic, Secondary and Vocational Education (*Ministère de l'enseignement primaire, secondaire et professionnel or EPSP)* [] and Ministry of Higher Education (*Ministère de l'enseignement supérieur or ESU*) [] and includes 11 Congolese provinces. The project's primary actions are: (1) to create a policy framework; (2) to create new programmes of study based on the situated approach; (3) to create new programmes of study for higher education which correspond to different degree levels (Certificate-Master's -Doctorate); (4) to equip infrastructures such as laboratories, conference/training/meeting rooms, libraries, and Information and Communication Technology labs (ICT); and (5) to strengthen teachers' technical, pedagogical, and subject area knowledge and expertise.

[4] DPSDM: Department of Programmes of Study and Didactic Material

The present article is concerned with the first objective of the Congolese education project (PEQPESU) and describes in detail the process through which a cross section of teachers and education specialists from across the country pre-validated the new programmes of study.

Challenges

The writing of new programmes of study in Science and Mathematics for the final cycle of Basic Education represents only one component of an expansive curriculum reform process that is currently taking place in the Democratic Republic of Congo. These new programmes of study must be in line with the entire movement towards a holistic curriculum that envisions structural modifications, such as extended Basic Education, and new guidelines for the education system as prescribed in the Education Act and Strategic Regional Plan for Education and Training. The new programmes of study constitute the conduit through which educational innovations will reach the classroom. They thus play an important role in ensuring the wide dissemination and implementation of changes throughout the Congolese education system.

Structural changes within the Congolese education system (2016a, 2016b, 2016c) will completely alter the country's education landscape at both primary and secondary levels. The traditional organisation of schooling will now change significantly. Integrating the 7th and 8th years of secondary school into one cycle alters the yearly planning of programme content. Conventionally, subject area content is separated and organised into distinct disciplines and respective learning activities. With the introduction of newly proposed learning situations and student-led activities into the new programmes of study, traditional pedagogical practices of Congolese educators, as well as their use of resources, textbooks and other didactic materials are challenged. Teachers must now focus on making learning more meaningful for students, and creating learning situations that reflect the everyday realities of their students. Real-life sample learning situations provide teachers and learners with a holistic, comprehensive and integrated approach to the new programmes of study. These pedagogical innovations require detailed planning and will permeate the education system only when teachers are well prepared to implement the changes. For this reason, initial drafts of the new programmes of study were subject to a pre-validation process before final verification, a process that involved teachers who will be the key implementers of these changes. It was important to ascertain the extent to which the innovations were acceptable to a cross section of Congolese teachers and specialists from across the country prior to planning teacher training sessions. What modifications, if any, did they wish to propose? (Jonnaert et al., 2017).

Many questions came to the surface after the pre-validation process. This illustrated the extent to which the group of Congolese teachers and specialists consulted understood the new programmes of study and the attendant pedagogical approach. The programmes of study were adjusted based on a wide assortment of data collected in the various regions of the country, where the pre-validation process took place. In addition, this information and feedback from local teachers and specialists was integrated into the teacher training sessions, which will ultimately be provided for all teachers concerned in the implementation of this reform. A technical team composed of Congolese educators from the Department of Programmes of Study and Didactic Material drafted three programmes of study within the *Science subject area*:

1. National Mathematics Programme, 7th and 8th years of Basic Education, Democratic Republic of Congo (2016b).
2. National Physical Science Programme, Technology, and Information and Communication Technology (ICT), 7th and 8th years of Basic Education, Democratic Republic of Congo (2016c).
3. Life and Earth Sciences Programme, 7th and 8th years of Basic Education, Democratic Republic of Congo (2016a).

The pre-validation process concerned these three programmes. The main objective of the research was to determine the degree to which each of these three programmes of study was acceptable to a cross-section of local experts (secondary teachers, inspectors, teacher trainers, education administrators) from various regions of the Democratic Republic of Congo. It was thus important that data on how well local experts understood the new programmes of study – e.g. whether they were aware of the impact of the programmes of study on the entire education system and their main areas of concern – was collected. The complexity of the pre-validation process was challenging, and required the use of appropriate methods and tools that enabled researchers to collect pertinent information.

Organisation of new programmes of study

Generally speaking, programmes of study are organised by discipline. For example, a programme of study outlines the content, objectives – sometimes in hierarchical order – and the list of competencies to develop throughout the programme.

However, the three new programmes of study within the Science subject area, for the final cycle of Basic Education (7th and 8th years) are organised differently. Below are a few of their distinguishing characteristics:

- The Science subject area is divided into disciplines or sub-sections: (1) Mathematics; (2) Physical Science, Technology, and Information and Communication Technology; and (3) Life and Earth Sciences. The programmes of study are located within these disciplines, where they interact, intersect, and overlap with each other. Additionally, the disciplines themselves are interconnected. This integrated approach encourages collaboration between teachers and intends to eliminate the compartmentalization of teaching, learning, and evaluation.
- This organisational structure guarantees the continuity of learning throughout the final cycle of Basic Education (7th and 8th years).
- Each programme of study contains *student entrance and exit profiles*. This allows teachers to perform various diagnostic activities that will help situate students' learning in relation to recommended exit profiles and will determine the types of learning situations and activities students need to accomplish in order to attain the exit profiles. Ensuring and making use of the continuum between entrance and exit profiles will enable teachers to plan and organise the teaching, learning, and evaluation process in a structured and progressive way. It facilitates the pedagogical endeavour.
- Each programme of study contains a list of *essential skills and knowledge*. The programme describes the competencies students will develop through a series of learning situations and increasingly complex student-centered activities. The list of essential competencies and knowledge - organised according to a specific system described by D'Hainaut (1988) in Jonnaert (2016b - represents the most important content within each discipline of the subject area. They are classified according to notions, classes, relationships, techniques, methods, strategies, or systems. This classification introduces students to various types of content, from simple notions to complex systems.
- Each programme of study proposes a *bank of learning situations* clustered into families of situations, and provides examples of specific learning situations. This enables teachers to contextualize and mould programme content into specific learning situations that are relevant and meaningful for their students. When students can relate to programme content, they are much more likely to understand and grasp its relevance and significance.

- Tables of *student learning activities* are organised and presented for each programme of study. These learning activities are categorised according to a taxonomy (Jonnaert, 2016b) that allows them to be modified. Learning activities of this type encourage teachers to place their students at the centre of the learning process, which in turn enables students to construct meaning and develop competencies relevant to the learning situations.
- Each table of *student learning activities* is followed by suggestions for assessing a student's competency development in each specific learning situation, and in relation to other tables of programme content such as competency descriptions, essential knowledge, and other activities connected to a particular section of the programme.

The distinguishing characteristics summarized above constitute the unique qualities of the new programmes of study. These features are designed to help teachers plan for the teaching, learning, and evaluation processes within the situated approach to education. Such programmes of study are intended to engage students in real-life learning activities and situations. To effectively and appropriately study the learning situations, students need to draw on the essential skills and knowledge and other diverse resources presented in the programme of study, as well as to develop competencies that are appropriate for each learning situation. This list of distinctive features applies to all new programmes of study, of which the draft version was subject to the pre-validation process.

Objectives of the pre-validation process

General Objectives

- The pre-validation process aimed to indicate the extent to which a group of local experts accepted the three new national programmes of study within the Science subject area for the final cycle of Basic Education.
- The pre-validation process was intended to provide the technical team with sufficient information and data to adjust the new programmes of study and to prepare teacher training sessions for teachers who will be piloting these programmes in their classrooms.
- Ultimately, the pre-validation process had to enable educators to decide whether or not the new programmes of study were acceptable to a degree to proceed with the process of implementation. If the rate of acceptance was too low, less than 4 out of 5 on the Likert Scale, then additional analyses would need to be undertaken, with subsequent modifications made to the programmes before the implementation phase.

Specific Objectives

- *Pre-validation of the content of the new programmes of study*: pertinence of content in relation to other programmes of study, the discipline, and the Science subject area; relevance for students in the final cycle of Basic Education; internal coherence of content between programmes within the same discipline; coherence of content between disciplines within the subject area; comprehensiveness and accuracy of content; and, validity and timeliness of content.
- *Pre-validation of programme structure*: a well-organised, clear and easy-to-use programme; information is readily accessible; the language level and presentation style are adapted to audience.

Methodology

- *Purpose of the research*. The pre-validation process aimed to determine the extent to which the new programmes of study within the Science subject area for the final cycle of Basic Education were acceptable or not to a group of educators from various regions of the Democratic Republic of Congo. The goal, through a detailed analysis, was to establish to what degree the local experts accepted the new programmes of study.
- *Diversity of methodological approaches*. Because both quantitative and qualitative data were deemed necessary from the outset, a variety of methodological approaches was adopted.
- *Three research targets*. Research based on the pre-validation process had three distinct targets: (1) for local experts to become familiar with the new programmes of study based on a predetermined reading schedule and specific instructions ; (2) for local experts to assess to what degree they accepted the new programmes of study, through the use of a questionnaire based on the Likert Scale; (3) for the technical team to synthesize the various comments, suggestions, and expectations about the new programmes of study that were received from local experts.
- *Three teams:*
    - *Technical team*. The technical team, comprised of 20 Congolese teachers and inspectors, was responsible for the design of the new programmes of study. As part of the pre-validation process, this team was divided into five groups dispersed in five regions across the country: Kikwit, Kisangani, Lubumbashi, Mbandaka and Tshikapa. The pre-validation process took place at these locations during the same one-week period. The technical team was responsible for ensuring that each region adhered to a set of specific instructions throughout the pre-validation process and that data collection was carried out appropriately.
    - *Local experts*. Five teams of local experts participated in the pre-validation process based on the methodology and specific instructions proposed to them by the technical team.
    - *Research team from UNESCO Chair in Curriculum Development (UCCD)*. A team of four research assistants from UCCD, coordinated by a research professor from UCCD, organised, analysed, and discussed all data collected as a result of the pre-validation process.
- *Research guidelines*: Guidelines for the pre-validation process were distributed to each of the five locations. These outlined the daily activities, as well as specific instructions, a timeline, and a method for data collection following each activity. The technical team for each region entered the collected data on a common template created by UCCD.
- *Qualitative approach*. Using a qualitative approach allowed the technical team to collect data based on questions and proposals formulated by local experts from all five locations. These consisted of corrections to the form and/or content of the programmes; content or details to be added to or removed from the programmes; reactions to suggested pedagogical approaches; and any other comments, suggestions, and/or reservations. The technical team in each location took detailed notes. Once the Likert Scale questionnaire had been completed, a focus group was organised to verify or confirm information gathered from the quantitative data. The focus group also juxtaposed statistics with certain comments and observations, thus clarifying some aspects of the quantitative data.
- *Quantitative approach*. To validate the content and structure of the new programmes of study within the Science subject area for the final cycle of Basic Education, an evaluative scale similar to

a Likert Scale was used. These types of scales allow researchers to measure the intensity of individual opinions or reactions on any given subject (Laflamme and Zhou, 2014). A questionnaire drawing from (or based on) a numeric scale is effective to measure the degree to which participants agree or disagree with a proposal related to a specific topic.

For the pre-validation process of the new programmes of study within the Science subject area for the final cycle of Basic Education, the questionnaire was divided into eight categories of proposals:

Category 1: Pertinence of disciplinary content;

Category 2: Relevance of disciplinary content for students;

Category 3: Comprehensiveness of disciplinary content;

Category 4: Internal coherence;

Category 5: External coherence;

Category 6: Prescribed elements of programme of study;

Category 7: Overall organisation of programme of study;

Category 8: Evaluation framework.

Each of these categories contained three proposals. As such, the Likert Scale encompassed a total of 24 proposals related to the new programmes of study within the Science subject area. Local experts were asked to respond to each of the 24 proposals. For each proposal, the scale was based on degrees of acceptance as follows: 5 = Agree completely; 4 = Agree; 3 = Disagree; 2 = Disagree completely; 1 = Undecided/Not applicable.

The data collected through the questionnaire was verified and analysed using a software programme for statistical analysis, *Statistical Package for Social Sciences* (SPSS) (Laflamme and Zhou, 2014). The questionnaire can be found in Annex 1.

Mixing qualitative and quantitative data. Qualitative and quantitative data were complementary to each other. On the one hand, quantitative data enabled researchers to validate a series of perceptions articulated by members of the focus groups; on the other hand, qualitative data provided a more nuanced understanding of the quantitative results. This enhanced the richness of the results. For example, the sentiments and specific words expressed by local experts enabled researchers to understand that the high degree of acceptance regarding the external coherence of the programmes of study was related to a strongly held belief that young people need to develop competencies, skills and knowledge relevant within their environment. In other words, local experts hoped the new programmes of study would help youth make sense of their world. All responses elicited by local experts stemmed from their interpretation of the new programmes of study.

Selecting Local Experts

Local experts were selected through random sampling. “The method for selecting local experts is based on choosing a sample of the population according to what is most convenient for the researchers or the observers; the idea is to select local experts who are representative of the overall population rather than

adding unnecessary variables to the selection process" (D'Hainaut, 1975, pp. 33-34). In total, 84 local experts were selected from the five regions where the pre-validation process took place. The education director of each region identified local experts according to a set of criteria that were defined and shared in advance across the regions. There were at least three local experts for each discipline or sub-section of the Science subject area. All local experts were specialists in at least one discipline within the Science subject area: inspectors, secondary school subject area teachers, and professors from the higher education institutions (*Instituts supérieurs pédagogiques orISP*) []. Collectively, they possessed a thorough knowledge and understanding of the existing programmes of study within the Science subject area for the final cycle of Basic Education. Local experts were responsible for pre-validating the new programmes of study by adhering to a set of instructions. When the results of the pre-validation process were analysed, the fact that local experts were not necessarily representative of all Science and Mathematics teachers for the 7th and 8th years of Basic Education was taken into consideration.

Qualitative Data

Throughout the pre-validation process, the technical team collected remarks, suggestions, comments, and various concerns formulated by the local experts. In addition, for each of the 24 proposals entered on the Likert Scale, a space was provided where local experts could enter their remarks. Tables were created for each programme of study; to compile and synthesise the qualitative data. They included all of the eight categories from the Likert Scale. Only proposals leading to a modification, correction, or addition to the programmes of study were retained, and then forwarded to the technical team who adjusted the programmes of study accordingly. Table 1 provides examples of qualitative data collected during the pre-validation process for the Life and Earth Sciences programme of study; the technical team discussed this data before modifications were made to the programme.

Discipline: LIFE AND EARTH SCIENCES	
Category 1	**Pertinence of disciplinary content**
- Add lower order plants in the 7th and 8th years. - Distribute the hours more effectively. - Adjust the overall school year programme, to make it less extensive. - Provide teachers with a synthesis of the programme to help them complete it.	
Category 2	**Relevance of disciplinary content for students**
- Identify notions of microscopy and the cell to provide students with pre-requisites for the 6th year of Basic Education. - Find a simpler method for presenting notions of microscopy, the cell, respiration, photosynthesis, etc.	
Category 3	**Comprehensiveness of disciplinary content**
<u>Suggestions of content to be added:</u> - Reproductive methods in the 8th year; - Lower order plants in the 8th year, under the category 'classification of plants'; - Sensory organs; - Hybridization and robustness of plant hybrids; - Production and quality of fruit; - Concepts related to human reproduction; - Skeletal hygiene; - Concepts related to medical treatment and first aid; - Concepts related to tourism; - Concepts related to museum studies; - Techniques for capturing animals; - Genital organs and related diseases (STD, HIV); - Consequences of global warming, loss of Ozone layer, and greenhouse effect; - Methods for disinfecting water in the 7th year; - Processes for extracting peanut oil, pumpkin oil, and soybean oil; - An introduction to the concept of saponification (soap-making) in the 8th year; - Maintenance of healthy teeth and teething; - Diet and nutrition; - Location and growth of mushrooms.	

Table 1: Examples of qualitative data in three categories, taken from the table for the programme of study, Life and Earth Sciences for the final cycle (7th and 8th years) of Basic Education.

Key. During the pre-validation process, the 84 local experts were encouraged to formulate proposals. The diverse proposals were then collected, organised, and transformed according to specific criteria that enabled the technical team to make appropriate adjustments to the programmes of study.

Findings. Some proposals received from local experts addressed major issues, while others targeted very specific aspects of the programmes of study. For the most part, these proposals concerned the various disciplines within the Science subject area, specifically *programme content* and how it should be organised. The local experts did not hesitate to suggest new content, or to transfer content from the old to the new programmes of study. Some proposals clearly indicated a *resistance* to the new Life and Earth Sciences Programme. Two such examples were: 'Take the traditional disciplines into account' and 'Organise the programmes by discipline'. Data presented in Table 1 above enabled the Congolese technical team to adjust the Life and Earth Sciences Programme. Not all proposals listed in Table 1 were adopted by the technical team; other proposals compelled the technical team to rethink decisions. An added benefit of this process was that the compilation and analysis of qualitative data served to clarify some of the quantitative data. This cross-fertilization of qualitative and quantitative data had the effect of highlighting certain details that would not necessarily be evident through a purely statistical analysis.

Quantitative Data

Raw data and general tendencies

The initial raw data transmitted to UCCD by the technical team was entered onto Excel files. The tables of raw data (please refer to Appendix 2) were then transformed into percentages of frequency. Averages were calculated and standard deviations were established. The results of this first stage of general analysis indicated a *high level of acceptance of the new programmes of study* within the Science subject area for the final cycle of Basic Education. In each of the five regions, the pre-validation process took place in the higher education institutions (*Instituts supérieurs pédagogiques or ISP*) [] or in the Pedagogical inspectorate (*Inspection pédagogique*)[]. The tendencies expressed by the 84 local experts are presented in Table 2.

Tendencies	Percentages of Frequency, in relation to general tendencies				
	Mbandaka	Lubumbashi	Tshikapa	Kikwit	Kisangani
Acceptance	85.93	84.37	87.49	82.17	83.82
Rejection	12.49	13.79	11.84	16.72	14.2
Undecided	1.56	1.82	0.65	1.11	1.96

Table 2: The general tendencies of acceptance or rejection of the new programmes of study based on the percentage of the total number of responses.

Key. The general tendencies correspond to the three categories used on the Likert Scale:

- *Acceptance:* 4 and 5 of the Likert Scale – Agree;
- *Rejection:* 2 and 3 of the Likert Scale – Disagree;
- *Undecided:* 1 of the Likert Scale – Don't know or not applicable.

Findings. Table 2 indicates a *high level of acceptance* of the new programmes of study in all five of the regions where the pre-validation process took place.

Questions. The above-mentioned results raise certain questions: Do significant differences exist between the five regions across the country? If so, what are they? Are there significant differences between the sub-sections within each subject area? If so, what are they? Below is a description of the analytical approach employed to address these questions.

Analytical Approach for Quantitative Data

Coding the data. The raw data entered onto the Excel files was re-examined. First, the data was interpreted to conform to information presented in the questionnaires. Next, the raw data was prepared for input into SPSS5, by coding and organising it according to discipline, region, and respondent. Responses that indicated indecision or imprecision were not considered. Thus, the tables used for analysis contained degrees of frequency for *Acceptance*: 4 and 5 of the Likert Scale and *Rejection*: 2 and 3 of the Likert Scale.

Data Analysis. The software SPSS enables a rapid calculation of a *Chi-square* test to determine differences between expected and observed results. This Chi-square test was applied to the cross-section of data collected from each of the 24 proposals and the sub-sections of the Science subject area, and between the 24 proposals and the five regions. Questions arise as soon as the p value of the Chi-square is less than 0.05. In this case, for the five regions or for the three sub-sections, the differences observed between the acceptance and rejection rates were significant. Following the analysis of the results from the Chi-square test, the same test was administered for other purposes. For example, the sub-section of the Science subject area, Physical Science, Technology, and Information and Communication Technology (ICT), was compared to other disciplines within the same subject area (Mathematics, Life and Earth Sciences, and Unidentified); the unidentified sub-section was measured against other disciplines. Wherever the rate of acceptance or rejection was 100%, the Chi-square test was not used. For example, in Table 3, the value of p for proposals 1.1, 1.2 and 1.3 was not calculated by the SPSS software because the rate of acceptance in all five regions was 100%.

Example of results: acceptance or rejection by region. Table 3 contains a cross-section of data from the 24 proposals and the five regions, comparing the rates of acceptance (A) and rejection (R) in each of the five regions.

[5] SPSS: Statistical Package for Social Sciences

Category	Proposal	Acceptance (A) or Rejection (R)	KI	KK	LU	MB	TS	Value of p from Chi-square test
1	1.1	Acceptance	100	100	100	100	100	
		Rejection	0	0	0	0	0	
	1.2	A	100	100	100	100	100	
		R	0	0	0	0	0	
	1.3	A	100	100	100	100	100	
		R	0	0	0	0	0	
2	2.1	A	100	100	100	93.8	94.7	0.594
		R	0	0	0	6.3	5.3	
	2.2	A	94.1	86.7	100	100	100	0.183
		R	5.9	13.3	0	0	0	
	2.3	A	85.7	78.6	100	93.5	89.5	0.381
		R	14.3	21.4	0	06.7	10.5	
3	3.1	A	76.5	78.6	87.5	87.5	78.9	0.875
		R	23.5	21.4	12.5	12.5	21.1	
	3.2	A	58.8	28.6	26.7	43.8	52.6	0.260
		R	41.2	71.4	73.3	56.3	47.3	
	3.3	A	76.5	100	87.5	81.3	84.2	0.438
		R	23.5	0	12.5	18.8	15.8	
4	4.1	A	94.1	86.7	75	100	94.7	0.137
		R	5.9	13.3	25	0	05.3	
	4.2	A	82.4	86.7	86.7	100	78.9	0.449
		R	17.6	13.3	13.3	0	21.1	

	4.3	A	100	85.7	93.8	100	100	0.149
		R	0	14.3	06.3	0	0	
5	5.1	A	100	100	100	100	100	
		R	0	0	0	0	0	
	5.2	A	100	92.9	87.5	100	100	0.439
			0	07.1	12.5	0	0	
	5.3	A	93.3	100	100	100	100	0.364
		R	06.7	0	0	0	0	
6	6.1	A	82.4	93.3	100	93.8	100	0.177
		R	17.6	06.7	0	06.3	0	
	6.2	A	94.1	86.7	100	93.8	100	0.372
		R	05.9	13.3	0	06.3	0	
	6.3	A	94.1	100	100	100	100	0.416
		R	05.9	0	0	0	0	
7	7.1	**A**	**29.4**	**20**	**46.7**	**07.1**	**57.9**	**0.018**
		R	**70.6**	**80**	**53.3**	**92.9**	**42.1**	
	7.2	A	47.1	40	26.7	06.7	50	0.067
		R	52.9	60	73.3	93.3	50	
	7.3	**A**	**58.8**	**46.7**	**53.3**	**100**	**58.8**	**0.022**
		R	**41.2**	**53.3**	**46.7**	**0**	**41.2**	
8	8.1	A	94.1	73.3	87.5	93.8	89.5	0.381
		R	05.9	26.7	12.5	06.3	10.5	
	8.2	A	93.8	86.7	93.3	100	100	0.501
		R	06.3	13.3	06.7	0	15.8	

	8.3	A	100	87.5	93.8	93.8	100	0.397
		R	0	12.5	06.3	06.3	0	

Table 3: Rates of acceptance or rejection expressed in % for each region, and the value of p from the Chi-square test for each proposal. All proposals are described in the questionnaire found in Annex 1 to this article.

Key. LU: Lubumbashi; TS: Tshikapa; MB: Mbandaka; KK: Kikwit; KI: Kisangani; A: Acceptance; R: Rejection.

Findings. The value of p from the Chi-square test was above 0.05 for 22 of the 24 proposals. This means that decisions made by the 84 local experts resulted in *few significant differences between rates of acceptance or rejection* for the proposals. Reactions from local experts from the five regions across the country were coherent and consistent for 22 of the 24 proposals. Data from the Kikwit region indicated the highest rate of rejection, close to 17% (see Table 2), but distributed in the same way as the other regions. For proposals 7.1 and 7.3, which address the number of documents to produce for each programme of study, a value of p from the Chi-square test was less than 0.05 indicating a lack of consensus among the five regions.

Additional analysis. Proposals 7.1 and 7.3 point to a value of p from the Chi-square test of less than 0.05 – 0.018 and 0.022 respectively. The analysis indicates a significant difference in rates of acceptance and rejection from the five regions concerning these two proposals. Agreement about these two proposals is not uniform across the country.

Category	**Proposals 7.1 and 7.3**	**Rate A/R**	**KI**	**KK**	**LU**	**MB**	**TS**	**Value of p from Chi-square test**
7. Overall organisation of programme	*7.1 All sub-sections within the Science subject area for the final cycle of Basic Education will be presented in one document.*	Acceptance	29.4	20	46.7	07.1	57.9	0.018
		Rejection	70.6	80	53.3	92.9	42.1	
	7.3 Programmes of study will be presented in 3 separate documents, one for each sub-section within the Science subject area, each document covering the final two-year cycle of Basic Education.	Acceptance	58.8	46.7	53.3	100	58.8	0.022
		Rejection	41.2	53.3	46.7	0	41.2	

Table 4: Rates of acceptance or rejection expressed in % for each region, and the value of p from the Chi-square test for proposals 7.1 and 7.3.

Key. Table 4 summarizes data related to proposals 7.1 and 7.3 only.

Findings. Proposal 7.1 suggests that all disciplines or sub-sections within the Science subject area for the final cycle of Basic Education will be presented in one document. Out of five regions, four rejected this proposal. Only Tshikapa accepted the proposal, but with an acceptance rate of slightly less than 60%. The region of Mbandaka, on the other hand, rejected the proposal with a rejection rate of slightly higher than 92%.

Proposal 7.3 suggests that programmes of study be organised according to the three disciplines or sub-sections within the Science subject area and that each of the three documents covers the final cycle of Basic Education. Out of five regions, four accepted this proposal; for three of the regions, the acceptance rate was slightly less than 60% but for Mbandaka the acceptance rate was 100%. Kikwit rejected the proposal at a rate of slightly less than 60%.

Concerning proposals 7.1 and 7.3, decisions made by the 16 local experts from Mbandaka were coherent and consistent. Table 3 confirms a uniform decision in Mbandaka.

Proposal 7.3 *(to organise programmes of study into three documents according to sub-sections within the Science subject area, with each of the three documents covering the final cycle of Basic Education*) was initiated by the technical team. An analysis of the data presented in Table 4 indicates a lack of consensus on proposal 7.3 between the five regions. Although four out of five regions accepted the proposal, the rates of acceptance were not uniform. Because Mbandaka indicated such a high rate of acceptance for proposal 7.3, this skews the overall acceptance rate. No coherent response emerged regarding this proposal.

Conclusion. Proposal 7.3 was adopted. This proposal aimed to validate the choice made by the technical team – to create a single document for each discipline within the Science subject area, with each document covering the final two-year cycle of Basic Education. The value of p from the Chi-square test for this proposal was less than 0.05, which demonstrates a significant difference of opinion between the regions regarding this choice. There is a lack of acceptance of this proposal among four out of five regions. One region rejected the proposal altogether. Regional decisions concerning two other proposals from Category 7 (Overall organisation of the programme) were also divided.

There are two possible explanations for these inconclusive results:

1. The proposals were not clearly formulated and led to confusion. The descriptions were too long and overly complicated. For example, proposal 7.3 presented two separate ideas in one sentence: one document per discipline, and each document covering the two-year final cycle of Basic Education.

2. The local experts knew the technical team had already made a decision about proposal 7.3, potentially influencing their response.

The pertinence of including proposals from Category 7 on the questionnaire for the pre-validation process must be considered. In reality, local experts were asked to make choices about issues that had already been decided on by the technical team, such as organising the programmes of study into a single document for each discipline within the Science subject area.

Discussion, conclusion and perspective

Discussion

When additional analyses were carried out that compared various disciplines or sub-sections of the Science subject area with other proposals, the value of p from the Chi-square test was never less than 0.05. This indicates a high degree of coherence among the five regions where the pre-validation process took place, as well as between experts from the three disciplines. It is not possible to report all of the findings in this article; they are described in detail in a report on the entire pre-validation process (Jonnaert et al., 2017). Although analysis of the data indicated a slight atypical distribution of responses on tables where certain categories were cross-referenced with the five regions, none of these results undermines the overall coherence of the 2,016 choices made by the 84 local experts. This research shows a high level of correlation between the 2,016 choices made by the 84 local experts, and the 10,080 instances wherein they either accepted or rejected proposals presented on the Likert scale. For the Democratic Republic of Congo, acceptance rates were very high for the new programmes of study within the Science subject area for the final cycle of Basic Education.

Nevertheless, some proposals need to be re-examined. Two, in particular, are mentioned here:

- The number of documents for each programme of study (proposal contained in Category 7): there was *no consensus on this proposal*. Of the three proposals considered, no single proposal emerged as the preferred choice, not even the one actually adopted for the programmes of study within the Science subject area. For example, the creation of a single document containing all of the content material related to the programmes of study for the discipline, Physical Science, Technology, and Information and Communication Technology, would require that a vast quantity of material be gathered into a single volume. The same problem would exist for the Mathematics discipline, although less so for Life and Earth Sciences.
- Comprehensiveness of disciplinary content (proposal contained in Category 3): *a very weak consensus* formed around this proposal. Concerns were raised about the feasibility of evaluating the quantity of material found in the three programmes of study, given time constraints imposed by the school calendar. For a comprehensive evaluation to occur, it will be necessary to plan and organise a strict timeline for each programme of study within each discipline, and to ensure timelines are coherent with the school calendar and prescribed elements related to each sub-section within the subject area.

The technical team responsible for adjusting and adapting programmes of study for the Science subject area will need to re-examine the clarity and goals related to proposals from Categories 3 and 7. Some proposals are quite complex; they are lengthy and present multiple ideas. When one proposal contains more than a single idea, it is difficult for local experts to respond unequivocally. It also makes it more complicated for the technical team to interpret decisions made on multi-faceted proposals.

Overall, the analyses carried out indicated a *high degree of coherence* both across the five regions of the country where the pre-validation process took place, and between the three disciplines within the Science subject area. *No significant differences* emerged related to either place or content.

It is important to mention a few nuances that emerged from the analysis of qualitative data. An examination of the qualitative data slightly influenced the rate of acceptance of the new programmes of study. For example, some local experts prefer a more traditional approach where programmes of study are organised by discipline and by year; their preferences call into question the application of an interdisciplinary approach within the Science subject area. Other local experts want to add more disciplinary content to the programmes of study; a seemingly over-emphasis on content calls into question the understanding of the situated approach. Although these qualitative analyses slightly dilute the high rate of acceptance of the

new programmes of study, they do not significantly undermine the overall results. It is also important to emphasise that the local experts selected are not necessarily representative of all teachers within the Science subject area for the final cycle of Basic Education. The results of the pre-validation process express *general tendencies* from only *five regions* of the country and from only *84 local experts.*

Conclusion

Pre-validation of new programmes of study is an essential part of every curriculum reform project. It is during this process that pedagogical innovations introduced through the new programmes of study are judged, accepted, or rejected. Pre-validation often constitutes a difficult period for technical teams responsible for readjusting and adapting new programmes of study based on the feedback received. For the Democratic Republic of Congo, all of the elements collected and analysed through the pre-validation process, when considered as a whole, confirmed a *high rate of acceptance* of the new programmes of study within the Science subject area for the final cycle of Basic Education. The technical team adjusted and adapted the new programmes of study based on feedback received from the 84 local experts, after which the programmes will be piloted in a selected number of schools and classrooms.

Much of the credit for the successful pre-validation process and for the high rates of acceptance of the new programmes of study goes to members of the *Ministère de l'Enseignement primaire, secondaire et professionnel* [Ministry of basic, secondary and vocational education], and in particular the Department of Programmes of Study and Didactic Material. This team coordinated the five regions across the country where the pre-validation process took place and oversaw the selection of 84 local experts by discipline. Credit also goes to the 84 local experts who demonstrated their openness to new ideas and change. The innovations introduced represent major changes and they were accepted by all five regions. At the same time, the qualitative data revealed general conservative pedagogical practices, and programme content in particular. The team from the *Ministère de l'Enseignement primaire, secondaire et profession*nel [Ministry of basic, secondary and vocational education], analysed the qualitative data. Based on this analysis, changes were made to the programmes of study. For example, instead of each two-year programme for the final cycle of Basic Education being contained in the same document, the programmes were separated according to the year of study (7th or 8th year of study).

The pre-validation process is always complicated, but this is even more obvious in a country such as the Democratic Republic of Congo. It is too often the case that studies of the pre-validation process are undertaken lightly. This article describes the very serious approach that was taken towards this research project. A diversity of research methods combined with stringent data analyses resulted in precise and significant findings.

Perspective

In the short term, information collected as a result of the pre-validation process enabled the technical team to adjust the new programmes of study and to adapt the forthcoming training sessions designed specifically for teachers from the 11 Congolese provinces, where the new programmes will be piloted. Although the pre-validation process was somewhat complex, it is a crucial component of any curriculum reform project through which programmes of study are re-imagined and re-defined in new ways. Many obstacles and questions concerning the implementation of new programmes of study can be avoided or moderated through the pre-validation process, and by paying close attention to the results of the study. Another crucial element of the pre-validation process is that it solicits feedback from teachers and other educational partners who will ultimately be responsible for implementing the new programmes of study. This is an essential component of the curriculum reform process and determines, to a great extent, the success or failure of innovations communicated through the new programmes of study.

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Annex 1: Questionnaire for the pre-validation of programmes of study for the Science subject area, final cycle of Basic Education

Science subject area

Enter the related sub-section of the Science subject area:

_____

Enter the related discipline if different from the sub-section:

_____

Presentation of questionnaire

To *validate the content and structure* of the programmes of study for the Science subject area, final cycle of Basic Education, a type of *Likert Scale* was used. Likert Scales are numerical scales. They are used in relation to questionnaires in order to determine the extent to which participants accept individual proposals or a range of proposals. This scale was organised into eight categories directly related to the programmes of study for the Science subject area. Each of these eight categories contained three proposals. For each proposal, the scale was divided into five levels of acceptance.

Guidelines

After reading and becoming familiar with the new programme of study related to your sub-section or discipline, you are asked to complete the questionnaire. You are welcome to refer to the programme of study as you respond to the questionnaire. The questionnaire will be completed individually and will remain anonymous. You are asked to consider eight categories, with each category containing three proposals. You are asked to indicate your level of acceptance of each of the proposals. Please read the instructions carefully.

Instructions

- *Read* one proposal at a time.
- If you wish, you may address *a question of clarification* to the technical team associated with the Science subject area.
- *Select one number between* 1 and 5 that corresponds to your level of acceptance of the proposal:

  5 levels of acceptance:
  - 5 = Agree completely
  - 4 = Agree
  - 3 = Disagree
  - 2 = Disagree completely
  - 1 = Undecided/Not applicable
- *Circle* the number to the right of the proposal that corresponds to your level of acceptance.
- Circle only *one number for each proposal*.
- *Write* your comments and suggestions related to the proposal.
- *Write* any additional suggestions related to the category of proposals to which you are responding, by entering them in the space provided for this purpose on the scale.
- *Proceed* to the next category of questions.

Proposals	Scale					Comments and suggestions
1. Pertinence of disciplinary content **Thinking of your own discipline, indicate to what extent the disciplinary content (essential knowledge) is pertinent in relation to the discipline and sub-section of the Science subject area.**						
1.1 The proposed content is pertinent in relation to the discipline.	1	2	3	4	5	
1.2 The proposed content is pertinent in relation to the sub-section.	1	2	3	4	5	
1.3 The proposed content is pertinent in relation to the Science subject area.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to pertinence of disciplinary content:

Proposals	Scale					Comments and suggestions
2. Relevance of disciplinary content for students **Thinking of your own discipline, indicate to what extent the disciplinary content corresponds to the level of knowledge of students in the 7th and 8th years of Basic Education.**						
2.1 The disciplinary content is pertinent for students in their 7th and 8th years of Basic Education.	1	2	3	4	5	
2.2 The presentation of disciplinary content is adapted for students in their 7th and 8th years of Basic Education.	1	2	3	4	5	
2.3 The disciplinary content builds on the prior learning of students who have completed the 6th year of Basic Education.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to relevance of disciplinary content for students in 7th and 8th years of Basic Education:

Proposals	Scale					Comments and suggestions
3. Comprehensiveness of disciplinary content **Thinking of your own discipline, indicate to what extent the proposed disciplinary content covers the material for the 7th and 8th years of Basic Education, keeping in mind the realities of the school calendar.**						
3.1 The disciplinary content covers the material traditionally indicated for the 7th and 8th years of Basic Education.	1	2	3	4	5	
3.2 There is an excessive quantity of disciplinary content proposed by the programme of study for the 7th and 8th years of Basic Education.	1	2	3	4	5	
3.3 The quantity of disciplinary content proposed is realistic in relation to the realities of the school calendar.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to comprehensiveness of disciplinary content:

- Indicate which content (essential knowledge) you would like to add to the new programme of study that is not currently proposed as part of the program:

- Indicate which content (essential knowledge) you would like to delete from the new programme of study that is currently part of the program:

Proposals	Scale					Comments and suggestions
4. Internal coherence **Thinking of your own discipline, indicate to what extent the disciplinary content is organised coherently from one section of the programme to the next.**						
4.1 The disciplinary content is organised coherently throughout the programme of study.	1	2	3	4	5	
4.2 The proposed disciplinary content is organised according to traditional disciplinary methods (pre-requisites, hierarchy, chronological order of learning, etc.)	1	2	3	4	5	
4.3 The organisation of the various elements of the programme of study is coherent with their interrelatedness (essential knowledge, examples of learning situations, evaluation, bank of situations, etc.)	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to internal coherence:

Proposals	Scale					Comments and suggestions
5. External coherence **Thinking of your own discipline, indicate to what extent the programme content is coherent with students' day-to-day realities outside of school.**						
5.1 Proposed content will help prepare students for the types of scientific training required by society.	1	2	3	4	5	
5.2 Proposed content, presented through learning situations, is coherent with the everyday lives of students.	1	2	3	4	5	
5.3 Proposed content is consistent with international standards established for and by the discipline.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to external coherence:

Proposals	Scale					Comments and suggestions
6. Prescribed elements of programme of study **Thinking of your own discipline, indicate to what extent the programme of study is well presented.**						
6.1 The overall structure of the programme of study is well organised.	1	2	3	4	5	
6.2 It is easy to access various types of information within the programme of study.	1	2	3	4	5	
6.3 The programme of study is written in clear comprehensible language.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to prescribed elements of programme of study:

Proposals	Scale					Comments and suggestions
7. Overall organisation of programme of study **In your opinion, what is the best method for issuing the new programmes of study to teachers?**						
7.1 A single volume containing all sub-sections for the two years of the final cycle of Basic Education.	1	2	3	4	5	
7.2 The programme of study divided into two separate documents, one for each year of study.	1	2	3	4	5	
7.3 The programmes of study for each sub-section divided into three separate documents, each one covering the two years of the final cycle of Basic Education.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to overall organisation of programme of study:

Proposals	Scale					Comments and suggestions
8. Evaluation framework **Thinking of your own discipline, indicate to what extent the proposed evaluation framework enables teachers to verify student learning.**						
8.1 It is necessary to verify the degree to which students have mastered essential knowledge.	1	2	3	4	5	
8.2 It is necessary to verify the degree to which students are capable of effectively treating a learning situation.	1	2	3	4	5	
8.3 It is necessary to verify the degree to which students have mastered essential knowledge and are able to effectively and appropriately apply it in a learning situation.	1	2	3	4	5	

5 = Agree completely
4 = Agree
3 = Disagree
2 = Disagree completely
1 = Undecided/Not applicable

Additional comments and suggestions related to evaluation framework:

Appendix 2: Example of general data for Mbandaka (N = 16 local experts)

Proposals by Category		Rate of acceptance: Number of choices relative to total possible responses [1: Undecided/Not applicable; 2: Disagree completely; 3: Disagree; 4: Agree; 5: Agree completely; N=16]				
		1	**2**	**3**	**4**	**5**
1. Pertinence of disciplinary content	**1.1**	0/16	0/16	0/16	8/16	8/16
	1.2	0/16	0/16	0/16	6/16	10/16
	1.3	0/16	0/16	0/16	6/16	10/16
2. Relevance of disciplinary content for students	**2.1**	0/16	0/16	1/16	8/16	7/16
	2.2	0/16	0/16	1/16	10/16	5/16
	2.3	1/16	0/16	1/16	7/16	7/16
3. Comprehensiveness of disciplinary content	**3.1**	0/16	0/16	2/16	8/16	6/16
	3.2	0/16	4/16	5/16	4/16	3/16
	3.3	0/16	0/16	4/16	11/16	1/16
4. Internal coherence	**4.1**	0/16	0/16	0/16	9/16	7/16
	4.2	0/16	0/16	0/16	7/16	9/16
	4.3	0/16	0/16	0/16	7/16	9/16
5. External coherence	**5.1**	0/16	0/16	0/16	4/16	12/16
	5.2	0/16	0/16	0/16	8/16	8/16
	5.3	1/16	0/16	0/16	8/16	7/16
6. Prescribed elements of programme of study	**6.1**	0/16	0/16	1/16	5/16	10/16
	6.2	0/16	0/16	1/16	8/16	7/16
	6.3	0/16	0/16	0/16	1/16	15/16
7. Overall organisation of programme of study	**7.1**	2/16	12/16	1/16	1/16	0/16
	7.2	1/16	8/16	5/16	1/16	1/16
	7.3	1/16	0/16	0/16	1/16	14/16
8. Evaluation framework	**8.1**	0/16	1/16	0/16	3/16	12/16
	8.2	0/16	0/16	0/16	4/16	12/16
	8.3	0/16	0/16	1/16	3/16	12/16

	Total reported	6/384	25/384	23/384	138/384	192/384
	Total (%)	**1.57%**	**6.51%**	**5.98%**	**35.94%**	**50%**
	Com-bined Total (%)	**1.57%**	**12.49%**		**85.94%**	