MINISTRY OF EDUCATION
YOUTH AND INFORMATION

NATIONAL STANDARDS CURRICULUM

Companion Manual for the Jamaican Multigrade Context

Every Child Can Learn
Every Child Must Learn

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National Standards Curriculum: Companion Manual for the Jamaican Multigrade Context

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NOT FOR SALE

Ministry of Education, Youth and Information
Core Curriculum Unit
Caenwood Centre
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Kingston 5
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STEERING COMMITTEE

NAMES	POSITIONS
Mrs. Coleen Clarke Russell	Education Officer, Functional Education (Chairperson)
Mrs. Marjoriana Clarke	Manager, Programme for International Student Assessment
Mrs. Charlotte Commock	Education Officer, Language Arts
Mrs. Shereen Davey Stubbs	Senior Education Officer (Acting), Home Economics Education
Mrs. Christa Ferguson Rainford	Education Officer, Language Arts
Mrs. Dionne Gayle	Education Officer, Special Education Unit
Dr. Clover Hamilton Flowers	Assistant Chief Education Officer, Curriculum Unit
Mr. Seymour Hamilton	Education Officer, Mathematics
Mrs. Michelle Kerr	Senior Education Officer, Functional Education
Mrs. Allecia Lindsay	Senior Education Officer (Acting), Curriculum and Support Services
Mrs. Olivette Lue Nicholson	Education Officer, Media Services Unit
Mrs. Anna Kay Magnus Watson	Health and Family Life Education Coordinator
Dr. Lennox Rowe	Senior Education Officer, Science
Dr. Francine Taylor Campbell	Education Officer, Science
Dr. Lorna Thompson	Education Officer, Mathematics
Mrs. Lorraine Thompson Stewart	Senior Education Officer, Visual Arts
Mr. Conrad Valentine	Senior Education Officer, Business Education
Miss Jasmine Waite	Education Officer, Geography
Mr. Marlon Williams	Senior Education Officer, Performing Arts

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PREFACE

Jamaica is not alone in the existence of schools in which multigrade teaching occurs. The phenomenon has long existed in both developed and developing countries. Jamaica has made much progress in the areas of curriculum development and implementation, and training of teachers for this special type of institution. Many schools with multi-grade classes have produced successful graduates who have been making important contributions to national and inter-national development.

The quest for the improvement of schools with multigrade classes is an on-going effort. There is much evidence that advances have been made in some vital areas, which have resulted in some improvement of the quality of education and the physical and social conditions associated with multigrade teaching.

The teacher of the multigrade class is a special individual who has to master skills for classroom management and general curriculum delivery at a level beyond that which is required for the teacher of a single-grade class. The effort to strengthen the provisions for the multigrade class teachers at system and school levels must continue in order to empower them with the special skills and attributes that are required. The production of this, the third manual to assist teachers with multigrade classes in Jamaica, will help to reaffirm teachers of these schools, of their important role of enabling all children to access and benefit from quality education, so that the mantra of the Ministry of Education Youth and Information (MoEYI) becomes a reality.

MESSAGE FROM THE MINISTER OF EDUCATION YOUTH & INFORMATION

Schools with multigrade classes are an important part of the Jamaican education landscape. These schools numbering under 200, located in the remote parts of Jamaica have provided essential educational services to small isolated communities all over the island. Thus these multigrade classrooms help to provide the opportunity to bring quality education to all Jamaican students. The Ministry of Education, Youth and Information (MoEYI) is aware of the dynamics and the extent of the needs of multigrade institutions, and is focused on improving these conditions.

The development of this "Multigrade Companion Manual" is a direct response to ensuring that our multigrade classrooms provide learners with quality learning experiences. This resource will assist teachers in multigrade institutions with the planning and delivery of their lessons by providing the requisite guidance on how to adapt the National Standards Curriculum to their unique situations. The manual was developed in collaboration with experienced multigrade practitioners in the field and was designed to meet the needs of multigrade teachers as they work to improve the performance of students in their care. This contributes to fulfilling the MOEYI's mantra, 'Every Child Can Learn...Every Child Must Learn...'

It is the MoEYI's duty to ensure that teachers are equipped with the requisite skills and tools to do their job, and to this end we have developed this manual and trained multigrade practitioners in its use. This approach has helped to improve the professional skills and competencies of the multigrade teachers. They have been equipped with the information and skills of designing lesson plans that cater to the various grade levels, ages, stages of development and interests of their students.

I applaud the efforts of all those who have contributed to the development of this "companion manual". I give my full support to the use of this manual in assisting multi-grade practitioners to effectively implement the NSC as well as navigate and improve their unique school environment. I encourage multigrade practitioners to embrace this resource that has been developed for you. I am sure that your use of it will help you to be more effective educators.

Honourable Karl Samuda, MP
Minister of Education, Youth and Information

MESSAGE FROM THE MINISTER OF STATE IN THE MINISTRY OF EDUCATION YOUTH AND INFORMATION

Are we preparing our children for the 21st Century? Are we effectively reaching all our students? Is our education system really all inclusive? These are some of the questions we at the Ministry of Education, Youth & Information (MoEYI) ask ourselves as we reflect and plan for our nation's children. In answering these questions we have seen the need to develop this Multigrade Companion Manual to support the adaptation of the National Standards Curriculum to the nuances of the multigrade context.

'Multigrade teaching' occurs in situations where one teacher has the responsibility of delivering two or more curricula to students of different grade levels in a single class at the same time. Schools with these types of classes are often called "multigrade schools", but are correctly termed schools with multigrade classes. In Jamaica predominantly in the rural parts we have a significant number of these institutions. These schools are not unique to Jamaica, as multigrade institutions exist all over the world in many developing and developed countries.

The students in multigrade institutions need the same skills and competencies to effectively function in society as do those in the mono-grade institutions. How do these teachers help to prepare them for the challenges and the constant changes in everyday life? We are in the age of information and knowledge, where 21st Century skills are required. The teacher in the schools with multigrade classes, like those with mono-grade classes, must facilitate students to acquire creative thinking, problem solving, collaboration and innovative skills that are needed to succeed in life. Therefore this manual was developed to equip teachers in these institutions to effectively deliver the NSC.

Our children must not be short changed. This manual presents the teacher with practical ways of navigating the multigrade classroom and delivering the curricula. It provides supportive ideas that can be utilized in their daily practice. These ideas are presented in areas such as, Classroom Organization and Management, and Teaching and Assessment Strategies.

This manual represents hope; it is a signal that the Government of Jamaica values all the children of Jamaica and wants them to be equipped with the core of knowledge, skills and abilities that will help them to chart their life's path.

I am happy to be associated with this document and to be here in the MOEYI at such a time as this. I salute the team that has worked tirelessly in bringing this manual to reality. I encourage all educators to utilize this resource as its usefulness transcends the boundaries of the Multigrade landscape.

Honourable Alando Terrelonge, MP
Minister of State
Ministry of Education, Youth and Information

MESSAGE FROM THE ACTING PERMANENT SECRETARY

The implementation of the National Standards Curriculum (NSC) is quite significant in the history of our education system as it is an all-inclusive curriculum that presents teachers, parents, and other stakeholders in education with many opportunities to effectively contribute to improving learning outcomes, and adequately prepare our children for the challenges and opportunities of the twenty-first Century.

The implementation of a new curriculum can be challenging as it requires not only the introduction of new content and skills but also new attitudes and often a new philosophy for its delivery. This can be quite daunting for some teachers, especially those who do not easily adapt to changes. Everything must therefore be done to empower our teachers, regardless of the type of school by which they are engaged, to embrace changes in curriculum delivery which will redound to the benefit of our main stakeholders, the students.

The very special set of schools we call "multigrade schools" constitute a very important part of the Jamaican educational landscape. These are schools in which one teacher teaches students of two or more grade levels in the same classroom at the same time. This situation requires special skills and competences of the teacher to ensure that the curriculum of each grade is effectively implemented and that the widely varying needs of students in his/her charge are adequately catered to. The task of the teacher is to create opportunities for children to acquire life skills and develop their potential.

The structure of the NSC lends itself more readily to monograde teaching; hence its use is a much greater task for multigrade teachers who are expected to adapt the curriculum to their unique situation.

We at the Ministry of Education Youth and Information have taken a fresh look and a new approach to providing support to our teachers in multigrade institutions. We are continuously providing training, coaching and mentorship for our teachers. Along with these measures, the NSC Companion Manual was developed as a support tool to assist multigrade practitioners with the implementation of the NSC.

Multigrade teachers must plan systematically and implement according to the classroom conditions. The manual offers useful strategies that will assist both novice and experienced multigrade teachers in improving the quality of instruction. It is our intent that this manual will be the first point of reference for multigrade practitioners wanting to learn new skills or to refine those they already possess. We therefore present it to the education system with the hope that it will be used to enhance the experience of students in multigrade classes.

Grace McLean, PhD.
Permanent Secretary (Acting)

MESSAGE FROM THE ACTING CHIEF EDUCATION OFFICER

In an effort to ensure that teachers have the requisite support to facilitate learning based on the design of the National Standards Curriculum (NSC), the Ministry of Education, Youth and Information has developed a suite of measures, which will support teaching, learning and assessment of our students. The Multigrade Companion Manual was developed as one of the necessary resources for supporting our teachers in "multigrade institutions".

Schools with multigrade classes have always been a part of the educational landscape in Jamaica, and are an important means of helping the country attain its mandate for Education for all. Within our Jamaican context multi grade institutions exist mainly because there are communities that are sparsely populated, schools are very far apart, are remote/isolated and enrolment is very low. These schools also exist in areas where parents send their children to more popular schools (sometimes travelling very far distances) and this in turn impacts the population of the less popular schools that are closer to home.

Teaching and learning is affected by many factors, including the quality of teacher preparation and curriculum delivery. It is true that teachers in multigrade classes are expected to implement the curriculum and fulfil assessment expectations in much the same way as monograde classes. However, these issues are intensified within the multi-grade context.

The Ministry is aware of this and has taken a proactive step to develop this companion manual that will assist these teachers with the effective and meaningful adaptation of the NSC. This manual provides guidance and tips that multigrade practitioners can utilize in the planning and delivery of their lessons. It outlines well-needed ideas in areas such as, Classroom Organization and Management, Approaches to Teaching and Evaluation of Learning, and Adapting the Curriculum and Learning Environment for Multi Grade Teaching.

I give my full endorsement to this manual and invite all multigrade practitioners to utilize this very practical resource that has been provided to help you better serve the students under your care.

Kasan Troupe, Ed.D.
Chief Education Officer (Acting)

MESSAGE FROM THE DEPUTY CHIEF EDUCATION OFFICER— CURRICULUM & SUPPORT SERVICES

In Jamaica schools are not built or designed for multigrade classes; these types of schools have arisen out of necessity. Multigrade schools are most prevalent in rural areas where population and student numbers are declining in schools that were previously monograde in operation. The multigrade approach has increased educational access and reduced absenteeism in these rural communities. However, it has impacted the quality of delivery by the teacher, since the teacher who was trained to teach monograde classes and use a curriculum designed for monograde classes, is now teaching in a multigrade context.

Although our school system is largely monograde, the peculiarities and needs of multi-grade institutions have not gone unnoticed by the Ministry of Education Youth and Information. We are aware that multigrade teaching places greater demands on teachers than monograde teaching and as such great efforts have been made by the Ministry to assist teachers to effectively navigate two and in some cases three versions of the curriculum all at once.

The development of this manual is timely, as it will facilitate the effective implementation of the National Standards Curriculum (NSC). It is a companion manual that was expertly designed to help multigrade teachers adapt the curriculum to their unique situation. It provides guidance and good examples on how to successfully manage, plan for, and assess students within the multigrade context. I encourage multi-grade practitioners to carefully read the pages of this manual and be guided by it, as it provides support and affirmation for your work as well as instructional/pedagogical strategies and ideas.

Winnie-Ann Berry (Mrs)
Deputy Chief Education Officer- Curriculum and Support Services

MESSAGE FROM THE ASSISTANT CHIEF EDUCATION OFFICER--CORE CURRICULUM UNIT

The development and provision of a manual to equip teachers of multigrade classes with strategies and tools for the implementation of the prevailing curriculum has been an on-going effort of the Ministry of Education, Youth and Curriculum

The implementation of the National Standards Curriculum has now made it necessary for this manual, the third such publication, to be provided. We continue to acknowledge that curriculum development is a dynamic process; therefore, as the needs of the target population change, so must the curriculum and its support materials change to adapt to the new demands that are created.

The development of this manual had broad-based participation. Teachers of multigrade classes, trainers and officers at all levels, joined the members of the Multigrade Committee to make their input in assessing, reviewing and contributing to the content. Teachers were also familiarised with the strategies, procedures, and suggested materials and resources outlined in the manual before the document was completed. Every effort was made to ensure that this manual serves as a practical guide to today's teacher of the multigrade class.

Primary level students in small rural communities are the major beneficiaries of this manual. However, it is recognised that there are students in other locations and situations in which multigrade teaching is adopted by choice or necessity. For example, the intake of smaller numbers of students per grade level in some schools where Special Education is offered creates the situation for multigrade teaching to occur, whether the schools are in urban or rural areas.

I take this opportunity to express my deep gratitude to all who made the production of this manual possible. We place it in the hands of teachers, teacher educators, curriculum developers and all who can use it to help to make a positive difference in the education of the children of Jamaica and even beyond our shores to the wider Caribbean.

Clover Hamilton-Flowers PhD.
Assistant Chief Education Officer
Core Curriculum

INTRODUCTION

A Historical Perspective

Multigrade teaching may be defined as a type of teaching in which one teacher engages students of two or more grade levels in a single class. This means that the teacher is charged with the responsibility of more than one age group, with varying levels of ability, at the same time.

Schools with multigrade classes have been a normal part of the Jamaican landscape since the Jamaican education system was opened up to the general population with the establishment of elementary schools for ex-slaves after their emancipation in 1834. The existence of schools with multigrade classes is not unique to Jamaica, but has long been a worldwide phenomenon. The extreme case of the school with multigrade classes is the one-room school, which still exists all over the world.

Multigrade teaching occurs on every continent in the world - Africa, Australia, Asia and the Pacific, Europe, North America (including the Caribbean) and South America. Incidences above 35% of the school population exist for Belize, Guyana, and Dominica. The Turks and Caicos (30%) and Trinidad and Tobago (12%) report the lowest incidences (Kivunja, 2014). From a level of over 30% in the 1990s the percentage of schools with multigrade classes in Jamaica has been reduced to 20% of the primary school cohort (Ministry of Education, Youth and Information 2018 data).

"The teacher of a multigrade class is faced with the task of providing learning experiences for students of more widely varying ages, abilities, interests, developmental levels and socioeconomic backgrounds than the teacher of the single-grade class. It follows, therefore, that the multigrade teacher faces a higher level of instructional complexity on a daily basis, and this requires a display of good organizational, planning and managerial skills, and the ability to be highly innovative and creative so that effective learning will take place.

The teacher of the multigrade class is a special individual, playing an important role in the nation's development". (Message of Minister of Education, The Honourable Andrew Holness, *Manual for Teachers of Multigrade Classes in Jamaica, 2008)*. Creativity and flexibility are the hallmarks of the effective teacher of the multigrade class.

Schools with multigrade classes in Jamaica face many challenges, but they will remain a reality in Jamaica, if all children, wherever they reside, are to benefit from the right to be educated. Efforts have been made over the years, and continue to be made, to strengthen curriculum implementation in these schools. Some of the initiatives were funded and facilitated by external agencies such as the Organization of American States (OAS), the Inter-American Development Bank (IDB), and the United States Agency for International Development (USAID). National initiatives such as the deployment of literacy and numeracy specialists, supporting the production of manuals to assist the teacher of the multigrade class, and the training of lecturers of the teacher education institutions, have also played their role. The contributions made over the years are summarised in the following table on the next page.

Table 1: Contributions to Multigrade Teaching

Source of Support	Contribution/Achievements
MOE/OAS Funded Projects, 1990-2011	• The training of teachers of schools with multigrade classes in all six Educational Regions, in multigrade teaching strategies • The production of the first manual for teachers of multigrade classes (published in 1995) • The training of officers and teachers' college lectures in multigrade teaching strategies • The development of audio-visual instructional materials for multigrade classes • The provision of musical instruments and equipment (keyboards, Conga drums and CD players) for 108 schools with multigrade classes – 1 item per school. • The provision of presentation equipment (smart board, multimedia projectors) for the Core Curriculum Unit • Training of teachers in the use of the second manual produced for teachers of multigrade classes in 2008.
Primary Education Support Project (PESP – GOJ/IDB III)	• The printing and distribution of a second manual for teachers of multigrade classes in 2008
USAID Basic Education Project	• Interventions by literacy and numeracy specialists to improve teaching methods and student achievement in Mathematics and reading in 72 primary schools, in which a deliberate attempt was made to target some schools with multigrade classes. • Provision of equipment (computers, multimedia projectors, etc.)

Source of Support	Contribution/Achievements
GOJ-funded National Literacy and Numeracy Programmes	• Literacy and numeracy specialists have been carrying out diagnostic activities and have been addressing weaknesses identified in the implementation of the curriculum in many schools, a significant number of which are schools with multigrade classes. • The work of the specialists has benefitted from the support of the officers of the Core Curriculum and Special Education Units, along with the officers in the
Collaboration of the Core Curriculum Unit with teacher education institutions	• Officers of the Core Curriculum Unit have participated in delivering training on multigrade teaching at Boards of Studies meetings of the Joint Board of Teacher Education. • Other training sessions were also held with individual teacher education institutions (colleges and universities) with lecturers and students as requests were received. •

STATUS OF MULTIGRADE TEACHING IN JAMAICA

It is worth noting that "multigrade schools" now comprise about 20% of primary schools across the island, which is a significant reduction from the over 30% which obtained in the 1990s. This improvement, however, does not diminish the reality that a significant proportion of children in the age cohort six to twelve years is still being educated in these institutions.

A major development in multigrade teaching in Jamaica over the past decade is the provision of a course in teacher education institutions in the Bachelor of Education programme, to prepare teachers for the multigrade setting. In 2017, at least six (6) institutions offering teacher education courses offered the course "Introduction to Teaching in Multigrade Schools". This course as a welcome addition to the efforts that have been made over the years to improve the quality of education in schools with multigrade classes.

There are some benefits that are being derived from the multigrade setting and some strategies are being executed effectively by schools. The following are findings from an informal survey conducted by Regional Education Officers with other Education Officers, principals and teachers of schools with multigrade classes in all Educational Regions of the island. The findings portray positive aspects of the multigrade situation that are currently of benefit to the teachers and students: Curriculum Implementation Teams (CITs) are active in some schools, Common Planning Time is a regular part of the administrative process, teachers are conducting research to improve teaching and learning, the 5E model is being utilized in lesson planning, the use of technology is evident in the conduct of lessons, the use of differentiated instruction is gaining prevalence, schools are sharing their effective practices and networking with each other, there is effective student monitoring because of the lower student enrolment, there is usually an arrangement in place for the effective vetting of lesson plans, and teaching time is usually well- structured.

It is acknowledged that challenges are a part of the multigrade landscape as much as they are a part of any other type of institution. Efforts are, however, being made to provide the necessary support in teacher education, provision of instructional materials, and in curriculum implementation in general, so that the challenges can be alleviated.

Schools in Jamaica with multigrade classes show the following characteristics:

- **They are usually located in areas of low population density.**

- **In the majority of cases, not all classes are multigrade.** An effort is usually made to avoid the combination of Grades 3 and 4. Grade 3 follows an integrated programme while Grade 4 marks the start of the single-subject programme. Combining students of the two programmes in the same class would make the task of catering adequately to the needs of the different groups even more difficult for the teacher.

- **Schools with multigrade classes also occur because student numbers are declining in a school where previously there was monograde or single-grade teaching.** Reasons for this phenomenon include:
  - ⇒ Gradual migration of the population from the area over time
  - ⇒ A preference of parents to send their children to a neighbouring school that they perceive will offer their children greater prospects for being selected for a high school deemed by them to be high status.

- **In some instances, as an innovative or strategic measure, there might be some combination of students from two or more grade levels, as a matter of choice.** This can happen for various reasons, including:
  - ⇒ Multigrade teaching being the norm in special education institutions
  - ⇒ Having students from two (2) or more grade levels interact with a particular teacher who is best able to address the learning or social needs of the students.

The condition of the physical plant of schools with multigrade classes is varied. Some schools are well- endowed in terms of space for classrooms, Performing Arts rooms and areas for other activities (Physical Education, meetings, etc.)

- Some schools with an abundance of space had larger enrolments at some point in the past. The present reduced student population now has access to the same physical expanse, so that places that would have been used for classrooms are now free to be used for other purposes.

- Other schools have little room to manoeuvre, an appreciable number still having blackboards partitioning classes. Some schools in the mountainous areas have no playfields. The teacher in such settings has to be even more resourceful and creative in order to enable students to gain the same skills that the presence of such facilities would have provided.

PURPOSE OF THE MANUAL

A new manual is produced for schools with multigrade classes with each revision of the primary curriculum. This is necessary because alignment to the prevailing curriculum makes the manual optimally effective in guiding the teacher in the implementation of the curriculum. The new version of the manual captures the nuances in the philosophy of the new curriculum and guides the teacher in implementing new requirements in lesson planning and delivery (e.g. using the 5E model in lesson planning). In addition, the manual updates the teacher of the multi-grade class on multigrade teaching as an international phenomenon; assists the teacher with teaching strategies aligned to the new curriculum; and makes suggestions regarding the use of resources in the multigrade class.

It must be emphasized however, that the manual is a companion document and not a stand-alone curriculum document. While there is no claim to providing all the answers to all the questions that might arise in the multigrade environment, this manual will empower teachers with the tools and information for efficient use of the National Standards Curriculum (NSC) and point teachers to other resources that will also assist them to solve their every-day challenges and issues.

THE NATIONAL STANDARDS CURRICULUM (NSC)

The National Standards Curriculum is the curriculum currently being used in Jamaica's primary school system. It exists in four (4) volumes---The Integrated curriculum of Grades 1-3; and the curriculum guides for grades 4, 5, & 6. It espouses a constructivist philosophy which aligns with the national mantra "**Every Child Can Learn...Every Child Must Learn.** The integrated design of the grades1-3 curriculum does not abandon the skills and understandings specific to the individual key learning areas, and these are woven into that integration as clear early learning standards to form an "underpinning architecture" on which the integrated curriculum itself is based and on which the curriculum for grade 4 upwards can be built.

The curriculum acknowledges that children use their senses to experience the world and derive meaning from their efforts to satisfy curiosity. They are encouraged to use their brains to make connections, and they benefit from their acquisition of knowledge and a variety of skills that help them to survive within the boundaries of the prevailing/ acceptable culture of the society. In the early years, the curriculum makes reference both to Standard Jamaican English and Jamaican Creole, the two languages likely to be used at school.

The Philosophy of the NSC

The NSC embraces constructivist theory, which asserts that students construct their own understanding and knowledge of the world, through their own experiences, and reflections on such experiences. New knowledge is reconciled with previous experiences. The new knowledge may result in changing or discarding what was previously held as fact. Students become active creators of their own knowledge, asking questions, exploring the new experiences, and assessing the previous information based on the new knowledge gained.

The 21st century skills of communication, collaboration, critical thinking and creativity are also fully embraced and are promoted through the methodologies of simulations, group/peer-work, problem-based tasks and adequate allowance for exploration and innovation. The affective dimension is also foregrounded through specific objectives which when met, will help facilitate the development of the mentioned skills. Other values and attitudes are also developed through the focussed inclusion of the affective dimension.

KEY AIMS OF THE MANUAL

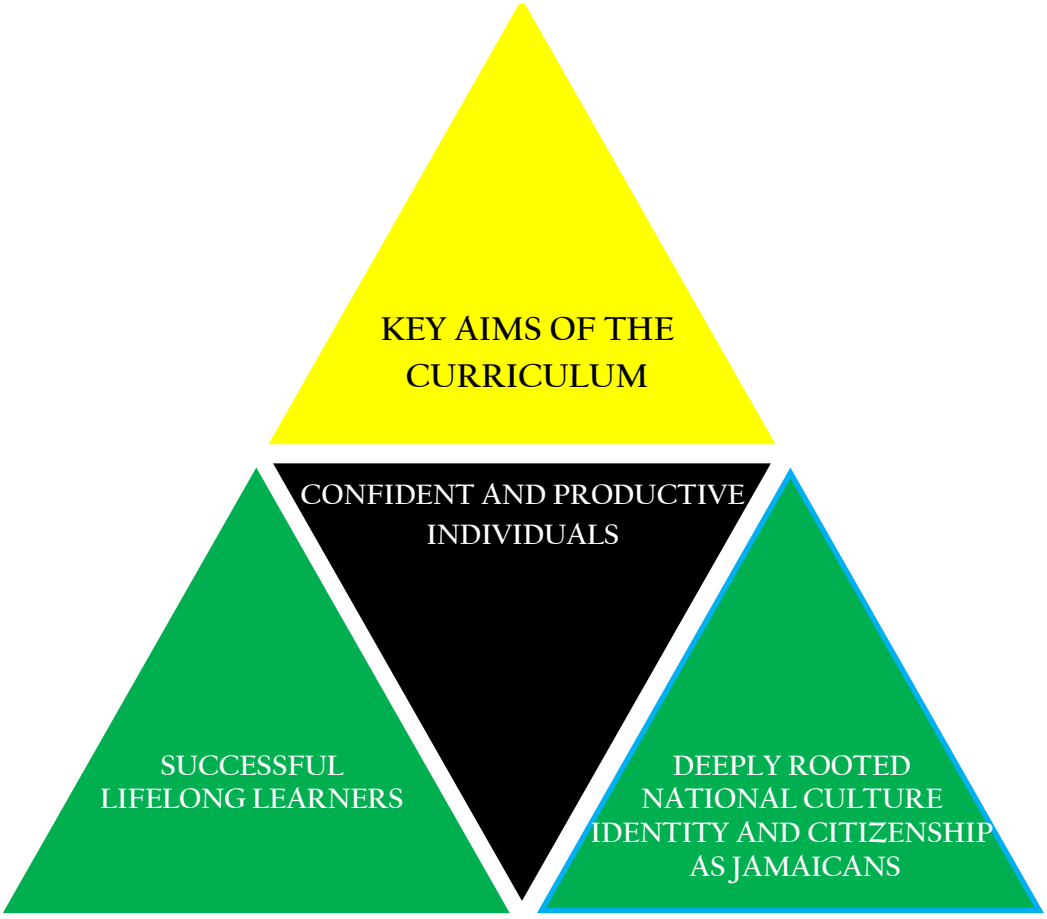
The rapid rate of the growth of information makes it impossible to learn enough in school to last a lifetime. Students therefore have to be taught in a way that prepares them to face a rapidly changing information landscape. Three (3) key aims outlined below, which are consistent with constructivist philosophy, underpin all learning in the curriculum and provide its purpose and direction:

- To be successful lifelong learners, young people need to develop a love of learning and a belief that they can succeed. They need to develop the competencies that underpin learning itself and which will enable them to continue learning with enthusiasm throughout their lives.

- To be confident and productive individuals not only have self-belief to be enterprising and creative, they can relate well to others, understand others' concerns and needs, and work well in teams or collaborative groups.

- To become citizens who value their identity, young Jamaicans need to understand and treasure their rich culture and heritage. They need to learn the importance and crucial role that values, morals and attitudes play in contributing towards the fabric of Jamaica's society, for their own good and that of others. As global citizens, they will be delighted about Jamaica's role and position in the wider world (Ministry of Education, Youth and Information, 2017).

Figure 1. Key Aims of the Curriculum



Source: Ministry of Education, Youth and Information (2017). *The National Standards Curriculum: Philosophical Framework.* Presentation. Kingston, Jamaica: Author.

These aims have been at the forefront of all the decisions taken in the development of this manual for teachers of multigrade classes. The same approach taken in the development of the NSC is adopted and implemented. Teachers are encouraged and facilitated to develop in students the skills needed to be confident and productive, to regard their learning as a lifelong venture and to value their Jamaican culture, identity and citizenship.

OUTLINE OF TOPICS/AREAS COVERED

The introduction to the manual creates the historical context for the development of the manual and gives the current perspectives on multigrade teaching in Jamaica and at a global level. The alignment to the National Standards Curriculum is demonstrated and instructions on the use of the manual are given.

The second section of the manual deals with Multigrade School Leadership and Management. The Role of the Curriculum Implementation Team and the importance of Corporate Planning and Reflection are highlighted. Classroom Organization and Management and Teaching and Learning Strategies and Tools relevant to the multi-grade class are then addressed, with helpful hints for the teacher.

A major undertaking of multigrade teaching is adapting the curriculum and the Learning environment for multigrade teaching, which is dealt with in a section with this exact caption. Teachers are given helpful information for adapting both the Grades 1-3 and the Grades 4-6 programmes.

The final section in the main part of the document addresses Instructional Resources. A list of helpful resources and their use is provided, along with information for the procurement of similar items.

The Appendices provide sample lesson plans for the multigrade class, and monitoring instruments for teachers and students.

How to Use the Manual

This manual is not a curriculum. It is to be used as a companion document to the NSC. It provides useful tips and suggestions for the teacher of the multigrade class, the principals of schools with multigrade classes, the lecturer in teacher-education departments of colleges and universities, and the student teacher.

The manual is presented in seven (7) main sections and appendices. Each section is self -contained and provides information on a particular aspect of multigrade teaching. The teacher is encouraged to read the introduction thoroughly, to get an appreciation of the context within which the manual has been developed, and the aims the manual was developed to achieve. It is also recommended that the manual be initially examined from cover to cover in order to become familiar with its contents. After the initial familiarisation, the relevant sections of the manual can then be consulted as needed.

LEADERSHIP AND MANAGEMENT OF THE MULTIGRADE CLASS-ROOM

LEADERSHIP AND MANAGEMENT OF THE SCHOOL WITH MULTI-GRADE CLASSES

The peculiarities of the multigrade setting require management that demands not only the same skills which are required for the management of schools with monograde classes, but in addition, special skills unique to the multigrade situation. The greater diversity of students in the multigrade class requires that school administrators (who often double as teachers) ensure that the teacher is equipped with the skills necessary to operate successfully in a differentiated classroom. Tomlinson and Moon (2013) outline five general principles that set the stage for engaging students effectively in the differentiated classroom, where teachers address the needs of students of varied readiness levels, interests, and learning preferences. The five principles or conditions are: an environment that encourages and supports learning, quality curriculum, assessment that informs teaching and learning, teaching that responds to student variance, as well as the capacity to lead students and manage routines.

Management structures which exist for the implementation of the curriculum such as the Curriculum Implementation Team (CIT) and Common Planning Time (CPT), or Corporate Planning and Reflection (CPR) help to create an environment that encourages and supports learning and set the stage for the achievement of the other four principles and conditions outlined by Tomlinson and Moon (2013).

The Role of the Curriculum Implementation Team

The Curriculum Implementation Team (CIT) is a group of persons (which in small schools can be the entire staff) at the school level, who collaboratively perform well defined responsibilities to monitor the implementation of the curriculum on site in order to ensure that the curriculum is delivered as efficiently and effectively as possible. The principal or his/her designate is the leader of the CIT, and assigned school staff and community members complete the team. The education officer supervising the school is an ex-officio member.

The operation of the CIT requires principals and staff members to share common vision and values and to have regular meetings to discuss and reflect on teaching practices and student performance. Teachers working collaboratively and consistently in this way to find solutions to issues and challenges in the implementation of the curriculum, mirrors the collaborative approach to student learning that is promoted in the National Standards Curriculum. This mode of operation is also highly adaptable to the multi-grade situation.

Composition of the CIT

A Curriculum Implementation Team (CIT) is composed of members who have clearly defined responsibilities in order to carry out its mandate. The team members may include the principal/chairman, senior teachers, the school based assessment coordinator, the literacy, numeracy and other coordinators and specialists, community members/parents, and other special appointees. In schools with multigrade classes, each team member might be called on to perform multiple roles. For example, the school- based assessment coordinator might have to double as the literacy or numeracy coordinator. Clear guidelines are available for the operation of the CIT.

Note: *Please refer to the Manual for Curriculum Implementation Teams published by the Ministry of Education, Youth and Information (2018) for additional information.*

Collaborative Planning and Reflection

Collaborative Planning and Reflection (CPR), a renaming of Common Planning Time (CPT), for the multigrade setting, was one of the features introduced in the Jamaican educational landscape during the period 2000 -2004, and has been retained as an exemplary strategy for the implementation of the National Standards Curriculum (NSC).

CPR is a scheduled time on the school's timetable when teachers meet for joint reflection and planning of the teaching programme and related events to be executed over a given period – week, month, term or year. In large schools, CPR is mainly carried out in grade level groups, but in schools with multigrade classes, the entire teaching staff is often involved, and the planning therefore is more broad-based, involving several grade levels. During CPR, the following activities are carried out (the number and type of activities will vary to some extent from school to school):

- Identifying/selecting instructional materials for the delivery of particular units/ lessons
- Identifying/discussing the ideal instructional methods for the delivery of particular units/lessons
- Identifying and developing interdisciplinary themes to be used in the implementation of the curriculum over a given period
- Developing/adjusting teaching schedules (or timetables)
- Developing units to be taught over a given period
- Discussing/evaluating/tracking student performance on internal and national examinations and assessments.
- Seeking help from colleagues about challenges being encountered in the delivery of the curriculum
- Giving demonstrations on the delivery of selected topics
- Giving advice to/sharing successful practice with colleagues on matters of curriculum delivery
- Identifying students' academic, social and personal needs
- Discussing how to address student behaviour and general discipline in the school setting
- Addressing ways to increase and maintain student motivation for learning
- Formulating long-term goals for the instructional programme of the school
- Planning the use of the physical space for curriculum delivery
- Discussing current educational research and how it will impact the teaching programme
- Discussing the effect of policies and directives of the Ministry of Education, Youth and Information on the programmes of the multigrade school.

Some General Tips on Managing the School with Multigrade Classes

The majority of the following tips have been recommended by principals of schools with multigrade classes, and are being presented for the consideration of school boards, principals, and the Curriculum Implementation Team.

- Activate (if defunct) and maintain the Curriculum Implementation Team (CIT) to effectively monitor and support the implementation of the curriculum.
- Maintain Cooperative Planning and Reflection (CPR) as an essential strategy for planning, and organising for the effective execution of the teaching programme.
- Maintain a programme to regularly access training for teachers (in collaboration with the members of the CIT) so that they are kept abreast of the availability of new methodologies and resources.
- Ensure that classrooms have the best layout so that they can be attractive and educationally stimulating places for the children. The placement of furniture and educational resources should facilitate easy access and flexible arrangements.
- Keep and frequently update the school's inventory of instructional materials and equipment. Institute a plan for recording the **use and return** of materials. The materials and equipment are needed to keep students on task especially when the teacher is engaged with others in the classroom, and are therefore very crucial for the multigrade classes.
- Deal with issues as they arise, so that they are "nipped in the bud" and not left to fester. A brief to deal with an emerging matter impacting the delivery of the curriculum, will help greatly to alleviate the situation.
- Keep parents fully updated about the programmes of the school and enlist their help based on their expertise.
- Employ multiple means to enable two-way communication with staff, parents and students – face-to-face meetings, letters and memoranda, bulletin boards, telephone social media e.g. WhatsApp, website (with contact page), etc.

- Keeping in touch with all stakeholders as well as being available to them is important in this special situation where external support is crucial for effective management of the school.
- Display all class schedules/timetables so that the daily routine for each class can be readily observed by students, other staff members, parents, and other stakeholders.
- Be cognizant of the need to activate and operate the various plans, guidelines and policies put in place by the Ministry of Education for the effective organisation and functioning of schools (e.g. the School Improvement Plan, CIT guidelines, Nutrition Policy). Make any necessary adjustments for the multigrade setting in consultation with the education officer supervising the school, and the CIT.

MULTIGRADE CLASS-ROOM ORGANISATION AND MANAGEMENT

ORGANISATIONAL AND MANAGEMENT SUGGESTIONS FOR THE MULTI-GRADE CLASSROOM

Managing the classroom environment is the linchpin of effective multigrade teaching and learning. Organising and ordering classroom procedures, routines and furniture, when diverse groups are engaged in different activities, augur well for enabling learning to take place. Failing to plan and organize for student learning will result in the shortchanging of the students' educational achievement and a waste of resources. When planning and organization of the use of time, resources and space is done, much can be achieved to the benefit of learner and teacher, rivaling to a notable degree, the achievements in single-grade settings.

The following table presents some organisational and management tips that can be implemented to effectively manage the multigrade classroom environment, and the rationale for implementing them:

TIPS	RATIONALE
Organisational Tips	
Arrange the classroom so that the materials that students need for their learning activities can be easily accessed.	Having materials readily accessible will enable students to get quickly to the task at hand. Students will be more likely to sustain the motivation to work if they do not have to wait after the initial engagement/introduction to the lesson, to be presented with the materials needed for their activities.
Have assigned areas for students of the different grade levels to place completed work	Having an assigned area for completed work will ensure that valuable instructional time is effectively used. It allows students to work at their own pace.

TIPS	RATIONALE
Organisational Tips	
Make the learning space flexible – furniture and fixtures and resources can be moved to facilitate different activities	A flexible learning space will be easily adaptable to the varying activities that will take place throughout the day. The ease with which the physical learning environment can be transformed makes the provision of a variety of learning experiences for the students, easily facilitated.
Utilize appropriate storage for teaching and learning materials and make available to students for independent or group work.	The storage of materials for easy retrieval when needed will contribute to order in the classroom. Materials can be found in a given area/space whenever they are needed.
Build a classroom environment that will facilitate group activities, information sharing, and opportunities for individual learning through the classroom library and reading corners, class displays, resource centres.	In such an environment, students can engage in structured and unstructured learning.
Management Tips	
Give directions for learning tasks in a form that can be revisited (written, audio recorded, etc.) to groups engaged in separate work.	When directions are presented in a form that enables students to refer to them after the initial engagement or introduction to the activity, students will not lose an inordinate amount of time on task trying to get the teacher to repeat the instruction.
Sensitize students to the fact that various classroom organisations will be employed based on the nature of the lesson being delivered. (Including how they are expected to move around the classroom)	This will help to improve efficiency as students move purposefully from one task to another.

TIPS	RATIONALE
Organisational Tips	
Keep conversational noise in the class-room at a reasonable level while students are working on their various tasks	Some level of noise is expected as students work collaboratively on their tasks, but it should not be at a level that disturbs or prevents other groups or individuals from working effectively.
Provide ways for students to get help when you (as teacher/facilitator) are working with other individual students or groups. Strategies that will help in this regard are the use of peer tutors, learning corners/resource corners, class libraries, and computers. A child should however be able to consult the teacher when the other avenues are not proving successful. Students should be made aware of the rules for operating when such situations arise.	Students will be facilitated to remain on task when they can get the help they need to pursue their learning activities.
Give directions as to a specific task a student should do when an assigned ac-tivity is completed.	It is necessary to be specific about the new task to be pursued so that time is not lost and student interest not reduced.
Formulate with student input, rules about keeping order and cleanliness in the classroom. Formulate rules specific to particular learning areas and activities.	When students help to formulate the rules, they will feel a sense of ownership of them. They will be more likely to buy into the rules if they participate in creating them.
Make special accommodation for activities that will cause distraction for other students in the neighbouring area. (e.g. Drama, Music, Oral Language presentations) Some strategies to prevent distraction are: -Timetabling and engaging the whole classroom in the activity -Taking the group engaging in the activity outdoors, or to another room, if available	Students who are engaged in quiet seat activities will be distracted by more active and vocal activities in the environment. Everything must be done to keep students on their assigned tasks for the planned duration.

TIPS	RATIONALE
Organisational Tips	
Make a list of the available resources and the subjects/topics/units/lessons they support.	This list of resources will be a quick reference for you, the teacher when preparing lesson plans.
Keep and frequently update the class inventory of instructional materials and equipment. Institute a plan for recording the use and return of materials by students (The method of record keeping should be simple, especially for the younger students; for example pasting a picture of the item being used beside the name of the student). An inventory and record of use should also be in place for the school, to keep a record for those materials and equipment that are stored centrally and used by several classes.	An updated inventory of materials and equipment will aid in accountability for the resources of the class and school and to inculcate in students the habit of keeping a record.
Keep a checklist, or record deviations from the class timetable to track how students are spending their time during school hours.	An assessment of the checklist or records will indicate the proportion of the school day for which individual students are productively engaged.

Adapted from:

1. Tomlinson, C. and Moon, T. R., (2013). *Assessment and student success in a differentiated classroom*. Alexandria VA: ASCD.
2. UNESCO. (2015).Embracing *diversity: Toolkit for creating inclusive learning-friendly environments, Specialized Booklet 4*. Bangkok, Thailand: Author.

Ways of arranging students

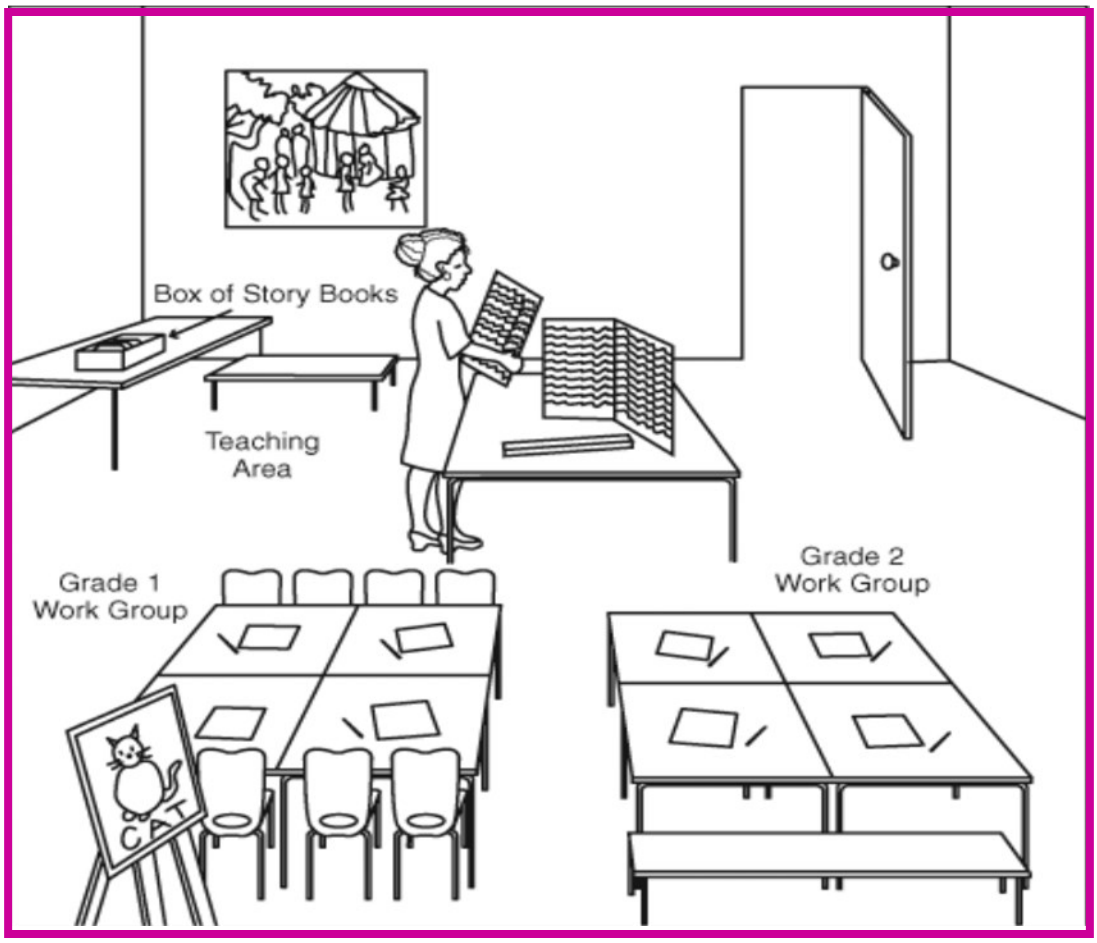
Having students productively engaged for the entire teaching and learning period requires detailed preparation and planning. Planning should take into account the following arrangements:

- Whole-class activities
- Grade group activities
- Interest group activities
- Independent/single-student activities
- Seatwork and resource centre activities
- Students working in pairs

The multigrade classroom arrangement should be flexible. The arrangement should be based on the focus of the lesson and should accommodate students' needs. Organise in a way that facilitates student-centred learning, and effective utilization of classroom resources. In practical terms, this means the teacher cedes some of his/her power of controlling activities, in preference to the student getting more of the opportunity to explore, manage or behave in ways the student finds conducive to self- expression.

The teacher, acting as facilitator, will observe how students make choices and social statements and also how they wish to spend time, effort and personal creativity. He/she will then help the students convert half–baked ideas, or "out of the box" projects, into meaningful development, growth and achievement. This includes the subtle, and not-so-subtle ways in which the teacher insists that individual students becomes self-disciplined and learns respect for others and their space.

Figure 2. Example of Possible Multigrade Classroom Arrangement



Source: Adapted from The Common Wealth of Learning (2000) *Multigrade Teaching Classroom Organisation and Management, Module 2.*

Photographs of Multigrade Classrooms in Jamaica

In this picture, students are seated in grade groups. The configuration of the classroom furniture makes it easy to create distance and separateness in an average size classroom.

Grade Group Activities (Grade 6)

Children can get used to the idea of being set an activity to work on their own, until they ask for help or some explanation.

Children can get used to the idea of being set an activity to work on their own, until they ask for help or some explanation. These students are working in a small group setting independent of the teacher, seeking assistance from the teacher only when a problem arises.

Grade Group Activity

Students work collaboratively.

Whole Class Activity

Pair work.

Interest Group Activity

Interest Group Activity

ADAPTING THE CURRICULUM AND THE LEARNING ENVIRONMENT FOR MULTIGRADE TEACHING

ADAPTING THE CURRICULUM AND THE LEARNING ENVIRONMENT FOR MULTIGRADE TEACHING

The teacher of the multigrade class uses the same curriculum as the teacher of the single-grade class. In most instances, the curriculum is produced in separate books, one for each grade level. Sometimes, however, one book might contain material for more than one grade level, with the content for each grade level in its own section. As the teacher of the multigrade class, you will be required to combine the content and skills in the two or three guides (or sections of guides) which span the grades in the class, in order to plan lessons. The exercise can be made more efficient in terms of the use of time and the output of the planning, if certain procedures aimed at bringing the various grade level components together, are utilised.

Steps to be Taken when Adapting the Curriculum

The following **steps** are recommended when adapting the Grades 1-3 and 4-6 programmes in the NSC for multigrade teaching:

- Review Themes/Topics for Connections
- Select related topics
- Examine the Focus Questions
- Examine Attainment Targets and Objectives
- Adapt/Develop Learning Activities
- Unify Elements of the Curriculum
- Develop Lesson Plans from the Unified Elements
- Organise the Learning Environment
- Execute the Lesson Plans
- Assess each Lesson Plan

STEP 1 : REVIEW THEMES/TOPICS FOR CONNECTIONS

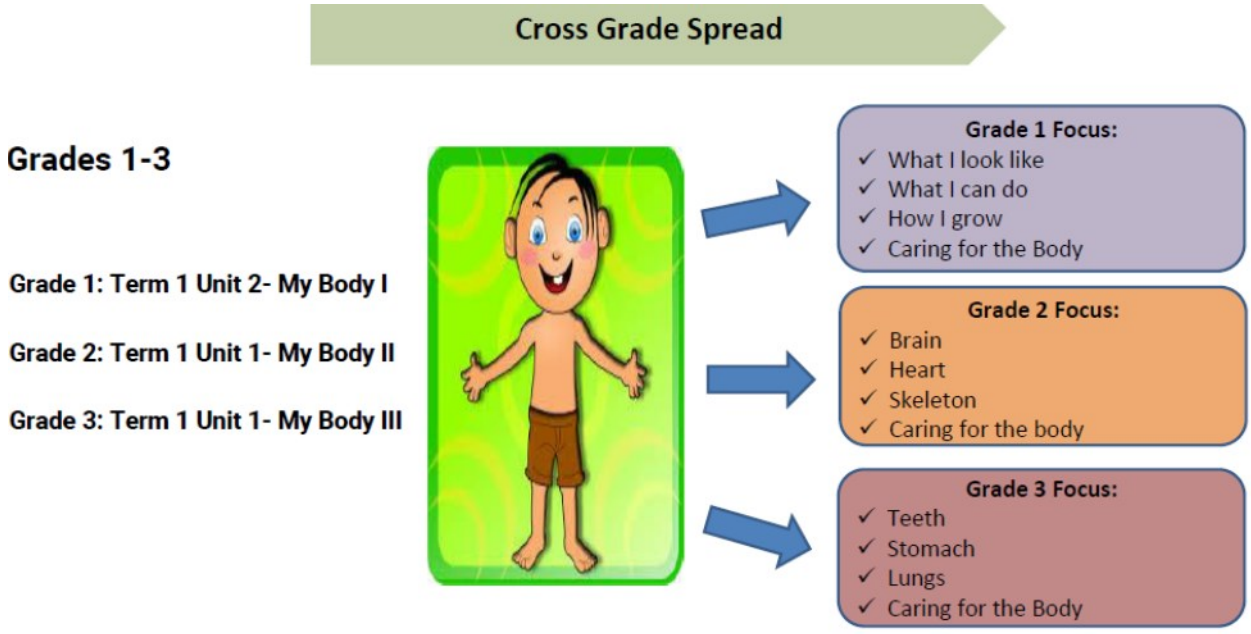
Kinds of Connections Possible:

Cross grade spread—same theme/topic spanning different grade levels

Spiralling—theme/topics in complexity/depth across grade levels

Expanding horizons—theme expands in terms of breadth

Cross subject links—similar themes spanning different disciplines



SPIRALLING—THEME GROWS IN COMPLEXITY/DEPTH

Grade 4

Plants and Animals

- Identifying and naming common plants
- Drawing main parts of the plant
- Functions of main parts of the plants

Grade 5

Nutrition

- Importance of plants in food chains
- Importance of light energy (sun) to plants

EXPANDING HORIZONS—THEME EXPANDS IN TERMS OF BREADTH

Grade 1
My Home

Grade 2
My Family

Grade 3
My Community

CROSS SUBJECT LINKS—THEME/TOPICS SPANNING DIFFERENT DISCIPLINES

Grade 4 Drama

Term 2

How do I use movement to tell a story?

Objective: Tell a story using mimed movements

Grade 5 Language

Term 2

Strand: Writing
Topic: Story Writing—Story Elements
Objective: Compose narratives which include the basic story elements

POINT TO NOTE: Those areas for which no connections can be made must be noted and taught separately to the respective grade levels.

STEP 2: SELECT RELATED UNIT TOPICS

Organize the themes that are connected and can be taught simultaneously across the two grade levels

DO NOT force the connection; all connections made should be natural and plausible

STEP 3: EXAMINE THE FOCUS QUESTIONS

The focus questions help to clarify the scope and slant of the content.

- See Appendix I for an Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum
- See Appendix II for an Overview of Themes, Units and Focus Questions in the Grades 4-6 Science Curriculum

STEP 4: EXAMINE ATTAINMENT TARGETS AND OBJECTIVES

- Cluster objectives with commonalities—content, skill
- Separate those objectives which have to be treated on their own

STEP 5: ADAPT/DEVELOP LEARNING ACTIVITIES

- Be guided by the curriculum activities
- Adjust/Develop new activities, as necessary
- Differentiate in order to cater to students' diverse needs
- Ensure alignment with objectives
- Seek opportunities for formative assessment

POINT TO NOTE

The main requirement in the adjustment or creation of learning activities is that they satisfy the related objectives at each grade level and they reflect the philosophy of the NSC.

Table 3: Illustration of Step 5 (Adapt/Develop Learning Activities

Illustration from Grade 1-3 Integrated Studies	Demonstration from Grades 4-6 Science
See for example the activities outlined in Grade 2 Term 1 Unit 1, and Grade 3 Term 1 Unit 1 in the NSC. Two activities are shown below as examples	The activities selected for Grades 4 and 5 Science are under the topics Plants and Animals (Grade 4, Term 1 Unit 3, and Nutrition, Grade 5 Term 2 Unit 1)

Objective	Activity
Grade 2 Use drama modes to highlight the role of the heart, brain and skeleton	**Students will** examine charts/pictures/models/specimens of the heart, brain and skeleton and talk freely about their location and appearance, using the speak-easy mode.
Grade 3 Use drama modes to portray the story of Jonah inside the stomach of the fish	**Students will** read the story of Jonah and the fish. They will in groups discuss how Jonah was able to fit in the fish's stomach and create a dramatic piece to present the information.
Grade 4 Identify and name a variety of common plants and animals including wild and cultivated/ domesticated types	**Students will** in groups, observe and record the different types of plants and animals in their community. Collect samples/take pictures/make video recordings of the organisms. With the aid of the teacher or using appropriate resource materials (online/offline), find out the names of the plants and animals they observed. Prepare a presentation (digital/non-digital) on the organisms in their community and share with the class.
Grade 5 Explain how plants and animals are interdependent in relation to the food chain	**Students will** investigate habitats in their community and record the plants and animals found there. Answer questions on what each animal eats. Analyse information to discover that the food sources can be traced back to the plant.

STEP 6: UNIFYING ELEMENTS OF THE CURRICULUM

What does it mean to unify curriculum elements?

1) Merge elements with similar components
2) Link areas of commonalities
3) Bring together related elements
4) Make connections
5) Adapt the curriculum

POINT TO NOTE

Rationale for Unifying

Because of:

- Need to manipulate two or more curricula for effective planning and lesson delivery
- Need to use time effectively
- Need to efficiently manage classroom assessment and learning outcomes

The unification of some elements of the curriculum can be achieved by arranging the identified components (themes, unit topics, focus questions, attainment targets, objectives, activities) in a manner that facilitates their selection for easy and appropriate delivery of the lessons within the multigrade context. An example of the formulation of unified elements follows: (The original unit title "My Body" appears in Grades 1, 2, and 3 (Grade 1, Term 1, Unit 2; Grade 2, Term 1, Unit 1, and Grade 3, Term 1, Unit 1). **This presents a good opportunity to merge these units and deliver them as "My Body Parts 1, 2 and 3".**

UNIFYING ELEMENTS OF THE CURRICULUM

POINT TO NOTE

For a summary of the rationale and approach of integration used at the grade 1-3 levels please see appendix

INTEGRATED STUDIES: GRADES 2 & 3

Theme: My Body Parts 2 and 3
Grade 2 Term 1 Unit1 Focus Question 1
Grade 3 Term 1 Unit 1 Focus Question 1

The following abbreviations will be useful as you interact with the table that follows:

WC **Whole Class** – The entire class, incorporating all the grade levels, is engaged in the activity.

SA **Separate for Activities** – The grade levels are separated for the activity. The separation usually follows an introductory whole class engagement, in which a common topic is introduced, followed by separation into group activities appropriate for students of the different grade or ability levels.

IA **Independent (grade level) Activity** – The topic or concept appears only at the particular grade level. The students are engaged independently of the other grade groups in the class.

Table 4. Objectives & Activities across Grades

Objectives & Activities		Method of Delivery/ Treatment
Grade 2	Grade 3	
Identify the position of the heart, brain and skeleton in the human body	Locate the stomach and lungs in the human body	WC, SA
Describe the appearance of the heart, brain and skeleton using familiar terms	Describe the appearance/ structure of the stomach and lungs – size, shape and colour	WC, SA
	• Identify the different types of teeth • Identify the parts of a tooth	IA
	Distinguish between temporary and permanent teeth	IA
Describe the role of the heart, brain and skeleton	Relate the appearance of the lungs to their functions	WC, SA
	Distinguish between inhaled and exhaled air	IA
Write simple sentences about the heart, brain and skeleton	Relate information about the teeth, stomach and lungs using well-constructed paragraphs	WC, SA
Compose lyrics about the functions of the heart, brain and skeleton	Create jingle about Jonah inside the stomach of the whale and use body percussion and instruments to apply the correct rhythm/ beat/ tempo / timing etc.	WC, SA
Show appreciation to the Creator through various means for the parts of the body	Relate the religious story of Jonah to the functions of the stomach	WC, SA
Compare the pulse of the heart with beat in music	Use appropriate breathing to allow the voice to produce a variety of long and short sounds	WC, SA
Respond to songs that have a slow/fast tempo		IA

Table 4. Objectives & Activities across Grades...continued

Objectives & Activities		Method of Delivery/ Treatment
Grade 2	Grade 3	
Use different rhythms to create short dances and movement sequences/body patterns		IA
Investigate the effects of types of movement on the pulse of the heart	Investigate the functions of the teeth, stomach and lungs	WC, SA
Use drama modes to highlight the role of the heart, brain and skeleton	Use drama modes to portray the story of Jonah inside the stomach of the whale	WC, SA
Plan, design and create 2D pictures and 3D models of the brain, heart and skeleton	• Create models of the lungs, stomach and a tooth using a variety of materials • Modify model of a tooth to portray decay/cavity	WC, SA
	Investigate differences between the volumes of inhaled or exhaled air at rest and after exercise	IA
	Demonstrate, using simple apparatus, how the lungs work	IA
	Investigate the elastic nature of the stomach	IA
Use the symbols for "greater than" and "less than" to compare frequency of heart beats		IA
Solve problems relating to parts of the body which involve addition and subtraction	Present information in a simple table or graph/create simple tables or graphs	WC, SA

Table 4. Objectives & Activities across Grades...continued

Objectives & Activities		Method of Delivery/ Treatment
Grade 2	Grade 3	
Use ICT tools to identify the heart, brain and parts of the skeleton	Manipulate and use a variety of ICT tools to complete assigned tasks on teeth, stomach and lungs to share with class.	WC, SA
Use ICT tools to create various multimedia presentations relating to the brain	Design an advertisement promoting non-smoking habits using either a processing soft-ware or presentation software.	WC, SA
Use selected ICT tools to explore basic information of-fline/online relating to the brain, heart and skeleton	Collect information about the teeth, stomach and lungs from online and offline sources	WC, SA

The unification of the curriculum elements (Grades 2-3 used here as an example) has the following features as distinct from the single-grade unit:

Table 5: Unification of Curriculum Elements

Unification of Curriculum Elements	Single-grade Unit
It is based on cross-grade themes identified from the overview of the curriculum or programme which outlines the themes, subthemes and unit topics.	The delivery of the unit is done independent of whether cross-grade themes occur or not.
The components of the original units often have to be reorganized or reordered for ease of simultaneous teaching of a topic to the grade levels present in the class	Any reorganisation or reordering of the components of the unit is based on expediting delivery to the single grade
Units which do not fit under a theme which spreads across the grade levels are given "stand-alone" treatment at the grade level	All delivery is "stand-alone" except where differentiated instruction is practised, in which case a single topic is broken down for delivery to different groups of a single grade level and not related topics from several grade levels.
The teacher has to keep a strict and close tally of curriculum objectives as they are addressed. (One way to do this is to place a tick beside the objective written at the beginning of the multigrade unit).	It is easier to track the coverage of objectives since only one unit at a time is being addressed.
Some focus questions may have to be reworded, repeated or replaced, to fit the reformulated units.	The focus questions do not necessarily have to be adjusted because the units are basically taught the way they are presented in the curriculum document.
The formulation of multigrade units might necessitate particular objectives being addressed more often than in the original units.	The repeated teaching of objectives beyond what is required in the normal execution of the unit does not normally occur.

Development of Unified Curriculum Elements Grades 4 and 5

When presented with the need for multigrade combinations in upper primary, the sample below gives an idea of how the teacher can organize lessons.

- Grade 4 Term 1 Focus Question 1 – Introduction to Science

Grade 5 Term 1 Focus Question 1 – Forces and Work

Objectives		Treatment
Grade 4	Grade 5	
State what is science and who are scientists.		IA
Identify some skills and attitudes of scientists.	Classify the forces as push, pull or turn	WC, SA
Explore the methods used to gain scientific knowledge.	Investigate the effects of forces (pushes/pulls/turns)	WC, SA
Plan simple scientific investigations to answer questions and solve problems.	• Make and repeat measurements to ensure accuracy of results • Consider patterns in results in order to draw conclusions	WC, SA
Carry out a fair test.	Investigate the relationship between the mass of an object and the force needed to move it.	WC, SA
	Infer that work is done when a force causes movement	IA
	Deduce when work/no work is done, even with forces acting.	IA
	Show objectivity by using data and information to validate observations and explanations about forces.	IA
Key: WC – whole class, SA – separate for activities, IA – independent grade activity		

STEP 7: DEVELOP LESSON PLANS FROM THE UNIFIED ELEMENTS

Table 6: Tips for Writing the Multigrade Lesson Plan

Tips	How Executed in the Sample Shown	Rationale
Identify the objectives for each grade level that should be treated in the lesson	Objectives relevant to the lesson topic were selected from the curriculum.	The objectives determine the direction of the lesson.
Group objectives that deal with similar skills/ concepts together	Objectives that deal with the identification and description of parts of the body are grouped together. Those that deal with presenting information in written or graphic form are also placed together, and stand-alone objectives for Grade 4 are placed at the end of the list of objectives.	The arrangement of the objectives in the order in which it will be taught makes the ordering of the execution of the lesson easier for the teacher
Formulate a composite topic for the multigrade lesson (This is optional)	The composite topic is: Looking at My Body and Some of its Parts	All the grade levels are examining different parts of the body. The activity at the ENGAGE stage will have all students looking at the body in its totality.
Outline some key concepts for easy reference.	Key concepts are outlined.	The provision of the key concepts will ensure that accurate information is conveyed to the students. The key concepts will also set the scope and depth of the content.

Table 6: Tips for Writing the Multigrade Lesson Plan...continued

Tips	How Executed in the Sample Shown	Rationale
Select/customise/ develop activities to match objectives previously identified.	The activities selected are aligned to the objectives.	Activities must be aligned to the objectives.
Utilize multiple methods/ strategies for the execution of the lesson – including field trips, resource persons, presentations (of project work, etc.)	The curriculum drivers (ICT, music, drama & visual arts) were integrated. Research (investigation)	Using multiple methods/ strategies cater to multiple intelligences and learning styles
Use the 5E model for the writing and execution of the lesson. The following elements constitute the 5 Es: engage, explore, explain, elaborate and evaluate.	The 5E model is used.	The 5E model is compatible with the constructivist philosophy which underpins how teaching is executed to enable students to construct their own understanding of phenomena.
As much as possible, make the **Engage** part of the lesson- execution, a whole-class activity.	The **Engage** section of the lesson involves singing, sharing ideas about the body in a whole class session. The attention of the students is captured and they are made ready to start learning the concepts to be introduced.	Beginning with a whole-class session will allow students to appreciate that they are all engaging in similar learning experiences, whatever the grade combination of the class – Grades 1-3, 1& 3, or 2&3. This will bring them together and give them a sense of harmony as a class.
It is important to note that units which do not fit under cross- grade themes are to be taught separately at the respective grade level. See stand-alone lesson plans in the NSC guides.		

Differentiation is key to ensuring that all the above is done. The teacher must use a multiplicity of resources for student engagement - books, flash cards, worksheets, quizzes, play materials, specific subject kits, charts, cellular telephones, computers of various types (laptops, desktops, tablets), catering to all the age and ability levels in the class.

POINT TO NOTE: The 5E Instructional Model

Read about the 5E Instructional Model in the Appendix of the NSC curriculum guides. The lesson plans will be based on this model. The 5Es represent steps in the process of curriculum delivery, namely: engagement, exploration, explanation, elaboration and evaluation. An example follows:

THE 5E LESSON PLAN

Grades: 2&3
Sub-theme: Myself
Topic for the Unified Elements: My Body (Parts II, & III)
Composite Lesson Topic: Looking at Some Parts of My Body
Duration: 3 Hours

Key Concepts	
Grade 2	Grade 3
• The heart is a very important part of the body. • It is made of muscles and it pumps blood all over the body • The heart then sends the blood all over the body to give all parts of the body food and oxygen to keep us alive • From the pumping action of the heart or the heartbeat, we can measure our pulse rate	• Teeth help us to speak clearly • Our teeth are not all alike. They have different shapes and sizes. • We have front teeth (incisors), jaw teeth (molars), and eye teeth (canines). • Incisors cut and bite food, canines cut and tear food and molars crush and chew food • Each tooth has a crown and a root. • Teeth are covered with enamel, the hardest material in our bodies • Temporary teeth which are also called milk teeth and baby teeth are replaced by permanent teeth when we are about twelve years old.

THE 5E LESSON PLAN...CONTINUED

Grades: 2&3
Sub-theme: Myself
Topic for the Unified Elements: My Body (Parts II, & III)
Composite Lesson Topic: Looking at Some Parts of My Body
Duration: 3 Hours

Key Concepts	
Grade 2	Grade 3
Focus Question What do I need to know about my brain, heart and skeleton? (The heart will be featured in this lesson)	**Focus Question** Why are teeth, stomach and lungs important parts of my body? (The teeth will be featured in this lesson)
Objectives	**Objectives**
• Identify the position of the heart in the human body • Describe the appearance of the heart, • Describe the role of the heart	• Identify the different types of teeth • Identify the parts of a tooth • Distinguish between temporary and permanent teeth • Investigate the functions of the teeth
• Write simple sentences about the heart	• Relate information about the teeth, using well-constructed paragraphs • Collect information about the teeth, from online and offline sources
• Use various means to show appreciation to the Creator for the parts of the body.	• Use various means to show appreciation to the Creator for the parts of the body.
Compare the pulse of the heart with beat in music • Respond to songs that have a slow/fast tempo • Compose lyrics about the functions of the heart	
Key Vocabulary	**Key Vocabulary**
Heart , pulse, heartbeat, blood	Temporary teeth, permanent teeth, crown, root, incisor, canine, molar

THE 5E LESSON PLAN...continued

Grades: 2&3
Sub-theme: Myself
Topic for the Unified Elements: My Body (Parts II, & III)
Composite Lesson Topic: Looking at Some Parts of My Body
Duration: 3 Hours

Skills	
Locate internal parts of the body, measure pulse rate, make description of heart	Observe teeth, investigate teeth (shape, number, functions, etc.) complete graph
Materials	**Materials**
Digital watch or stop clock Flash cards Chart or model of the human body (internal parts)	Flash cards Mirror Chart with blank table or graph outline
Activities	**Activities**
Engage (20 minutes – whole class activity) In a whole-class session, students will all sing along while a lively (easy-to-learn) jingle about the body and its parts is played. The song played will be taken from the following link: https://video.search.yahoo.com/search/video?fr=tightropetb&p=songs+about+my+body+for+kids#id=1&vid=7faaf349a0f8012794f77930c9c5a358&action=click The teacher will explain to the students that they all will be learning about the body and its parts; that Grade 2 will look closely at the heart, and Grade 3 will look closely at the teeth. Students will be taken through an exercise which targets students of specific grade levels; they will identify aloud, words on flash cards to establish previous knowledge: Grades 2-3: heart, heartbeat, blood, pulse Grade 3: incisor, molar, crown, root	

THE 5E LESSON PLAN...continued

Explore and Explain	
Students will be given pictures/ outlines of the human body and asked to locate the position of the heart (Grade 2) and the position of the teeth (Grade 3). Using models/ pictures of the heart and teeth, students will make observations and describe special features of these parts of the body. Students will also discuss the functions carried out by the heart and teeth.	
Students will use speak-easy mode to talk freely of the location, appearance and function of the heart and place an outline of the heart in a drawing of the body.	Students will present their observations in a blank table or graph, noting the number of teeth found (including the number of milk/ baby teeth) when their classmates were surveyed.
Elaborate and Explain	
Students will be introduced to the stethoscope and asked to suggest what it is used for. They will then use the stethoscope to listen to each other's heartbeat. Students will discuss what they notice about the heartbeats/ pulse taken. *Teacher will lead students to note the regular pattern in pulse/ heartbeats.* Students will conduct investigations to determine the number of heartbeats in a minute using two fingers placed just below the ear or inside the wrist. As a class, the differences in the heart beats per minute will be discussed and symbols for 'greater than' and 'less than' used to compare frequency of heartbeats within the class.	In groups, students will examine models/ specimens or videos showing intact teeth in a jaw. Observations about the shape, texture, size, number and position of the types of teeth seen will be recorded. Students will be given different scenarios (such as eating sugar cane, chewing food and biting a fruit) and asked to suggest which of the teeth identified would be used. Findings will be shared and noted in their textbooks. *The terms incisors, canine, molar and premolars will be introduced by the teacher.* Students will use interactive worksheets online or offline to reinforce the use of words with the "th" sound,(e.g. teeth)
Students will discuss what special care should be taken of the heart/ teeth.	

THE 5E LESSON PLAN...continued

Evaluate
Students will use play-dough to create a model of the heart and teeth. Using a teacher-prepared rubric, students will present their models indicating its location, appearance and function. Students will also create poem/ song/ jingle about the location and appearance of the heart and teeth and share their compositions with the rest of the class. Students will make non-electronic or electronic journal entries about their feelings during the activity.

THE 5E LESSON PLAN

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Content Outline	
Grade 4	Grade 5
• Science is a way of finding about our world. • A scientist is a person who carries out scientific investigations. • Scientists use the skills of observing, measuring, classifying, drawing conclusions, and communicating • Scientists carry out investigations to gain knowledge and find solutions to problems using the scientific method • Scientists display attitudes such as curiosity, honesty, and persistence. • A fair test is an investigation carried out under the same conditions	• A force can be classified as a push, pull or turn. • Forces can affect the size, shape, or motion of an object • When a force causes motion, work is done
Focus Question How do we find out about our world?	**Focus Question** How can I change the motion of an object?
Attainment Target: Gain an understanding and apply aspects of the scientific method	**Attainment Targets:** • Recognise the importance of energy to life processes, everyday life and the relationship between energy and matter • Gain an understanding and apply aspects of the scientific method

THE 5E LESSON PLAN...continued

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Content Outline	
Objectives:	**Objectives:**
Day 1 • State what is science and who are scientists • Identify some skills and attitudes of scientists • Show respect for the ideas of others • Explore the methods used to gain scientific knowledge • Work co-operatively in groups	Day 1 • Investigate the effects of forces • Classify a force as a push or a pull or a turn • Work cooperatively together in groups • Investigate the relationship between the mass of an object and the force needed to move it. • Value individual effort and teamwork through investigations
Day 2 • Plan simple scientific investigations to answer questions and solve problems • Carry out a fair test	Day 2 • Infer that work is done when a force causes movement • Deduce when work/no work is done, even with forces acting • Make and repeat measurements to ensure accuracy of results
Key Vocabulary	**Key Vocabulary**
Science, scientist, observe, measure, conclusion, fair test, scientific method	Mass, movement, force, push, pull, turn, fair test, scientific method, work
Skills	**Skills**
Investigate, observe, record, measure, carry out fair tests, analyse, draw conclusions	Investigate, observe, measure, carry out fair tests, analyse, infer, draw conclusions

THE 5E LESSON PLAN...continued

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Content Outline	
Materials	**Materials**
Ball, toy car, brick - any suitable objects that can be moved along a surface, timer or stop clock	Ball, toy car, brick - any suitable objects that can be moved along a surface, timer or stop clock
Prior Learning: Check that students can:	**Prior Learning:** Check that students can:
Communicate ideas	Identify everyday situations when force is used
Learning Outcome	**Learning Outcome**
Students who demonstrate understanding can: • Use basic scientific skills in carrying out an investigation • Determine if an investigation is a fair test	Students who demonstrate understanding can: • Show that forces affect shape, size, speed and direction • Show that greater force is needed for heavier objects • Determine when work is done in a given situation
Assessment Criteria	Assessment Criteria
• Accurate observations given • Science skills and attitudes accurately noted from investigations done • Accurate identification of the actions needed to make the tests fair	• Correct inferences about the effects and types of forces from observations • Relationship between the mass of an object and the amount of force needed identified • Correct determinations of work/ no work being done

THE 5E LESSON PLAN...continued

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Activities	
Engage (5 minutes)	**Engage (5 minutes)**
Students will watch a short video on How a scientist works.	Students will watch a short video on How a scientist works.
Explore	
Students will discuss in their groups the answer to the following questions: • Who is a scientist? • What does a scientist do? • Can I be a scientist? Students will present their answers to the class which will be assessed by classmates and the teacher. *Teacher will highlight the skills used by scientists from the video shown.*	
Students will use an observation sheet to observe Grade 5 students as they work like scientists, investigating the movement of selected objects. Students will record their observations of the investigations. Students will then carry out investigations with similar objects while Grade 5 students observe and record the procedures followed.	Students will push (with the same intensity) the selected items along the ground. Using a timing device, they will note the time taken by each object to cover the given distance. They will also note the pattern of movement Students will then make observations of Grade 4 students as they carry out the same exercise with similar objects.

THE 5E LESSON PLAN...continued

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Activities	
Explain	**Explain**
Students will give their explanations as to what happened to produce the resulting movements of the ball, car, brick and other items. They will include in their explanations: • **The time each object took to move over the given distance** • **Whether the item sped up or slowed down** • **A comparison of the time taken by the different objects to move over the given distance-Possible causes of the differences in the results (mass of the object, shape of the object, amount of force used etc.)** *The steps taken during the investigations will be noted and linked to the use of the scientific method.* Students will discuss what steps they took to ensure that the results were accurate and fair. *The use of repeated measurements and the requirements for a fair test will be noted by the teacher.*	Students will give their explanations as to what happened to produce the resulting movements of the ball, car, brick and other items. They will include in their explanations: • **The time each object took to move over the given distance** • **Whether the item sped up or slowed down** • **A comparison of the time taken by the different objects to move over the given distance-Possible causes of the differences in the results (mass of the object, shape of the object, amount of force used etc.)** *The steps taken during the investigations will be noted and linked to the use of the scientific method.* Students will discuss what steps they took to ensure that the results were accurate and fair. *The use of repeated measurements and the requirements for a fair test will be noted by the teacher.*

THE 5E LESSON PLAN...continued

Grades 4 & 5
Theme: Exploring Science. Forces and Matter
Composite Lesson Topic: Things that Scientists Do
Duration: 3 Hours

Elaborate	
• Students will record the ways in which they acted as scientists in carrying out the activities, noting the skills and attitudes observed. • Students will suggest what they could do differently to ensure a fair test.	• Students will adjust the activity to investigate the distance moved by selected objects in a given time. (Instead of the time taken to move over a given distance). They will record their results. • Students will discuss instances when there was no movement (no change in distance) and determine whether any work was done.
Evaluate	**Evaluate**
Students will submit the completed observation schedules and notes for assessment by the teacher.	Students will submit the completed observation schedules and notes for assessment by the teacher.
Extended Learning	**Extended Learning**
Research the international scientist Isaac Newton and his work on the force of gravity. • Grade 4: Suggest some steps and skills used by Isaac Newton in his discovery. • Grade 5: Suggest the importance of the force of gravity and what would happen without it.	Research the international scientist Isaac Newton and his work on the force of gravity. • Grade 4: Suggest some steps and skills used by Isaac Newton in his discovery. • Grade 5: Suggest the importance of the force of gravity and what would happen without it.
Links to other Subjects: Mathematics	**Links to other Subjects:** Mathematics
Post-Lesson Reflection:	**Post-Lesson Reflection:**

Table 9.1: Recording Observations (Fixed distance) in applying Scientific Methods

Item	What did I do?	Did the item slow down, speed up? (Observation)	How long did it take to move over the given distance? (Measurement)	What have I learnt? (Evaluation)
Ball				
Car				
Brick				

Table 9.1: Recording Observations (Fixed distance) in applying Scientific Methods

Item	What did I do?	Did the item slow down, speed up? (Observation)	How far did it move in the given time? (Measurement)	What have I learnt? (Evaluation)
Ball				
Car				
Brick				

STEP 8: ORGANISE THE LEARNING ENVIRONMENT FOR THE EFFECTIVE EXECUTION OF THE LESSON PLANNED

Psychosocial Environment

Maintain a classroom climate or tone that is conducive to student success. Take into account and address students' learning needs as much as possible. Tomlinson and Moon, (2013) suggest the following for creating a classroom environment that is conducive for learning:

Believe in your students' capacity to succeed through hard work.

- Respect your students and endeavour to know them well. Let them feel that they play important roles in the class.
- Work to make the classroom a place to showcase the success of the students
- Keep students challenged. Give them a sense of new possibilities.
- Help students to be persistent in their learning, and to find new ways of arriving at solutions.
- Observe and listen to the students at the different grade levels in the class in order to gather information that will help in creating opportunities for them to consistently learn and succeed
- Flexibility is key for multigrade classroom organisation and the choice of a design should be governed by the specific teaching and learning needs, the available resources and the types of learners being catered for.

Physical Environment

See page 40 Classroom Organisation and Management Tips for recommended physical arrangements of the Multi-grade classroom.

STEP 9: EXECUTE THE SERIES OF MULTIGRADE AND STAND-ALONE LESSONS

Here are a few tips for executing the lessons in a multigrade class:

- Use the whole-class setting to engage students in experiences which will provide core, basic or common information on a theme or topic.
- Monitor students to ensure that all are fully engaged, whether they are working individually, in pairs, or in groups.
- Engage in continuous assessment to identify students' strengths and challenges so that learning experiences can be tailored to meet the varied needs of students of the same and different grade levels.
- Execute activities in a manner which requires varying levels of teacher supervision/intervention.

- Use students' every-day experience to teach/explain concepts
- Encourage students to explore ideas and experiences, ask questions, to be willing to learn something new, to learn by doing and through play while learning at their own pace.
- Use a variety of strategies to differentiate lesson delivery (see page XX Differentiation Strategy) :
    - **Provide opportunities for students to engage in collaborative work. .**
    - **Promote problem solving.**
    - **Present students with choices to satisfy their interests.**

STEP 10: ASSESS EACH MULTIGRADE AND STAND-ALONE LESSON AND THE UNIT AS A WHOLE

Here are some tips to bear in mind as you assess the lessons and units:

- Conduct diagnostic assessments to ascertain how to proceed in enabling each grade level or group to build new knowledge.
- Use a variety of authentic assessment methods/ tools (observation schedules and checklists, portfolio entries, peer and self-assessments etc.), to make decisions about the students' performance.
- Assess not only cognitive/academic skills, but also psychomotor and affective domains (attitudes values and behaviours) to promote cognitive, social, emotional, physical, psychological, and aesthetic development of the students.
- Reflect on the impact of your own teaching skills, strategies, and methods in the execution of the lessons.

(Adapted from UNESCO 2015)

APPROACHES TO TEACHING AND THE EVALUA-

APPROACHES TO TEACHING THE MULTIGRADE CLASS

Effective teaching and learning in the multigrade classroom involves the use of a multiplicity of approaches and strategies by which the teacher/facilitator engages the students and also enable them to actively engage in learning. Strategies such as those presented in the following table should be in common use in the multigrade classroom. To facilitate students in effectively and successfully executing the learning activities, the teacher will focus on differentiating the lesson content, the activities, the expected student outcomes and the learning environment, to meet their varied needs.

TEACHING STRATEGY OR APPROACH	DESCRIPTION
Discovery/ Exploratory/	In discovery/exploratory methods of engagement, the class engages in practical and meaningful activities in which students are provided with opportunities to think critically, using process skills such as observation, communication, measurement, making inferences, and predictions and current information, to problem- solve.
Project Based/ Problem Based	• Student-centred approach to instruction which allows for the active exploration and solution of real-world challenges and problems. • Project-based/problem-based learning is further described on page XX.
Participatory	When students are facilitated to freely express their opinions and thoughts through media such as discussions, debates, and presentations of the visual and performing arts, they are engaging in the participatory strategy for teaching and learning.
Evaluative/ Reflective	In the evaluative/reflective strategy, students think critically and make judgements about their work.

APPROACHES TO TEACHING THE MULTIGRADE CLASS

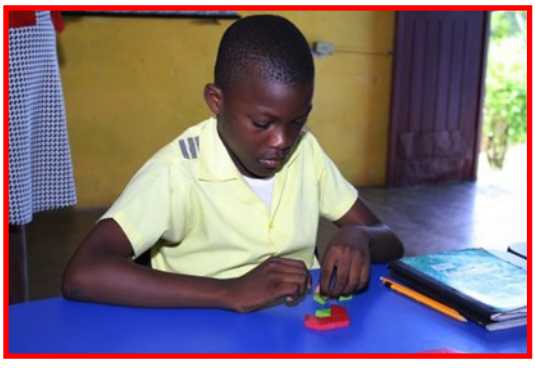
TEACHING STRATEGY OR APPROACH	DESCRIPTION
Tutoring/ Mentoring	A student who has a good grasp of a concept or skill can support another student who has not yet grasped the concept or skill, or gained the required level of competence. At the end of the period it will be expected that the student being tutored will acquire the required competences. In some cases in the multigrade classroom the teacher assigns a resource person to coach a group of students in a particular activity for a given period of time. The resource person is considered a mentor and can be from the school community.

Organizing Students for Learning	
The grouping of students in various ways is an inescapable part of the efficient conduct of learning and teaching in the multigrade classroom. Ways of grouping or arranging students to learn collaboratively or individually in the multigrade setting are outlined below.	
Grouping Arrangement	**Description**
Whole-Class **Whole class Activity**	In whole class teaching, the teacher engages the students of all grade levels present in the class at the same time. • Introduction – to introduce unified elements (topics, etc.) to students. • Developmental – for students to display or report to the other groups what they have learnt and clarify misconceptions • Culmination – To summarize the lesson and plan future learning 
Breakoff/Breakout/ Peel off	In this method, the teacher begins with a whole class activity, introducing a concept or topic at a basic level. One group then separates from the rest of the class to complete an activity. The remaining students stay with the teacher for additional time in which the concept being taught is taken to a more complex level, and a second group then separates to complete an activity. The process continues with the teacher taking the concept to greater complexity until the final group is released to complete their activity.
Rotation	Rotation occurs when the teacher works with one group that needs his/her direct attention, while one or more groups work on their own.

Organizing Students for Learning...continued	
Grouping Arrangement	**Description**
Pair	Students placed together in pairs because of similar interests, or because one student can help the other with solutions to challenges in a particular subject area.
Peer	Students of the same age can be placed together in small groups to assist each other with challenges, to discuss a topic, or carry out various other tasks.
Grade Level	Students at a particular grade level are grouped together when they are pursuing an activity which is a stand-alone activity for that grade group.
Ability	Students are placed in groups according to their ability in the particular subject being taught. Students of similar ability are placed in the same group and interface with material at their cognitive ability.
Interest	Students with the same interests (same hobbies, favourite food, favourite game, etc.) are placed together in activities which require them to collaborate on their areas of interest.
Independent work	Sometimes particular students have to work independently on a task that is not being done at class level. The work may involve the use of worksheets or other instructional material with which the student can be engaged on his or her own.

Students work in pairs

Students work in pairs



Independent/ Single –student activity

Table 7: Teaching Strategies/Approaches associated with group arrangements/ engagement

Teaching Strategies/Approaches	Methods of Arrangement/ Engagement of Students
Discovery/Exploratory/Project-based	Break/Peel Off, Interest ,Pair, Peer, Independent work
Participatory	Break off Rotation Peer Pair Ability/Grade Level/Random/Interest
Evaluative/Reflective	Break off Rotation Peer Pair Ability/Grade Level/Random/Interest
Tutoring	Peer Pair
Mentoring	Pair (student and mentor)

PROJECT-BASED LEARNING

What is Project-based Learning?

Project-based learning involves students working to complete a learning task or to master a concept which often can be most effectively grasped by practical or "hands-on" activities.

In project-based learning:

- Students work on a task or a problem. The teacher is a facilitator rather than a lecturer/director.
- Students use knowledge and principles from several subject areas and gain an understanding of how the individual subjects relate to each other – integration is at work.
- Students discover new information, ideas and strategies as they work on the project tasks.
- Students take ownership of their learning, and employ creative and critical thinking skills to solve problems.
- Students learn to work collaboratively, using available resources (including technology and the natural environment) to provide a solution.

Student performance on the task is assessed by applying an appropriate rubric. The acquisition (or lack of attainment) of the desired skills and competences by the student can be indicated on a checklist.

Project-based learning is an ideal strategy for the multigrade classroom. Apart from the general benefits of student collaboration, integration of subjects and students taking ownership of their learning, this strategy gives the teacher of the multigrade class added advantages such as the following:

- Project tasks can be created to involve students over the span of grade levels in the class.
- The opportunity is presented to simultaneously cover skills and content in the curriculum of each grade level.

- Students involved in project work in the classroom will be intensely engaged, allowing the teacher the opportunity to work with other groups or individuals that might be present in the class.

An Example of a Project-based Activity

Project Based Learning
Subject: Agriculture and the Environment
Grade 4 & 5
Project Title: CREATING AN ORNAMENTAL GARDEN & ESTABLISHING AND MAINTAINING A BASIC CONTAINER GARDEN
Science Theme: Living things, Life Processes and the Environment

Objectives	
Grade 4	**Grade 5**
• Define an ornamental garden • Discuss reasons for creating ornamental garden • Select from a range of possibilities, the most suitable plants for creating an ornamental garden • Predict outcomes of investigations exploring the basic survival needs of plants. • Use data from investigations on the survival needs of plants. • Find the area of various objects and figures • Use a square grid (1 cm^2 squares) to find the area of any shape.	• Create possible designs for a container garden in a real or imagined space of given dimensions • Select from a range of plants, the most appropriate plants for container gardening • Select from a range of growing media, the most appropriate for container gardening • Use terms associated with container gardening e.g. fertilizer, irrigation, containers, growing media. • Make predictions about the growth of plants in organic and non-organic media • Investigate organic and non-organic methods of growing food • Estimate, measure and record distances in centimetres (cm) • Compute the area of a rectangular region using squared centimetre as unit

Objectives

Grade 4 **Grade 5**

Problem Statement: You want to create a garden at your school which is located in the city. However, there is limited space, and unreliable water supply. Additionally, there is an abundance of plastic bottles for which the school has problems disposing.
Project: You are required to utilize a section of your school to create a container/ ornamental garden. The space you have is 2m x 2m This may be vertical or horizontal.
Materials: List the materials and equipment needed to create a vegetable garden based on the problem outlined above. Justify your choice of materials.
Garden Plan: Create a design for the layout of your garden. The design must take into consideration the amount of space needed for various types of plants.
Planting Container Plan: Using plastic bottles, develop an appropriate planting-container design. The design should include an irrigation system as a solution to the water crisis.

Select one or a combination of the following plants listed below to plan a container garden suited for a space measuring 2m x 2m.

Types of Plant	Sowing Depth	Spacing Requirement		Plants Selected	Total Space Needed	Days to Maturity
		Plant	Rows			
Tomato	0.6 cm	61 cm	91 cm			30 - 40
Hot Pepper	0.6 cm	61 cm	91 cm			90 – 120
Lettuce	30.5 cm	30.5 cm	46 cm			30 – 40
Cabbage	1.3 cm	46 cm	76 cm			60
Pak Choy	0.6 cm	25 cm	61 cm			30 – 40

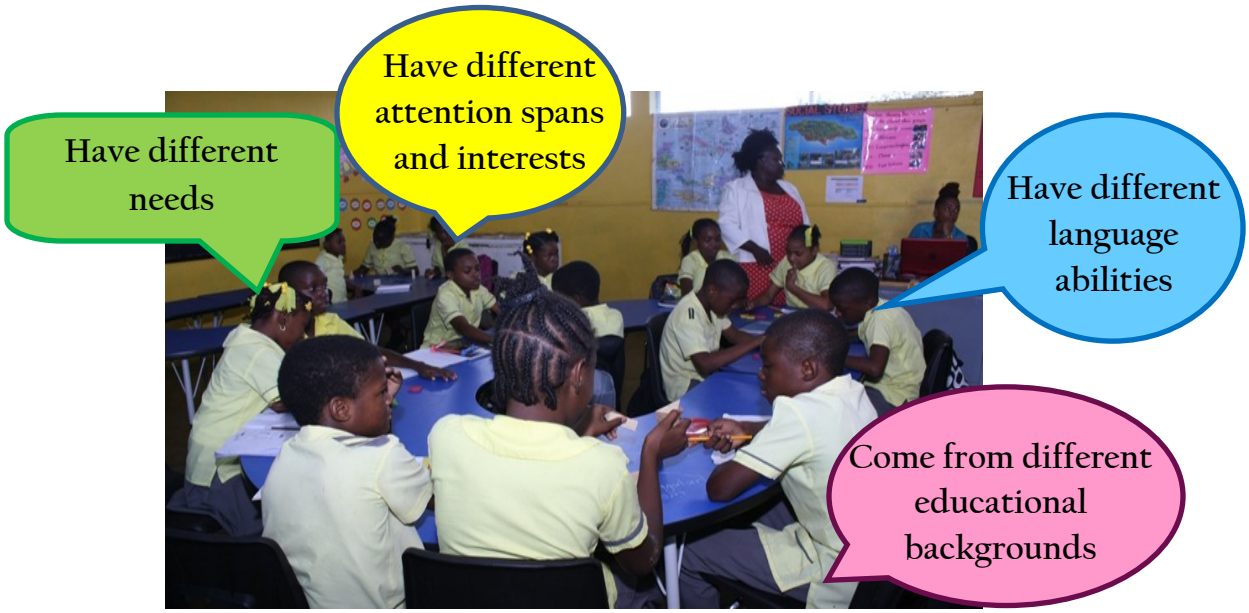
Descriptors	No progress (0)	Introductory (1)	Emergent (2)	Proficient (3)	Mastery (4)
Plan	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student does not understand problem and cannot identify data or create plan	Student understands problem but cannot identify necessary data or create plan to solve problem	Student understands problem but can only identify some necessary data or creates a slightly inaccurate plan to solve problem	Student understands problem, identifies necessary data for solving and creating an accurate plan to solve problem.
Research	Student's work demonstrates no understanding or progress towards the achievement of the outcome.	Student used only the reference provided by teacher.	Student used at least one credible additional source of data collection.	Student used at least two credible additional sources of data collection.	Student used at least three credible additional sources of data collection.
Process	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student's work demonstrates no sequencing to achieve expected outcome.	Student's work demonstrates limited sequencing to achieve expected outcome.	Student's work demonstrates adequate sequencing to achieve expected outcome.	Student's work demonstrates logical sequencing to achieve expected outcome.

Descriptors	No progress (0)	Introductory (1)	Emergent (2)	Proficient (3)	Mastery (4)
Application	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student demonstrates limited mastery of the relevant skills.	Student demonstrates mastery of 50% of the relevant skills.	Student demonstrates mastery of 70% of the relevant skills.	Student demonstrates mastery of all the relevant skills necessary.
Safety	Student work demonstrates no understanding or progress towards achievement of the outcome.	Student does not adhere to appropriate safety guidelines	Student adheres to a few of the appropriate safety guidelines.	Student adheres to most of the appropriate and relevant safety guidelines.	Student adheres to all appropriate and relevant safety guidelines.
Product/ service	Student work demonstrates no understanding or progress towards achievement of the outcome.	Product/ service is complete but cannot satisfy its intended purpose.	Product/ service can satisfy few of its intended purpose.	Product/ service can satisfy most of its intended purpose.	Product/ service can satisfy its intended purpose.

Descriptors	No progress (0)	Introductory (1)	Emergent (2)	Proficient (3)	Mastery (4)
Explanation/ presentation	Student demonstrates no under-standing or progress towards achievement of the out-come.	Student can explain only limited aspects of the work Logically	Student can explain the solution but cannot explain why the methods work.	Student can explain how to solve problem and why the chosen methods work; but did not provide alternate solution.	Student can explain thoroughly how to solve the problem and provided alternate solutions to the chosen methods.
Collabo-ration	Students demonstrate no under-standing or progress towards achievement of the out-come.	Students worked inde-pendently	Students worked together on few occa-sions.	Students worked well together most of the times with most members making valuable contribution.	Students worked well together to achieve objectives with each member making valuable contribution.
	Student work demonstrates no understand-ing or progress towards achievement of the out-come.	Student has made an incomplete attempt to create a design, work-ing-drawing, plan or chart of solution	Student creates design working-drawing, plan or chart that is not logical to the solu-tion	Student creates a reasonable design working-drawing, plan or chart for the solution	Student creates a logical diagram, working-drawing, plan or chart to help solve problem.

DIFFERENTIATION AS A STRATEGY IN THE MULTIGRADE CLASSROOM

Students...



What is Differentiation?

Differentiation, as defined by Tomlinson (2013) is an approach to teaching in which active planning for and attention to student differences in classrooms, takes place in the context of the implementation of a high quality curriculum.

POINT TO NOTE

A differentiated classroom will have a combination of teacher-directed, teacher- selected activities and learner-centred, learner-selected activities; whole class instructions, small group instructions, and individual instructions.

Why is Differentiation Important for the Teacher of the Multigrade Classroom?

Differentiation is an important strategy for the teacher of a multigrade class – a class with students of more widely varying ages, abilities and interests than the monograde class. The teacher therefore has to structure the delivery of the curriculum to meet the varied needs of your class. In catering to the needs of the students in the class, the teacher is helping all the students to learn. The more they learn, the more they will be motivated, and the more they will achieve. When the students achieve, the teacher will feel satisfied and accomplished.

Multigrade teaching and differentiation are inextricably linked. Both are about meeting the needs of students of varying ages, interests, abilities, readiness, and learning profiles. In order for a teacher to plan to meet the needs of the students in the classroom, and more so in the multigrade classroom, there are certain imperatives to be addressed:

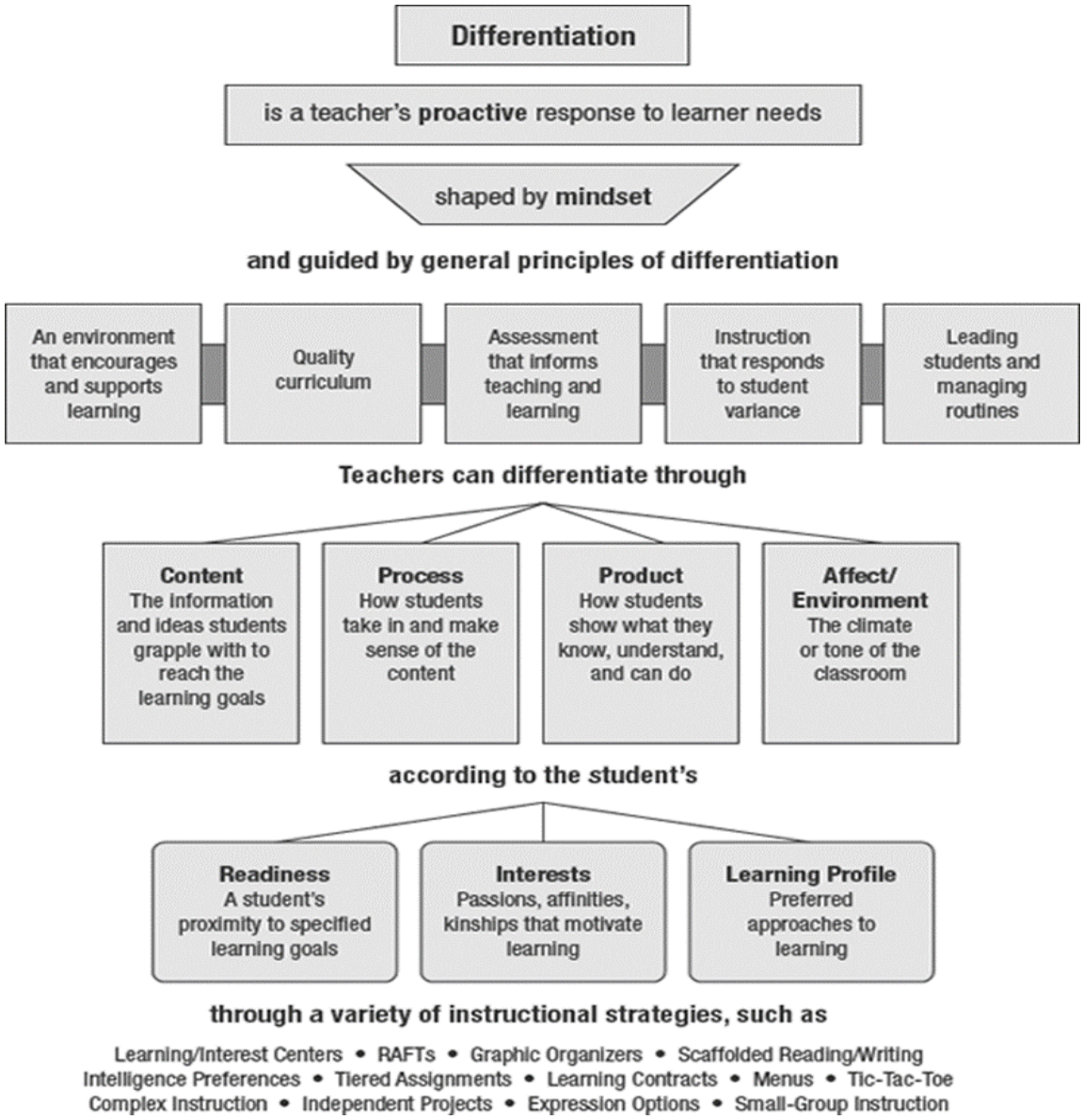
- **Know each learner** and therefore be able to determine his/her needs. The needs of each student are determined in terms of his/her readiness, interests and learning profile. In this regard, tests of student readiness are instrumental in determining fitness for learning at the respective levels. Inventories for interest and learning preference can also be administered.

- **Assess the learner** to gain information that will enable the teacher/facilitator to understand the current learning needs of the students, so that the best plans for addressing those needs can be made in the teaching and learning process. Pull on the information gleaned from any inventory administered.

- **Develop learning profiles:** A learning profile gives a description of the best ways that a student will process the learning experiences in which he or she is engaged. Learning profiles are shaped by gender, culture, learning style and intelligence preference. They are also influenced by environmental, physical, sociological and emotional features. A typical learning profile would outline a student's strengths, challenges and needs, learning preferences, interests, talents and aspirations. The learning profile serves as a reference tool for planning appropriate learning activities, as well as a tracking tool for monitoring the progress of the student. The learning profile must be updated as new information is received and as the student performance and achievement changes.

Figure 4, which follows, gives a description of the nature and process of differentiation, by showing the key elements of effective differentiated instruction. It is also important to note the changing role of the teacher as he or she seeks to be an aide and support to different students. It cannot be over emphasized that in differentiating classroom instruction, the readiness, interest(s) and learning profile of each student must be taken into account.

Figure 4: Key Elements of Effective Differentiated Instruction



Source: Adapted from Tomlinson, C. A. and Moon, T. R., (2013). *Assessment and student success in a differentiated classroom*. Alexandria VA: ASCD.

Tomlinson (2010) used the term "learning profile" to include learning style, intelligence preference, culture-based learning approaches, and gender-based learning approaches.

THE ROLE OF THE TEACHER IN A DIFFERENTIATED CLASSROOM

What is the role of the teacher in a differentiated classroom? According to Tomlinson and McTighe (2006), the teacher in a differentiated classroom:

- Helps students to accept that they are different and that being different has benefits
- Helps students to build on their strengths
- Helps students to acknowledge their areas of weakness
- Facilitates ways for remediating or making adjustments for students' weaknesses
- Guides students to develop a vocabulary related to their learning preferences
- Helps students to exercise those learning preferences that facilitate their growth
- Encourages students to reflect on:
  - ◊ their own growth
  - ◊ the factors that facilitate their growth
  - ◊ the next steps they should take to ensure their continued growth
- Supports students in setting and monitoring personal learning goals
- Facilitates students in talking with their parents and guardians about their growth and their goals.

When the teacher of a differentiated or multigrade classroom makes these steps for his or her students, he/she is putting the students on a path to success.

Differentiation may be implemented in terms of content (what is taught), process (learning strategy), product (how learning is assessed), and the physical and affective components of the environment.

Table 10: Differentiation for Variations in Readiness, Interest and Learning Strategy/ Style

Components of Differentiation	Readiness	Interest	Learning Strategy/ Style
Content/Skill	In a Language class with students of Grades 2 and 3, with the common objective of retelling a story, the teacher organises the Grade 2 students to work in pairs, retelling the story using simple story map (Students demonstrate weakness in sequencing ideas). While the Grade 3 students will create graphic organiser to retell the story.	In the Language class of Grades 2 and 3 with the same objective (retelling a story) students will select story based on their interest (from home, school/class library).	In the same Language class of Grades 2 and 3 students, the teacher organises the Grade 2 students to perform their story (many of them like to be "on stage") and Grade 3 students present their story to the rest of the class with a designated reporter using a chart with the graphic organiser to create a digital story.

Table 10: Differentiation for Variations in Readiness, Interest and Learning Strategy/ Style

Components of Differentiation	Readiness	Interest	Learning Strategy/ Style
Process	In a class with students of Grades 2 and 3, Grade 2 will assemble cut outs of the human skeleton; while grade three will examine their own mouth using the mirror to describe their teeth (shape, size, texture, number, location). The teacher may use a series of pictures for students to work in pairs to construct stories orally, using simple sentences. Grade 2 student pairs will be given between two and five pictures, while Grade 3 student pairs will be given between four and eight pictures to complete their stories orally.	The teacher of a class with students of Grades 2 and 3 decided to have students sharpen their skill of observation. For Grade 2, the teacher presented groups of students with a model of the skeleton, students identify the location of bones in different parts of their bodies; for Grade 3, the teacher presented specimens of teeth for students to identify different types of teeth and say how they differ, using their favourite visual or performing art (drawing, painting, rhythm/song or drama).	Grades 2 and 3 students using the theme **My Body** Tactile learners will create a model of the skeleton or teeth, auditory learners will create a rhythm or song about the skeleton or teeth, while visual learners draw/ paint the skeleton/teeth)

Table 10: Differentiation for Variations in Readiness, Interest and Learning Strategy/ Style...continued

Components of Differentiation	Readiness	Interest	Learning Strategy/ Style
Product	In a Social Studies lesson with students of Grades 4 and 5, on the elements of weather, Grade 5 students made a simple model of a portion of a landscape affected by a particular weather pattern (e.g. drought, flood, or hurricane). After a field trip, Grade 4 students compiled a scrap book with photographs of scenes depicting how elements of weather affect life in their community. (The product- for the Grade 5 students, which is the creation of a model, is more complex than the creation of the visual diary which is required of the Grade 4 students).	In an integrated Social Studies and Visual Arts lesson with students of Grades 4 and 5, the teacher gave assignments for students to create a document to give severe weather preparedness tips for a weather phenomenon of their choice, using graphic arts to create a poster/brochure/ bookmarker/calendar.	In a Social Studies lesson with students of Grades 4 and 5, students will create songs/poems/ jingles/ news release/ choreographed dance movements reflecting a particular weather phenomenon.

Table 10: Differentiation for Variations in Readiness, Interest and Learning Strategy/ Style...continued

Components of Differentiation	Readiness	Interest	Learning Strategy/ Style
Environment (Affective)	A teacher of Grades 2 and 3 watches students for signs of weariness as she recaps the findings from a field trip to explore plants and animals in the community, from which they returned a few minutes before. It was clear that students needed some time to relax before the question and answer review. Grade 2 will be engaged in a musical exercise to refocus their attention, while grade 3 will complete a reflective worksheet on the field trip.	A teacher of Grades 2 and 3 wants to reward students who persevere at their assignments and class work, and are always striving for success. Each time a male student completed a task he was rewarded with 10 minutes of free play on the tablet computer, while the female students were rewarded with colourful rosette or 10 minutes in the dress up corner.	In a small class with students of Grades 2 and 3, a student who shows signs of hyperactivity is allowed to move from one interest corner to another when completing seatwork, and often given added responsibilities. He is also allowed to sit in two designated seats during whole-class lessons.

Table 10: Differentiation for Variations in Readiness, Interest and Learning Strategy/ Style...continued

Components of Differentiation	Readiness	Interest	Learning Strategy/ Style
Environment (Physical)	A teacher of a class with Grades 2 and 3 organises the seating arrangements based on (activity/ functional level of students/location to resources/ students that are challenged)	A teacher of Grades 2and 3 has placed work sheets for both grade levels in interest centres/corners in the room so when students are working independently, they can go to the interest corner or centre of the subject they are working in, to complete exercises which they consider interesting.	During a lesson on geo-metric shapes, students of Grades 2 and 3, who learn best by movement and sense of touch (kinaesthetic learners) are given the option of using their bodies to form shapes on the carpeted area of the room, while others draw the shapes on the floor.

Adapted from: Tomlinson, C. and Moon, T. R., (2013). *Assessment and student success in a differentiated classroom*. Alexandria

ACTIVITIES AND STRATEGIES FOR THE DIFFERENTIATED CLASSROOM

Table 11: Activities and Strategies for the differentiated classroom

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Activity or Task cards	The use of activity or task cards gives an opportunity for tiered learning. This aligns with the participatory strategy. Activities or questions are written on cards which are then handed out to students for them to complete, or are placed in an activity area for students to access at an appropriate time. The teacher may laminate the cards so that they can last beyond a few uses. A teacher may also pre-record instructions for an activity, which is then played and acted on by students at an appropriate time.	Activity or task cards can be developed to cater for students of differing ability/readiness levels, interests and learning profiles in the same class and classroom.

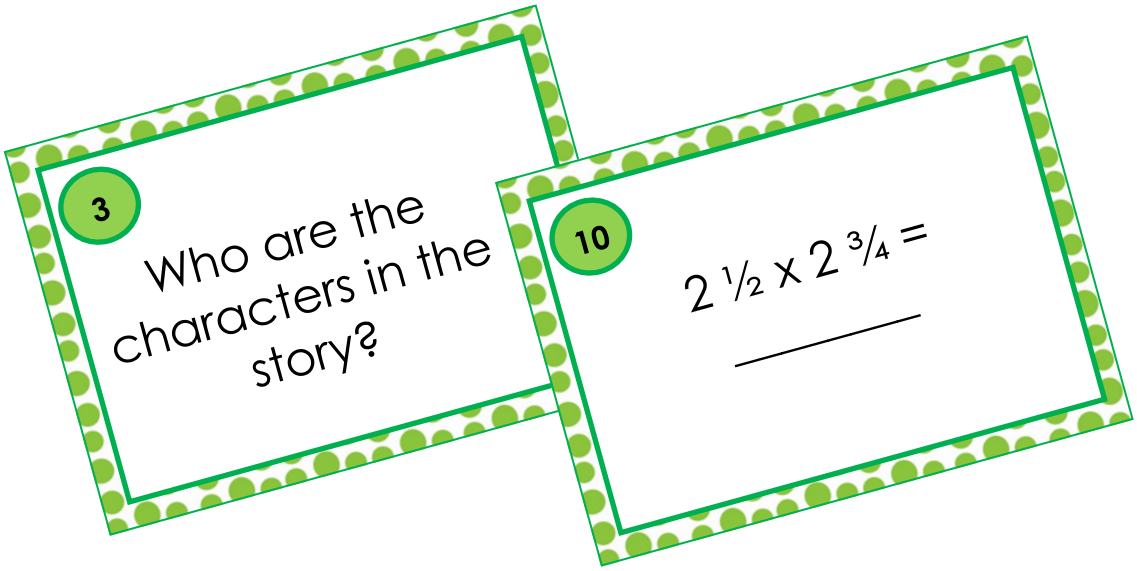


Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Learning stations/ Interest Centres	The setting up of learning/ interest stations around the class-room, with each one being geared to the development of a skill or the learning of a concept related to the lesson being taught, is a useful participatory strategy for the multigrade class. For example, in a Science lesson with Grades 4 and 5 about 'How a Scientist Works', the teacher can set up a learning station consisting of a video on the same topic. Other stations can offer activities which engage students in practising some Science process skills (such as measuring, classifying, experimenting, predicting, communicating, and interpreting data).	The activities in the learning stations can be geared to students of different grade levels. This can be achieved by varying the difficulty level of the activities, and relating the activities meant for a particular grade level to the objectives of that specific curriculum. Some stations can also be set up to cater generally to the different grade levels in the class (for example all students may use the learning station which involves viewing a video on How a Scientist Works).

Mathematics Learning Station. Image sourced from Pinterest

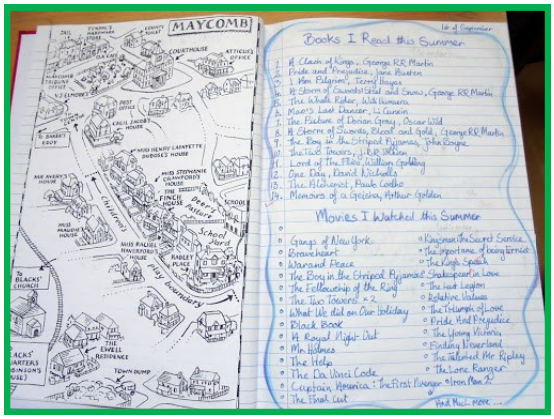
Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
The "Think-Pair-Share" strategy	In the "Think-Pair-Share" strategy, a problem or a topic is posed to students. They are given some time to think about it and try to solve it for themselves, after which they will pair with another student to discuss the solutions or opinions they have each come up with. They will then share their solutions and ideas with the rest of the class. This activity is highly participatory and provides opportunities for more able students to tutor others. Students are also able to evaluate and reflect on their own ideas and solutions to problems.	In this strategy, students are given the opportunity to work at individual, group and whole-class levels. Students at whatever grade or readiness level can make their contribution to the ideas being presented.

Mathematics Learning Station. Image Twinkl

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Journaling	Journaling is usually classified as an evaluative/reflective strategy and can be used in a flexible manner in the multigrade class. Students may use their journals to record their own understanding of a presentation, or a piece that has been read, or an explanation of an activity that has been performed. They may also use their journals to write their reflections or feelings on/about a lesson or any event within or outside of the school that has made an impact on their way of viewing life and learning.	Students of varying readiness, interest and learning profiles in the same class may use journals to record their questions, answers, ideas and feelings.



Student journal pages on the creation and governance of ideal societies—September 2015, Raheem Wood Steiner Secondary School, Ireland

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Word wall	A word wall, as the name suggests, is a wall on which new words, thematic words, activity specific words, are displayed. However, the word wall is not a static learning tool, but, as Cleaver (2018) reveals, it can be an interactive tool, used for a variety of learning activities. For example, to see patterns and differences in words, play word games, and use as a reference as they read and write. It is very helpful with spelling.	The word wall can be used to simultaneously help students of more than one grade level to attain vocabulary and related language skills. The display also allows individuals or groups of students to work independently at different activities (that is, without supervision) for given periods, while the teacher spends time with a group that needs direct attention. In this way, the activities emanating from the single word wall can satisfy the varying learning needs of students in your classroom.

Image: Edutopia

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
RAFT – Role, Audience, Format and Topic	RAFT is a writing strategy which is quite relevant for differentiated classrooms. Students assume a role (R) and communicate with a particular audience (A), using an appropriate format (F), to explore/examine a topic (T), from their chosen perspective. Students are given prompts to start the writing process. For example: Pretend you are the classroom clock (Role). Create a poster (Format) to show the principal and teachers (Audience) how students may use the time in the classroom in a better way. Students may be given the opportunity to choose any or all of the RAFT elements, depending on the purpose of the writing.	RAFT writing assignments may be varied within and across grade levels to suit children's differing readiness, interests and learning profiles. For example, students at higher grade levels can be given a greater or free choice in the selection of RAFT elements.

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Graphic Organisers	Graphic organisers are tools used to help students visualise and organise writing tasks. For example, in the pre-writing stage for presenting a story, students could organise the information by outlining pictorially and in words, in a pattern of squares on the page (each part in its own square) the characters, what happened in the beginning of the story, what happened in the middle of the story and what happened at the end. The groundwork for the actual writing of the story is laid.	Students of your multi-grade class engaged in a particular lesson may all use the strategy at the same time to organise their writing. The difference will be in the content placed within the chart/organiser of each student of group of students. This content will be relevant to the particular grade or ability level (readiness), interest, and learning profile/learning style of each student/group.
Scaffolded Reading/ Writing	Scaffolded reading & writing refers to a variety of techniques aimed at strengthening students' learning skills. This will enable them to eventually function independently in use of the particular skills addressed. Scaffolding is used when the student is assisted in understanding the meaning of new words in a passage so that he/she can later read and understand the passage as a whole. Scaffolding also occurs when the complexity of tasks incrementally increases as prior knowledge and understanding for each succeeding stage is acquired by the student.	In the classroom where differentiated instruction takes place, students at the lower grade or ability levels will benefit from the scaffolding strategy to eventually gain a level of understanding and proficiency to enable meaningful whole-class engagement with their older or more able peers.

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Intelligence Preferences	The use of intelligence preferences involves the application of Howard Gardner's Theory of Multiple Intelligences to the classroom experience. Students are provided with opportunities which accommodate their intelligences. For example, you will plan and execute lessons that enable students to view or create videos/pictures/ scenes (satisfying the visual-spatial learner); use movement of different parts of the body (satisfying the bodily kinaesthetic learner); tell others about how they feel about content presented (satisfying the verbal/linguistic and interpersonal learner); or create a musical piece (satisfying the musical learner), etc.	The use of intelligence preferences gives support for all intelligences present in students across their varied grade/readiness, interest and learning profiles/styles present in the classroom.
Expression Options	Expression options involve the provision of multiple and flexible means for students to demonstrate what they have learnt. This presents the opportunity to use more creative means of evaluation. Instead of the traditional pencil and paper tests, students of a group can present a dramatic piece, or create a poster, set up a display, debate a topic, etc.	Presenting flexible and multiple options for students to display what they have learnt is a good way to cater to students of differing readiness levels, interests, and learning profiles/styles. In this way, the learning needs of all students in the differentiated classroom or the multigrade classroom can be addressed.

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Learning Contract	A learning contract is a written agreement made between a student and a teacher. The student agrees to carry out certain learning tasks in order to achieve an identified objective or goal.	In a differentiated or multi-grade classroom students' learning contracts will assist in creating a path on which to chart the learning programme of individual students and also in serving as a tool for evaluating their progress. The learning needs of each child will be addressed even among the diversity in the classroom.
Tiered Assignments	In tiered assignments, small groups of students within a larger group are assigned specific tasks according to their readiness. Tiered assignments can be structured in terms of the challenge level, the outcome required, the process employed, the resulting product or the resources used.	Students in small group-ings in a single class are ful-ly and meaningfully en-gaged at their varying cog-nitive levels.

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Complex Instruction	Complex instruction is a cooperative learning strategy in which students are assigned or choose roles that contribute to the completion of a larger group assignment. These roles are matched with students' readiness levels, interest and learning profiles/styles. Students collaborate to ensure that all areas of the major task are addressed.	Roles in the complex instruction strategy are linked to students' readiness, interests and learning profiles/styles. Students of each grade level or group present, will have a task to perform which will contribute to the outcome of the larger group activity. Sometimes the teacher has to take an active part in role selection or assignment to properly exercise the abilities of different students.
Activity Menus	An Activity Menu is a grid with activities arranged according to their point values. Students are required to complete activities that amount to a certain point value within a certain period (for example, 20 points in one week). The resources needed to complete the activities must be readily available to the students. Activities at lower levels of cognitive operation (knowledge and comprehension) are given a lower point value than those at higher levels, such as the evaluation and synthesis levels.	With activity menus, you can maximise the engagement of students at all levels in the classroom, as they work at activities tailored to meet their various learning needs, being motivated by the reward of accumulated points at the end of a designated period.

Table 11: Activities and Strategies for the differentiated classroom...continued

Activity/Strategy	What It Involves	Relevance in the Differentiated or Multigrade Classroom
Tic-Tac-Toe	In the Tic-Tac-Toe strategy, the teacher presents activities to students in a 3X3 grid. Students are asked to select activities along a straight line. **N.B. The teacher should ensure that any activity selected includes at least one high level skill.**	Students are able to make selections of activities based on their readiness, interest, and learning profile/style. The requirement that they select in a straight line, vertical or horizontal, ensures they are not able to completely avoid activities of higher difficulty levels.
Independent Projects	An independent project is one that is pursued by an individual student and not the class as a whole. This is a good strategy for gifted students who would like to work on a topic they are interested in.	Independent projects enable students in the differentiated classroom to separately pursue an area they are interested in. Diversity in the classroom is catered to by addressing the learning needs of individual students.
Small Group Instruction	In the differentiated classroom small groups are commonplace. Groups of 4 to 6 students are used to enable closer teacher-student and student-student interaction; more opportunities for teacher feedback; and structured opportunities for students to practise & master new skills & concepts with each other's help.	In small groups, the learning needs of students of varying readiness interest and learning profiles can be more effectively and efficiently identified and addressed.

APPROACHES TO CURRICULUM INTEGRATION IN A MULTIGRADE CONTEXT

APPROACHES TO CURRICULUM INTEGRATION IN A MULTIGRADE CONTEXT

Curriculum integration has been identified as one of the most beneficial strategies used by teachers in multigrade classrooms as it enables a more effective and efficient use of instructional time. It promotes seamless teaching and makes learning more meaningful for students. Instead of designing discrete learning experiences for each subject area/ discipline, the teacher formulates a series of integrated learning activities that facilitate students participating in experiences and interactions that are interdisciplinary and achieve outcomes across several disciplines/ subject areas and grade levels. The emphasis is on creating connections and links between separate areas of knowledge and inquiry.

APPROACHES TO INTEGRATION based on the National Standards Curriculum

There are several approaches that schools may adopt as a means of providing a holistic educational programme for children using a workable schedule. Based on the NSC, approaches to integration of the content include variations of the MULTI-DISCIPLINARY or CROSS CURRICULA LINKAGES. This approach may be seen in the use of the following:

- a common theme and related focus questions to make connections to several subject areas
- a real-life situation or case that requires the use of a solution that involves many different aspects of life that relate to a specific subject.

An example of the latter is the integration of principles and practices from a specific set of disciplines (Science, Technology, Engineering Design and Mathematics – STEM/ STEAM when the Arts are added) and compatible processes being used to problem-solve.

Approaches to integration may also be applied **within a discipline** instead of across disciplines and are demonstrated in the following ways:

- Through **spiralling of the content** as is practised when learners are required to reflect on **Prior Learning or experience that is not limited to complete a task** or to recall important ideas or information for undertaking a new concept or skill.

- **By transferring skills that are specific to a subject area** when a new skill within the same subject area is being developed or used by learners. (intra-disciplinary integration).

- By responding to **students' queries or interests,** allowing them to draw on other subject areas as a means of developing new understandings, dispositions or technical skills.

In the NSC, approaches to integration are also evident in the use of various ICT tools, problem solving through projects (R & T), the focus on culture for relevance of content, and the use of the Arts to drive the content.

RECOMMENDED MODELS OF INTEGRATION FOR THE MULITIGRADE CONTEXT

The utilization of the different approaches to integration should be influenced by the context of the school/classroom, as well as national requirements. The significance of these priorities is likely to contribute to the development of a model of integration that has long- term benefits or may give rise to a sustainable way of practice for each school. The following models of integration may be employed in the multigrade classroom; however, they are to be treated as guides rather than prescriptions.

POINT TO NOTE: *Any method of integration that is adopted requires intentional focus on competencies to be developed by the learner, based on the aims and standards for each grade level.*

1. Complementary or Shared Integration

In this type of integration, two or more **related disciplines** are used to investigate a problem, a theme or issue. For example, based on the NSC, Social Studies in one grade group is related to the Enrichment Areas such as RE, HFLE, PE in another grade group, as well as the co-curricular programme, Citizenship and Culture in Education. For students to develop socially, emotionally, physically and spiritually and demonstrate the appropriate behaviours, where applicable, Social Studies could be used as the context for exposing students to relevant learning experiences from each of these disciplines as a form of shared integration.

2. Webbed Integration: Engagement using Interdisciplinary Themes:

In some cases, based on the curriculum for different disciplines, children may be required to engage in similar processes to develop tangible products or to demonstrate processes that are related to a theme that cuts across several disciplines. For example, in one grade group for Mathematics, students need to understand the concept, area/ perimeter in relation to the environment.

In the other grade group they are required in Science to:

i) Investigate how plants grow and

ii) demonstrate for their R&T Agriculture project, how to use limited available physical space to grow/produce a quick crop, to address a food problem. In planning for learning, a common theme that cuts across disciplines would be used, and the problem situation would require examination from several perspectives. Relevant objectives, content, activities and assessment criteria would be taken from the three subject areas as per the Curriculum Guides, and used to organize the lesson based on the 5E Model.

STEM/STEAM lesson/s around this common theme ~~is~~ are also applicable. In applying this model of integration, each subject would not be given a specific time. The nature of the session itself would indicate use of a project session or time set aside for Integrated Studies. This approach is similar to the NSC design for Grades 1 -3 Integrated Studies. If adopted for Grades 4-6, the same approach could be used to include opening "Windows" for skill building within each discipline. Transfer of skills would need to be encouraged as students problem- solve in specific contexts.

3. Students' Interests

An individual or a grade group of students may be interested in exploring an issue within a selected subject area. However, this area of interest may require connecting to another discipline(s) being studied by the other grade group. This form of Trans-disciplinary Integration is derived from students' input and requires the guidance of the teacher in ensuring that relevant competencies are developed. Again, this situation usually results in projects or themes to be studied and can be used to create the schedule for the Exploratory Core areas. As a means of helping students to integrate ideas from the different learning areas for better understanding and as a means of problem solving, they may be required to present their ideas creatively (using the Art Forms). In this case, a session of each Exploratory Core Area could be used as a "window" for students to develop the necessary competencies.

4. Co-Curricular Events: Opportunities for Integration

Clubs, national innovations and special events that are based on particular disciplines are also means by which the curriculum can be used to contribute to the holistic development of students. The curriculum may be used to shape the objectives, learning activities and method of assessment or to develop a plan for the programme. Documented reflections and 'portfolio of evidence' are useful means by which monitoring may be supported.

CONCLUSION

These suggested models of integration can only be effective if used to suit the context of each school. As a consequence, they are to be treated as guides rather than prescriptions. It is also important to reiterate that any method of integration that is adopted, requires intentional focus on competencies to be developed by the learner based on the aims and standards for each grade level. For each discipline to contribute significantly to a child's development, the integration model for a particular group of students should be appropriate for their level/stage of development. When planning lessons, consideration should ~~also~~ be given to the effective ways of using learning strategies so that all the children in a class can make use of their background experiences as they try to solve problems. This will include, how they prepare for high stakes assessment. Once the timetable or schedule is organized to account for the subject areas that are components of the NSC, it will be necessary for schools or teachers to communicate the model of integration selected for the benefit of other stakeholders who support teaching and learning and other aspects of curriculum implementation.

ASSESSMENT ON MULTI-GRADE CLASSROOM

ASSESSMENT IN THE MULTIGRADE CLASSROOM

What is assessment?

The term assessment encompasses the wide variety of methods and approaches used by teachers, students, and other practitioners in the education system to evaluate, measure, document, and monitor student performance, teacher performance, as well as other aspects of the learning and teaching, process. Student assessment usually involves one or more of the following areas:

- Readiness for learning
- Progress in a learning activity/programme
- Acquisition of competence in a learning activity/programme

Assessment is carried out for many reasons, including:

- To provide information on student performance
- To get an indication of where students need help
- To gauge and monitor student and teacher performance
- To inform future teaching methods/strategies
- To gather continuous record of progress for a student
- To gauge student progress as against class progress
- To place students in programmes within an educational institutions
- To certify students' achievement
-

Dimensions and Characteristics of Assessment in the Multigrade Classroom

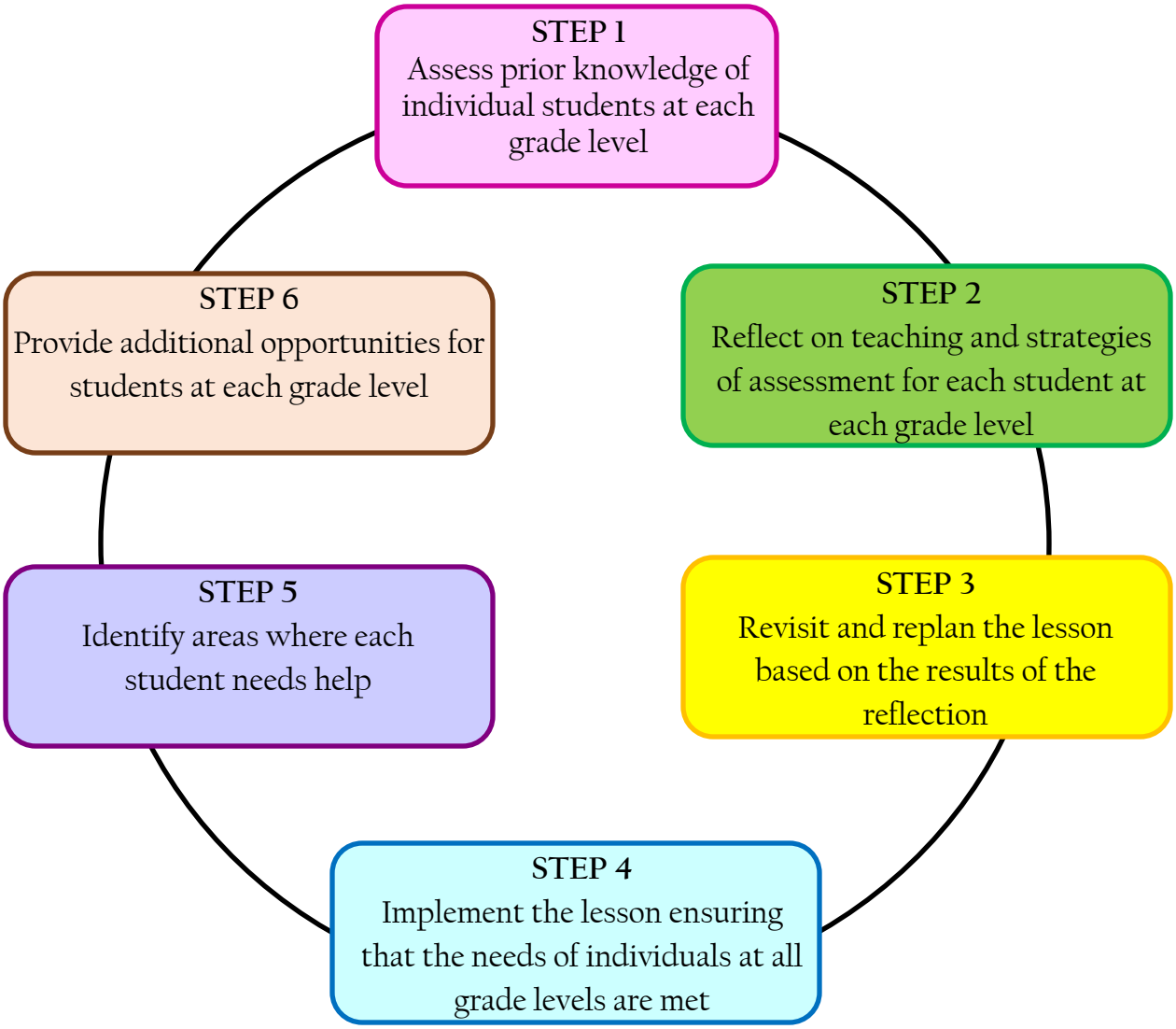
Assessments must be:

- Aligned to the philosophy of the curriculum
  a. Constructivist (building knowledge)
  b. Student-centred: taking into account student needs, demonstrating application of knowledge and skills that are meaningful for the student, usually consisting of a task for students to perform and a rubric that explains how the task is to be scored.

- Related to the objectives of the lesson/unit
- Valid – must measure what is intended
- Reliable – must yield consistent results
- Practicable – can be used to inform practice in the multigrade setting
- Differentiated – providing a variety of methods and strategies to ensure that students of varying abilities, strengths and needs are taken into consideration. Students are presented with varying opportunities to demonstrate their knowledge and skills.
- Fair – giving students equitable opportunities to demonstrate what they know, by using methods and procedures most appropriate to them (Suskie, 2000).
- Authentic – students performing practical or "real-world" or real-life tasks that demonstrate meaningful application of essential knowledge and skills. Other names for authentic assessment are performance assessment, alternative assessment and direct assessment (Mueller, 2018).
- Cyclic – providing opportunities to reflect on the results of the assessment, to revisit the learning process and to repeat the process making any necessary adjustments.

Figure 5 shows the cyclic nature of assessment.

Figure 5: The Cyclic Nature of Assessment



Adapted from: UNESCO, (2015). Embracing diversity: Toolkit for creating inclusive learning-friendly environments, specialized booklet 4. Bangkok, Thailand

ASSESSMENT METHODS AND APPROACHES

An array of methods and approaches for assessment are required to meet the varied needs of the multigrade class.

Formal and Informal Assessments

Formal assessments are usually conducted on a large number of students – beyond a single classroom or school. They usually have data to support any conclusions made about student performance, and can therefore be used for comparing groups of students on a certain skill or set of skills. Within the Jamaican context, students are prepared for formal assessments at the different points within the system. The teacher of multi-grade classes needs to pay keen attention to ensuring that the objectives stipulated for each grade level are covered.

Informal assessments should be incorporated into classroom routine. Examples of these include portfolio assessments, checklists, observations, reflective journals, etc. It is important that the teacher systematically collects and utilizes the information contained in these informal assessments, as the results will inform the teacher on how his or her students are performing in relation to objectives set at the class/school level.

Authentic Assessment

Authentic assessments are so called because they mirror real life situations for the student. They relate to the environment and experiences of the students, and facilitate students working independently, while supporting the teacher's role as facilitator. An example of an authentic assessment would be: the task of working out the profit made, after selling items for their school club. Another example is creating questions for and interviewing a police officer, to get his/her ideas on how children should be protected.

Portfolio Assessment

A portfolio is a collection of students' work over a given time. An examination of a portfolio will give an idea as to how a student's competence in a set of skills has progressed. For example, a student's grasp of the writing process may be tracked by examining pieces from the portfolio, which will show the progression of the mastery of the skills over the period covered.

Point to note

Assessment in the multigrade setting should be tailored to meet the needs of individual students or situations; and should be marked by authenticity, practicability and applicability to their real life situations.

Performance Tasks

A performance task is any learning activity that requires students to demonstrate their ability to **apply** their knowledge, understanding and skills. They yield a performance or tangible product that shows evidence of learning. Performance tasks are also used as assessment activities, allowing the teacher to measure student proficiency in a multiplicity of skills in areas such as research and problem solving. The 21st century skills of communication, creativity, collaboration, critical thinking, and use of technology (as advocated in the STEM and STEAM approaches), are also emphasised. The ability of students to persevere at a task and to give precise and accurate information, as well as other exemplary habits of mind, can also be observed. Performance tasks and project-based assessment are themselves examples of authentic assessments. (See the example of a project-based activity on **page 93.**

Steps in performance assessment

- Identify content (process or product)
- Identify decisions to be made
- Identify the decision makers/stakeholders/receivers of the information
- Identify the nature of the performance and the measurement procedure
- Develop criteria
- Develop rating scale
- Design conditions (process or product)

SAMPLE PERFORMANCE TASK—MATHEMATICS

General Instructions

This task has four parts: each part has 1 question

Objectives

- To solve problems (includes worded problems and money) requiring the addition/subtraction of decimal numbers
- To find the product of a whole number and a decimal number
- To write one or two- step problems based on information given, then write the correct algebraic sentence and solve the problem

Activity

Fundraising: Your class is planning a fundraising activity to help defray the cost of building a computer lab. Your teacher suggested that the class earn the money from one of two fundraising activities.

Fundraising Idea1: selling pencils
Fundraising Idea 2: participating in a walkathon

You will need to answer the following questions in order to select one of the two ideas.

Part 1 - Selling pencils

For the fundraiser, your teacher asked you to sell pencils. The cost of each pack of pencils is $100. One pack contains 10 pencils. Each pencil should be sold for the same price. Based on the scenario, use two of the options in the blank spaces below to make the statement true.

$5	$10	$20	$100	One	Five	Ten

_____ pencil(s) will be sold for _____

Part 2 - Participating in a walkathon

The second fundraising activity is a walkathon.
The teacher told you that each student will collect $50 for each 0.5 of a kilometre that the student walks. Sam walks 2 kilometres. What is the amount of money Sam will collect? Show how you found your answer.

Illustrate your answer.

Answer the following question using information from the question above.

If each student walks exactly 2 kilometres, what is the least number of students that will be needed to collect $8,000? Show how you arrived at your answer.

Illustrate your answer.

Part 3 – Participants in the Fundraiser

Your school has three grade 4 classes: 4A, 4B and 4C. The table shows the total number of students in each class and the fraction of the class that is expected to participate in the fundraiser by either selling pencils or walking in the walkathon.

CLASSESS	NO OF STUDENTS IN EACH CLASS	FRACTION OF STUDENTS PARTICIPATING IN FUND RAISING
Grade 4 A	50	O.4
Grade 4B	40	½
Grade 4C	40	

If a total of 50 Grade 4 students will participate in the fundraiser, what fraction of Grade 4B students will participate?

Show how you arrived at your answer.

Illustrate your answer.

Part 4 - Choosing the fundraising idea.

Use information from questions in Parts 1, 2 and 3 to answer the following question.

- If selling pencils is chosen as the fundraising idea, each participating Grade 4B student should sell 20 pencils.

- If the walkathon is chosen as the fundraising idea, each participating Grade 4B student should walk 4 kilometres.

- The participating grade 4B students need to collect $4,000 or more. Explain to your teacher which fundraising activity you would recommend.

- In your explanation, give details on both activities and use mathematics to explain how you arrived at your recommendation.

Adopted from (Ministry of Education Youth & Information, Primary Exit Profile Sample Item Publication, 2018)

RUBRIC FOR THE PERFORMANCE ASSESSMENT TASK

Response 1: Choosing two correct options to make the statement true

(One pencil will be sold for $10/ ten pencils will be sold for $100)

Score	0	2
Performance	No/partial/incorrect attempt is made to answer the question	Both options selected are correct

Score	0	1	2
Performance	No attempt is made to answer the question	An answer is attempted and the working is shown but there is an error. The correct answer is given but the working is not shown.	The correct answer is given and the working shown.

Response 2: The amount of money Sam will collect ($200)

Response 3: The least number of students needed to collect $8000 (40 students)

Score	0	1	2
Performance	No answer is given/ An answer is attempted and the working is shown but there is an error.	The correct answer is given but the working is not shown.	The correct answer is given and the working shown.

Response 4: The fraction of 4B students participating in the activity (1/5 or 0.2)
Response 4: The working to arrive at the fraction of 4B students participating in the activity (1/5 or 0.2)

Score	0	1	2
Performance	No attempt is made to answer the question	An answer is attempted and the working is shown but there is an error/The correct answer is given but the working is not shown.	The correct answer is given and the working shown.

Response 5 Recommendation of the best method (Walkathon)

Score	0	1	2	3
Performance	No attempt is made to answer the question	The working and the explanation of the process are attempted but not brought to completion	The working is shown and is complete, but the explanation is incomplete/ inadequate Or The working is shown and is not complete, but the explana-tion is complete.	Both working and explanation are complete and valid.

TIPS FOR ASSESSING STUDENTS IN THE MULTIGRADE SETTING

- Allow for student self-assessment. Help students to assess their own work by providing them with checklists or questions they can ask themselves to determine how much they have learned, or the extent of their success on an assignment.
- Take into account the general progress of the class and grade levels present, as well as the progress of individual students. (This will help to determine whether an individual student is performing above, below, or on par with grade level expectations.)
- Allow students to follow the path of mastering simple to gradually more complex knowledge/concepts and skills at their own pace.
- Assess not only cognitive/academic skills, but also psychomotor and affective domains to promote cognitive, social, emotional, physical, psychological, and aesthetic development of the students.

- Reward the display of positive attitudes, values and behaviours (e.g. sharing, volunteering to help, taking initiative)
- Assess students formatively and summatively; do it cyclically and with regularity.
- Adapt assessment to the type of activity being carried out.
- Assess students before a new topic is introduced, to determine what experiences or understanding students already have about the topic. This assessment is aimed at determining how much new knowledge is needed and how to proceed.
- Assess students during a lesson, to find out if your students are learning the concepts being taught; and take the necessary/appropriate ameliorative actions.
- Assess students at the end of teaching a topic. This will determine mastery prior to moving to the next topic and decide if further remediation is necessary for any student/group. Evaluate the success/suitability of the teaching methods, and materials used.
- Especially for tiered assessment, the teacher should be guided by the Assessment Criteria from the relevant curriculum documents.
- Assess students purposefully; target specific skills, knowledge and attitudes such as: reporting, narrating, drawing pictures, displaying curiosity, making predictions, listening labelling and completing maps, etc.

Adapted from UNESCO (2015).

MONITORING THE DEVELOPMENT OF SKILLS

Skills get more complex as students progress from one grade level to the next. Here is an example from Grades 4-6 Social Studies which maps some of the skills introduced at particular levels over the programme's three-year span. It should be noted that the introduction of some skills is dependent on the topic being taught.

Table 12: Spiralling of Skills in the Grades 4-6 Social Studies Programme

Skills in the Grades 4-6 Social Studies Programme	Grade Levels Introduced and/or Assessed		
	4	5	6
Locating places on maps	Locate places using cardinal points (N,S,E, W)	Locate places using inter-cardinal points (NE, SE, NW, SW, etc.	Locate places using latitude and longitude
Gathering information	Gather information using one simple source	Gather information using two or three simple sources	Gather information using multiple sources
Classifying information	Organise information to rank data or classify information	Organise information to rank data or classify information	Assess information then create categories for ranking
Developing strategies	Develop a simple plan to resolve a simple problem, e.g. garbage disposal in the *classroom*	Develop a simple plan to resolve a simple problem, e.g. garbage disposal at *school level*	Develop a simple plan to resolve a simple problem, e.g. garbage disposal in the *community*
Constructing timelines	Gather information from timelines	Construct simple timelines	Construct detailed timeline to scale
Developing questions	Develop simple recall questions Who, what, when, where	Develop probing questions Why, How, why not	Develop questions that relate to hypothetical thinking

Tools for Conducting Assessment

- Checklists/rubrics
- Anecdotal records
- Observation schedules
- Portfolios

EXAMPLE OF AN ASSESSMENT TOOL

Assessing a Skill – Checklist for Working Collaboratively in Grades 4-6
(Adapted from Fisher & Frey, 2007)

Self-Assessment of Group Work

Name of Student _____Class _____

Date of Activity _____

Name of Activity/Project _____

Members of my Group

_____

_____

_____

How I worked in my group

Place a tick beside the statement in the column that has the most appropriate answer
4= Always, 3= Almost always, 2= Sometimes, 1= Once or twice, 0= never

Statements	13 Always	3 Almost Always	2 Some-times	1 Once or twice	0 Never
I completed the task I was given on time					
I gave my ideas in the group discussions					
I listened when others were speaking					
I asked for help when the work was difficult					

I also have this to say about the activity:

_____

_____

_____

(See Appendix for additional examples) NB: The aforementioned tool can be adjusted and utilized for peer assessment.

INSTRUCTIONAL RESOURCES

Instructional Resources

Instructional resources are an important element of the learning and teaching process. The provision of instructional materials and resources is even more crucial for the teacher of the multigrade class since he/she has to keep all students actively engaged even while giving direct attention to a part of the class. Instructional materials are however equally effective in the whole class setting.

Instructional materials will take various forms including:

Textbooks (print and digital)

Workbooks	Magazines and periodicals
Non-fiction books	Worksheets
Storybooks	Manipulatives
Graphic novels	Flashcards
Activity books	Posters
Educational games	Realia
Apps	DVDs
Websites	CDs
Software	Models
Reference books	Maps and Atlases

The use of instructional resources will assist in keeping students on task with or without direct supervision. Teachers/facilitators of the multigrade class are encouraged to:

- Utilize a range and variety of learning materials (including digital tools) catering to all the age and ability levels in the class
- Request/develop resources that will be needed to carry out a specified role. (Manuals and other publications, website listings, information presented in a variety of electronic formats – DVDs, CDs, etc.)

- Make use of the environment as a resource (field trips, speakers from the community, learning materials in the environment, inventories of plants, animals, etc.)
- Utilize larger materials/furniture to facilitate the teaching of creative expressions: floor mats, bats, balls, physical education gears, etc.

The Use of Realia

Realia are objects and materials from everyday life that are taken into the classroom setting for use as instructional materials. Using realia as instructional materials has advantages such as saving time (because the students are usually familiar with the materials and do not have to be extensively introduced to them), stimulating interest and encouraging creativity.

Realia are ideal teaching aids to be utilized, for example, when teaching the Grade 4 Social Studies Term 1 Unit 2: How have the cultural practices of our ethic groups helped to shape our regional identity.

Items such as the yabba (a traditional bowl which is used as a plate), the Dutch pot, and other traditional items can be used to engage students in discussions about heritage and culture. Table 13.1 below presents other examples of realia which can be effectively used in the Jamaican classroom.

Table 13.1: Realia and Examples of Their Use

Realia	Examples of Use
Application forms	In Language Arts to give real experiences in responding to written questions.
Classified advertisements	In Language Arts to identify the words used to persuade others to buy a product or service.
Flyers	In Language Arts (e.g. in Grades 4-6) to identify words and expressions which provide clues to the writer's purpose (to entertain, inform or to persuade) also in the Visual Arts
Magazines	In Visual Arts for exploring the use of colour and images and to create pieces such as collages.
Comics	In Language Arts to identify features of dialogue.
Newspaper articles	In Language Arts for identifying purpose in writing or specific parts of speech or purpose of writing.
Restaurant menus	In Science and Family and Consumer Management for examination of the representation of food groups.
Recipes	In Mathematics as a stimulus for the calculation of proportions of materials used in the dish being made.
Utility bills	In Mathematics and Family and Consumer Management (Grade 4 and beyond) as a stimulus for the calculation of rates of payment for the various utilities (e.g. amount per kwh for electricity, etc.).
Furniture (small pieces)	In Drama to create a real setting for a presentation.

The Use of Advanced Technology

As the use of advanced technology becomes more prevalent in the society the, multi-grade classroom should not be left behind. It is however recognised that it is not possible for all schools to acquire a variety of technological devices. Examples of these devices are as follows:

- The multimedia projector
- Laptops
- Tablets
- Digital Cameras
- Audio enhancers
- Smart tables
- Smartboards
- Smart Telephones
- Digital textbooks

The use of digital devices in the classroom generates interest in students, and draws their attention and participation.

The use of print and on-line materials will still form a major part of the resources used in the school setting. The following table presents a list of print and other resources useful in the multigrade setting, along with descriptions of their use:

RESOURCE	DESCRIPTION
Ministry of Education, Youth and Information. *(2016). Game-based and interactive activities for the early years.* Kingston, Jamaica: Author.	This resource booklet provides games and activities for students. The games are aligned to the objectives of the Grades 1-3 NSC curriculum and their use will make learning a pleasant activity and reinforce concepts for the young learner.
Ministry of Education, Youth and Information. *(2019). Manual for Curriculum Implementation Teams*, Kingston, Jamaica: Author.	This manual gives detailed information on the operation of Curriculum Implementation Teams in schools from early childhood to secondary level.
Ministry of Education. (2014). *Policy guidelines for the implementation of curriculum implementation teams (CITs) in schools.* Bulletin. Kingston, Jamaica: Author.	This booklet gives guidelines at the policy level for the implementation of CITs.
UNESCO. (2015). *Embracing diversity: Toolkit for creating inclusive learning-friendly environments, Specialized booklet 4.* Bangkok, Thailand: Author.	This is a manual with a wealth of information for teachers of multigrade classes. It was written in Thailand, so some adaptation is necessary for the Jamaican school system. This manual is available on the UNESCO website.

RESOURCE	DESCRIPTION
The BSCS website https://bscs.org	This is the website of the Biological Science Curriculum Study (BSCS). It carries a wealth of research-based information in Science and education in general, including how the 5E instructional model was developed.
https://www.youtube.com/	Videos providing a wealth of songs and jingles on a wide cross section of subject areas and topics for children at primary and other levels are provided on the YouTube website. Choose songs with lyrics and visuals that are as close to the children's experiences and realities as possible.
https://www.ixl.com	IXL is a US-based educational website which delivers engaging learning experiences for students, ranging from early childhood to high school. Exercises to build skills in Mathematics, Language Arts, Science, Social Studies are provided. Membership is available at a monthly cost.
https://www.scholastic.com	Scholastic specialises in the development of robust literacy skills, creating literacy solutions that support the whole child—in the classroom, at home, and in the community. The main provisions of this website are research-based literacy instruction, professional development opportunities, and strategies for incorporating family and community engagement in student learning.
http://rubistar.4teachers.org/index.php.	RubiStar is a free tool to help teachers create quality rubrics.

Storybooks (in print or digital form) will also form an essential part of the resources for young students. An example of a collection of stories which could accompany the teaching of the Unit "Who am I?" is presented in the Appendices.

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APPENDICES

1. An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum
2. An Overview of the Grades 4-6 NSC Exploratory Core Curriculum
3. Multigrade Learner and Child-centredness
4. Sample Unified Elements of the Curriculum
5. The Integrated NSC Grades 1-3 Curriculum
6. Sample Lesson Plans
7. Monitoring/Evaluation Instruments for Teachers and Students
8. Examples of Stories for Use with the Subtheme: Who am I?

APPENDIX I

An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum

Grade 1	Grade 2	Grade 3
Term 1 Unit 1		
Subtheme: Myself		
Unit: Who am I?	Unit: My Body (II)	Unit: My Body (III)
How do you know me?	What do I need to know about my brain, heart and skeleton?	Why are teeth, stomach and Lungs important parts of my body?
To which group do I be-long?	How do these parts, my brain, heart and skeleton work together?	Why and how should I care for different parts of my body?
		How does food help to make my body healthy?
Term 1 Unit 2		
Unit: My Body (I)	Unit: Care and Safety of Self	Unit: Satisfying Other Needs
What do I look like and what can I do?	How do I keep my body healthy?	What is the difference between basic needs and other needs?
In what ways do I grow and what do I need to grow?	What do I do to keep my body safe (at school, on the road)?	How do we satisfy other needs?
How do I take care of my body?	How do others take care of me?	How does satisfying other needs make a difference to life?

An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum

Grade 1	Grade 2	Grade 3
Term 2 Unit 1		
Subtheme: My Home	**Subtheme: My Family**	**Subtheme: My Community, the Nation and the Wider World**
Unit: My Family	Unit: Living together as a Family	Unit: Providers of Goods and Services
What is a family?	What are the types of family?	Who are the providers of goods and services that I need?
Who are my family members?	How do family members relate to one another?	How do workers contribute to the development of my community?
How do family members care for each other?	How does my family satisfy basic needs?	How do rules help workers at the work place?
What are the activities in which I take part with my family?		

An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum

Grade 1	Grade 2	Grade 3
Term 2 Unit 2		
Unit: Things in the Home	Unit: Satisfying our Needs	Unit: Relating to Others Outside of Jamaica
What are the things in my home and who made them?	Why do I need education, and how am I educated?	What types of relations do we have with other people of other countries?
How do I care for the things in my home and use them safely?	Why do I need recreation and how can I spend my leisure time?	Why is it important that we relate to other countries of the world?
	Why do I need transportation and how do people and goods get from place to place?	In what ways am I like or different from the people outside of Jamaica with whom I relate?
		How can I ensure that Jamaica maintains good relations with other countries?
Term 2 Unit 3		
		Unit: Aspects of Jamaican Culture
		What is the Jamaican culture?
		Why is the Jamaican culture valuable to me?
		How has the Jamaican culture evolved

An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum

Grade 1	Grade 2	Grade 3
Term 3 Unit 1		
Subtheme: My School	**Subtheme: My Community**	**Subtheme: My Physical Environment**
Unit Topic: Myself at School	`	**Unit: Living and Non-living Things in My Environment**
How do I know my school?	What is a community?	How can I tell if something in my environment is living?
Who are the people at my school and what do they do?	What does my community look like?	Why do living things need specific habitats?
	Who are the people In my community?	How are living and non-living things affected by changes in the environment?
		In what ways are living things dependent on non-living things?
Term 3 Unit 2		
Unit Topic: Together at School	**Unit: Places of Interest in My Community**	**Unit: Caring for My Environment**
What are some of the activities and events at my school?	What are the places in our community that we find interesting?	What is my physical environment?
How do we live together at school?	Why do we find places in our community interesting?	Why and how should we care for our environment?
		How can I persuade others to care for the environment?

An Overview of Themes, Units and Focus Questions in the Grades 1-3 Curriculum

Grade 1	Grade 2	Grade 3
Term 3 Unit 3		
	Unit: Plants and Animals in My Community	
	What are the plants & animals in my community?	
	How are plants and animals useful?	
	How do I care for the plants and animals in my community?	

APPENDIX II

An Overview of Grades 4-6 Exploratory Core Programme: The NSC Science Programme

Grade 4	Grade 5	Grade 6
Term 1 Unit 1		
Unit: Exploring our World	Unit: Forces and Work	Unit: Environment
How do we find out about our world?	How can I change the motion of an object?	Why is it important to care for the environment?
	What are some types of forces and how do they act?	How do environmental problems affect us?
Term 1 Unit 2		
Unit: Living Things	Unit: Energy Forms	Unit :Energy - Light and Sound
What are living things?	What are the forms of energy?	How does light behave?
What are the needs common to plants and animals?	How is heat transmitted?	How does sound behave?
Term 1 Unit 3		
Unit: Plants and Animals		
What are the functions of some external parts of plants and animals?		
Term 2 Unit 1		
Unit: Sense Organs	Unit: Nutrition	Unit: Materials – Properties and Uses
Why are sense organs important?	What are the food nutrients and why are they important to us?	What are some properties of common materials and their everyday uses?
How does the structure of the sense organs relate to their functions?	How do plants and animals interact?	What changes are reversible and irreversible?
How can I care for and protect my sense organs?		

An Overview of Grades 4-6 Exploratory Core Programme: The NSC Science Programme

Grade 4	Grade 5	Grade 6
Term 2 Unit 3		
		Unit: Mixtures
		What is a mixture and how can it be separated?
Term 3 Unit 1		
Unit: Water and Air	**Unit: Simple and Complex Machines**	**Unit: Diet and Drugs**
What is water and why is it important to life?	What are machines and how do they help?	Why is it important to have a balanced diet?
Where does water come from and how can I make it safe for drinking?	How is a simple machine different from a complex one?	Why is the proper use of drugs important?
What are the properties of air and how do we make use of air?		
How can the air I breathe be unsafe?		
Term 3 Unit 2		
	Unit: Weather Instruments	
	What are some instruments used to measure the elements of weather and how do they function?	

SOCIAL STUDIES GRADES 4-6

Scope and Sequence

Term	Grade 4	Grade 5	Grade 6
1	**Unit 1**- Who were the original inhabitants of Jamaica? (The Tainos) **Unit 2**- How have the cultural practices of our ethnic groups helped to shape our regional identity? (names of places, food, dress, dance folklore) **Unit 3**- Who are some of the important persons that have helped to shape my community and Jamaica as a nation? (Community and national heroes)	**Unit 1**- Why did the Europeans come to the Caribbean and why were Africans taken to the Caribbean? **Unit 2** – Who are some important persons that have helped to shape Jamaica as a nation? (Nanny, Sam Sharpe, Paul Bogle, George William Gordon) **Unit 3**- How has the culture of the ethnic groups in the region influenced the development of Caribbean culture? (Jamaica, Cuba, Haiti and Caribbean culture- dance, music, language, dress, religion, food)	**Unit 1**- How can we promote and preserve our Caribbean Culture? (Chinese and East Indians, Caribbean festivals) **Unit 2** – How did Jamaica achieve independence? (Garvey, Bustamante, Manley, independence in Cuba and Haiti) **Unit 3**- How do we show respect and loyalty for our country? (national symbols and emblems)

SOCIAL STUDIES GRADES 4-6

Scope and Sequence

Term	Grade 4	Grade 5	Grade 6
2	**Unit 1**- How do I locate places on maps and what are the main physical features of Jamaica? (plains and rivers) **Unit 2**- How is Jamaica divided and how have divisions and places changed over time? **Unit 3**- How are we governed and what are my responsibilities as a member of my community?	**Unit 1**- Why does erosion occur and how does it affect the land? **Unit 2** – How do I locate other Caribbean territories on regional maps? Cardinal and intermediate points – (N,S,E,W,NE, SE,SW, NW) **Unit 3**- What are Municipal Corporations (Parish Councils) and how does this system of governance operate in Jamaica?	**Unit 1**- How are mountains important to people's lives and how do human activities affect mountain environments? **Unit 2**- How can we classify the landmasses and water bodies of the world? (Continents, Oceans, Rivers Location- Latitude and Longitude) **Unit 3**- How are decisions made at the national level and how do these decisions affect us?

SOCIAL STUDIES GRADES 4-6

Scope and Sequence

Term	Grade 4	Grade 5	Grade 6
3	**Unit 1**- How does weather affect human activities? (wind, temperature, sunshine) **Unit 2** –Why is planet Earth unique in the Solar System? **Unit 3**- Why are plants important to humans? **Unit 4**- How can I help to keep my community clean? (Land Pollution and waste management)	**Unit 1**- What are the elements of weather and how does rainfall occur? (types of rainfall) **Unit 2** – What are the features of the Solar System? **Unit 3**- Why are plants important to humans and the environment? (forests and wetlands) **Unit 4**- How do some human activities negatively affect the environment? (water pollution)	**Unit 1**- What are some of the key factors influencing climate and how do these factors influence climate? **Unit 2**- How do the movements which the Earth makes as it orbits the Sun impact us? (Rotation and Revolution) **Unit 3**- How do some human activities affect the atmosphere? (Air pollution) **Unit 4**- How can we benefit from cooperating with our Caribbean neighbours?

OVERVIEW OF THE LANGUAGE ARTS PROGRAMME

	GRADE 4	GRADE 5	GRADE 6
	Term 1 unit 1	**Term 1 Unit 1**	**Term 1 Unit 1**
Theme	**Our Common Heritage**	**Energy and Matter**	**Our Common Heritage**
Sub-theme	Cultural Heritage		Cultural Heritage
Focus Question	How do I effectively share ideas about cultural practices which have helped to shape our national and regional identity?	How do I Construct meaning from information about Forces and Machines?	What was Jamaica's road to independence?
	Term 1 Unit 2	**Term 1 Unit 2**	**Term 1 Unit 2**
Theme	**Why are Sense Organs Important?**	**Diversity, Sustainability and Interdependence**	**The Physical Environment and Its Impact**
Sub-theme	The Skin, Nose and Tongue	Habitats	Landforms
Focus Question	How do I construct meaning from information about the senses?	How do I effectively communicate my understanding about matters related to nutrition?	How do we use our expression to show our understanding of land formations and their impact on the environment?
	Term 2 Unit 1	**Term 2 Unit 1**	**Term 2 Unit 1**
Theme	**The Physical Environment**	**Health and Well-being**	**Energy and Matter**
Sub-theme	Physical Landscape	Nutrition	Light and Sound
Focus Question	How do we communicate information about our Jamaican landscape?	How do I glean meaning from information about the ways in which people interact with the environment?	How does light behave?

OVERVIEW OF THE LANGUAGE ARTS PROGRAMME...continued

	GRADE 4	GRADE 5	GRADE 6
	Term 2 Unit 2	**Term 2 Unit 2**	**Term 2 Unit 2**
Theme	Exploring Science and the Environment	Institutions and Political Decisions	Living Things and Life Processes
Sub-theme	Water	Local Government	The Human Body System
Focus Question	How do I read, find and share information about water?	How do I effectively communicate my understanding about parish council and how this system of governance operates in the Jamaican context?	How do we use oral and written language to express our understanding of the life processes of living things?
	Term 3	**Term 3**	**Term 3**
Theme	The Physical Environment	Living Things and Life Processes	Diversity, Sustainability and Interdependence
Sub-theme	Weather	Health and Well-being Understanding Air Pollution	Diversity and Interdependence
Focus Question	How do we respond to different aspects of weather using oral and written language?	How do I read, find and share information about air pollution?	How do I describe the diversity among ethnic groups in Jamaica and the Caribbean?

OVERVIEW OF THE MATHEMATICS CONTENT GRADES 4-6

GRADE 4		
Term 1	**Term 2**	**Term 3**
Number (5 weeks) • Sets • number value • Fraction ideas • Estimation and mental calculation	**Number (3 weeks)** • Multiplication & division of whole numbers (up to 4 digits) including mental calculation • Decimals	**Number (4 weeks)** • Multiplication and division • Use of calculator
Measurement (4 weeks) • Units of measurement • Computing with units of measurement	**Measurement (2 weeks)** • Comparing length and area • Estimating and comparing measures	
Geometry (2 weeks) • Relationships between lines and angles	**Geometry (2 weeks)** • Lines of symmetry	**Geometry (2 weeks)** • Similarities and differences in shapes
	Algebra (2 weeks) • Using variables	**Algebra (2 weeks)** • Using variables
Statistics (3 weeks) • Collect, organize, interpret and display information	**Statistics (2 weeks)** • Mean • Sampling population	**Probability (2 weeks)** • Outcomes of an event

OVERVIEW OF THE MATHEMATICS CONTENT GRADES 4-6...continued

GRADE 5		
Term 1	**Term 2**	**Term 3**
Number (5 weeks) • Representation of Sets • Number value • Types of numbers	**Number (4 weeks)** • Computing with fractional numbers: addition, subtraction and multiplication. • Approximation, estimation and mental calculation. • Computing with whole numbers: division of five digit numbers by up to three digit numbers.	**Number (3 weeks)** • Use of calculator (four operations) • Roles of Financial Institutions • Problem Solving Procedures
Measurement (4 weeks) • Units of measure-ment: length, mass, temperature and liquid • Conversion between units of measurement (time, length, liquid and mass).	**Measurement (2 weeks)** • Relationship between units of measurement. • Perimeter • Units of area. • Volume	**Geometry (4 weeks)** • Make and explore Geometric shapes: • pentagon, hexagon, heptagon and octagon. • Lines of symmetry
Geometry (2 weeks) • Types of lines and angles	**Geometry (3 weeks)** • Make and explore Geometric shapes: triangles and Quadrilaterals. • Lines of symmetry	**Algebra (2 weeks)** • Using variables: application of Algebra
Statistics and Probability (3 weeks) • Sampling/population • Display and interpret information	**Algebra (2 weeks)** • Using variables: number sentences. • Using variables: substitution.	**Statistics and Probability (2 weeks)** • Measures of central tendency. • Outcomes of an event.

OVERVIEW OF THE MATHEMATICS CONTENT GRADES 4-6...continued

GRADE 5		
Term 1	**Term 2**	**Term 3**
GRADE 6		
Number (5 weeks) • Representation of Sets • Number value: exponential form • Use of Calculator	**Number (4 weeks)** • Number properties • Computing with fractional numbers: addition, subtraction, multiplication and division. • Representing shared portions (ratio and percentage).	**Number (3 weeks)** • Problem Solving Procedures
Measurement (2 weeks) • Scale drawing • Units of time • Perimeter	**Measurement (3 weeks)** • Units of area and surface area. • Derive formulae in measurement situations: volume.	**Measurement (3 weeks)** • Applying measurement formulae. • Parts of a circle. • Investigating pi.
Geometry (3 weeks) • Properties of Geometric shapes (2 D's and 3 D's)	**Geometry (2 weeks)** • Compare and contrast geometric shapes. • Congruence • Concept of Reflection within the Cartesian Plane.	**Geometry (1 week)** • Use of protractor.
	Algebra (2 weeks) • Using variables: word problems. • Using variables: number sentences. • Using variables: substitution. • Using Patterns and making predictions	**Algebra (1 week)** Simple equations
Statistics and Probability (4 weeks) • Collecting and representing data • Stem and leaf		**Statistics and Probability (3 weeks)** • Interpreting tables and graphs • Outcomes of an event.

APPENDIX III-THE MULTIGRADE LEARNER AND CHILD-CENTREDNESS

Catering to the Whole Person in a Multigrade/Diversified Classroom.

Introduction

Each learner is different and comes to the learning situation with a unique set of characteristics and needs. By ensuring that planned learning episodes take into account the different kinds of learning objectives for different aspects of human development, these needs can be appropriately met.

Consideration must be given however, to the design of the learning environment based on the learner-centred focus of the NSC- see Figure 1. By selecting and carefully analysing the objectives for each domain of development (affective, psycho-motor and cognitive), appropriate activities can be identified in the curriculum or designed by the facilitator to match these objectives.

In this document, an example is provided of how to analyse objectives and match each aspect of the objective with appropriate activities.

The Learning Environment: Supporting Holistic Development

- Inclusive
- Carebased
- Engaging
- Collaborative
- Team or Learning Community oriented
- Reflective Practice

Figure 1: The Nature of the Learning Environment emphasised by the NSC

EXAMPLE OF DIFFERENTIATION BASED ON ANALYSIS OF OBJECTIVES & CONTEXT

OBJECTIVE PER DOMAIN	EXAMPLE OF OBJECTIVES	SCOPE OF CONTENT INDICATED BY OBJECTIVES			EXAMPLE OF DIFFERENTIATION METHOD/S BASED ON TASK/IDENTIFIED FOR MULTIGRADE OR MIXED ABILITY GROUP
		Know (Concepts, Facts)	How to conduct self	DO (Key Skills & Processes to be used	
Cognitive	Design a floor plan for better management of space	Floor, plan, space, char-acteristics of floor plan	Behav-iours of managers	Designing Manage given space	**Complexity**: Break task into subtasks and assign parts or the entire task to individual or group of students based on their readiness, interest, learning style
EXAMPLE: COGNITIVE					
Affective	Listen attentively to recording on the parts of the human body	Listen, attentively, Parts of the human body	Staying focused while listening	Collect information using a recording	**Process**: Stages of listening Duration of attentive-ness required by each child or group (timeline)

MATRIX FOR INTEGRATING NSC PROBLEM SOLVING APPROACHES WITH DIFFERENTIATE INSTRUCTION MODEL

PROBLEM SOLVING MODEL (PSM)	Differentiation Method/s per Grade Level Combined		Role of Learners, Teacher, other support persons	Resources Required	
STEAM Integration: The Design Process Problem situation for learners to: Identify Problem Design a solution Examine the solution Apply the solution Look back, look forward	Grade x	Grade y	Learner Teacher: Support Person:	Grade x	Grade y
PROJECTS (R & T/ Other) Type and Scope of Project			Learners: Teacher: Support Person:		
OTHER PSM Area of focus and nature of problem:			Learners: Teacher: Support Person:		

NB: One problem situation or project idea may be used in a differentiated way. Examples of Differentiation Methods – Complexity of task, Scope of Content, Process, Pacing/Timeline agreed on, Product, Expected Outcome.

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5

Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals

Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3		Grade 5 Term 2 Unit 1	
Attainment Targets • Gain an understanding of some life processes in plants and animals, and how lifestyle choices impact health and well-being in humans. • Recognise the variety of living things, their interdependence and their inter-relationship with the environment. • Demonstrate a positive attitude towards the use of scientific language. • Demonstrate positive interpersonal skills in order to foster good working relationships			
Objectives	**Skills**	**Objectives**	**Skills**
Classify plants based on their root systems	Observe, make labelled drawings, communicate, think critically – compare Collaborate, research, analyse	Recognise the importance of plants as the food source at the start of all food chains	Collaborate, communicate, think critically (analyse, interpret)
Classify animals as vertebrates or invertebrates	Collaborate, investigate, observe, manipulate, communicate, think critically (classify, analyse, draw conclusions, justify)	Classify organisms in a food chain as producers and consumers	Collaborate, communicate, operationally define

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5

Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals

Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3		Grade 5 Term 2 Unit 1	
Objectives	Skills	Objectives	Skills
Construct graphs and analyse data collected from investigations on plants and animals	Collaborate, observe, record, measure, think critically - analyse communicate, plot graphs	Construct food chains involving producers, herbivores, carnivores and omnivores Appreciate that arrows in a food chain indicate the direction of energy flow from producers to consumers Explain how plants and animals are inter-dependent in relation to the food chain Appreciate the relationships among living things	Research, communicate, think critically (analyse, draw conclusions) Collaborate, research, communicate, classify, synthesise Research, create, communicate, think critically (evaluate, predict, make conclusions), collaborate

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5

Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals

Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3		Grade 5 Term 2 Unit 1	
Objectives	**Skills**	**Objectives**	**Skills**
Handle plants and animals with care Show concern by being responsible towards plants and animals Show curiosity in exploring plants and animals in the surroundings	(Handling animals and plants with care) (Being responsible towards plants and animals) (Showing curiosity in exploring plants and animals)	Appreciate the importance of plants in the environment and the need to preserve and protect them Infer how environmental changes can affect organisms in a food chain Offer simple explanations based on observations (evidence)	Research, create, communicate, think critically (evaluate, predict, make conclusions), collaborate
STRATEGIES Multimedia presentations, group work, demonstrations, independent work, observations, experimentation			
MATERIALS Multimedia materials on food chains, producers and consumers Pictures of animals and plants, charts, pamphlets and other written materials on food chains Stiff cardboard, Scissors, Paste, String/yarn etc., or other suitable material Plant, iodine solution, aluminum foil, paper clips or tape, computer, internet access and any other available technologies			

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5

Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals

Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ACTIVITIES Observe and make simple drawings of the external features of a grass plant with its root and leaves intact. Compare the grass plant with the pressed sample from the previous activity and record their observations (*Teacher should ensure the students focus on the similarities and differences between the root, stem, leaf and flower*). Share findings with class. In groups, compare the differences between an insect and a fish. Look inside the two animals to see if bones are present. Discuss what they have observed. Compare other animals and determine if bones are present inside. Group animals using this characteristic. (*Teacher should introduce the two main groups as vertebrates and invertebrates*) Be given other examples of animals and asked to find other ways of grouping them; based on their body covering, limbs (e.g. wings, scales, legs). Provide reasons and justifications for their observations and groupings. (*Mammals, birds, fish, amphibians and reptiles should be introduced as the main groups of vertebrates*)	ACTIVITIES In groups, be provided with examples of food from plants (e.g. carrot, pea, potato, corn, lettuce, apple, rice, mango, soya bean, grape, coconut, onion) and asked to identify and record which parts of a plant each represents. Review the types of food that supply their bodies with energy, and where these foods originate (*Teacher should guide students in tracing food from animals back to plants, e.g. beef -> grass, chicken -> corn or chicken -> worm -> cabbage*). In groups, discuss why all food sources can be traced back to plants and share their ideas with the class. (*Teacher should guide students to the realisation that plants make their own food; **photosynthesis** and its word equation should **NOT** be mentioned or treated.*) In groups, discuss and give reasons to support the statement: "Plants are producers and animals are always consumers." Share their ideas with the class to generate a simple working definition for the terms 'Producer' and 'Consumer' as it relates to feeding relationships among plants and animals.

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5
Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals
Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ACTIVITIES Select a small plant, carefully remove it from the soil, wash off the roots and place it in a trans-parent container with water. Take an initial measurement of the water level, and then continue to measure and record the water level at the same time each day, over a one-week period (*The container should be covered with only the shoot of the plant exposed*). Use the results to plot a graph showing the variation of water level during the week. Discuss the activities carried out then draw and record conclusions about the functions of the root. Write a report on the investigations outlining their observations and conclusions. Share their reports with the class.	ACTIVITIES Investigate habitats around them to determine what each animal eats OR Be given pictures of different animals to research (online/off-line) what each animal eats. Make a flow diagram to illustrate the feeding relationships, beginning with plants and ending with an animal, e.g. grass -› worm -› bird. (*At this point, teacher should introduce the term 'Food Chain' as the scientific name for the flow diagrams that represent these feeding relationships.*) In groups, research and discuss the terms – *herbivores, carnivores, omnivores* and group a given set of animals into each category. Use examples from previous activities to construct food chains with the ultimate source of energy traced to the sun e.g. Sun®grass (producer) ®cow (herbivore) ®human (omnivore). In groups, use research skills to determine the importance of plants to the environment. Answer questions such as "Why do we need plants?", "What food products do we obtain directly or indirectly from plants?", "If there were no plants, which animals would be affected?", "How would humans be affected if plants were absent?" Present findings in a variety of forms (oral, written, multi-media). Produce concept maps showing the uses or importance of plants.

APPENDIX IV Sample of Unified Elements

Science

Grade s 4 & 5

Grade 4 Term 1 Unit 3 Focus Question 2 – Plants and Animals

Grade 5 Term 2 Unit 1 Focus Question 2 - Nutrition

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ASSESSMENT CRITERIA • Drawings and labels completed to acceptable standard • Acceptable comparisons made • Conclusions supported by evidence • Sound reasons given on importance of roots • Correct measurements recorded • Graph accurately constructed • Report contains accurate observations and investigations	ASSESSMENT CRITERIA • Reasonable statement given about food sources originating with plants. • Logical associations made • Food chains correctly constructed • Producers, consumers, herbivores and carnivores correctly identified • Accurate information presented • Creative presentations produced • Visually appealing concept maps with accurate information • Logical conclusions drawn

GRADE SPECIFIC

Grade 4 Term 1 Unit 3		Grade 5 Term 2 Unit 1	
Attainment Targets • Gain an understanding of some life processes in plants and animals, and how lifestyle choices impact health and well-being in humans. • Recognise the variety of living things, their interdependence and their inter-relationship with the environment. • Gain an understanding of and apply the engineering design process. • Gain an understanding of and apply aspects of the scientific method. • Begin to appreciate the influence and limitations of science. • Demonstrate a positive attitude towards the use of scientific language. • Demonstrate positive interpersonal skills in order to foster good working relationships			
Objectives	**Skills**	**Objectives**	**Skills**
Identify and name a variety of common plants and animals including wild and cultivated/ domesticated types	Observe, record, compare, communicate, draw, think critically, research	Investigate the functions of different structures of plants (root and shoot systems) and animals	Collaborate, communicate, observe, record
Identify, draw and label the basic structure common to flowering plants and animals	Observe, make labelled drawings	Investigate the importance of light energy to plants	Collaborate, investigate, observe, record, communicate, think critically (make comparisons, draw conclusions) think critically (carry out fair tests) Gather evidence and data, create

GRADE SPECIFIC

Grade 4 Term 1 Unit 3		Grade 5 Term 2 Unit 1	
Objectives	Skills	Objectives	Skills
Compare the external features of two groups of flowering plants (a grass plant and a shrub) and animals in different habitats	Communicate, label diagrams, record, manipulate		
Explain the functions of parts of the flower	Communicate, label diagrams, record, manipulate		
Make labelled drawings of the external parts of plants	Communicate, label diagrams, record, manipulate		

STRATEGIES

Multimedia presentations, group work, demonstrations, independent work, observations, experimentation

MATERIALS

Multimedia materials on food chains, producers and consumers
Pictures of animals and plants, charts, pamphlets and other written materials on food chains
Stiff cardboard, Scissors, Paste, String/yarn etc., or other suitable material
Plant, iodine solution, aluminum foil, paper clips or tape
computer, internet access and any other available technologies

KEY VOCABULARY

Producer, consumer, herbivores, carnivores, omnivores, predator, interdependence, storage organs Root, shoot, flower, petal, sepal, tap root, fibrous root, stamen, pistil, head, limb, body, fur, scales, skin, feathers, wings, legs, aquatic, land, desert, forest, vertebrate, invertebrate, protected, endangered, birds, mammals, fish, amphibians, reptiles

GRADE SPECIFIC

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ACTIVITIES In groups, observe and record the different types of plants and animals in their community. Collect samples/take pictures/make video recordings of the organisms. With the aid of the teacher or using appropriate resource materials (online/offline), find out the names of the plants and animals they observed. Prepare a presentation (digital/non-digital) on the organisms in their community and share with the class. Observe and make simple drawings of the external features of a grass plant with its root and leaves intact. Compare the grass plant with the pressed sample and record their observations (*Teacher should ensure the students focus on the similarities and differences between the root, stem, leaf and flower*). Share findings with class. View videos or pictures of different animals in different habitats/ environments [e.g. aquatic (water), land (desert, forest etc.)] In groups, identify the animals present. Discuss why the animal is suited for that particular habitat or environment. Compare the external features of the animals (e.g. fins, feathers, fur, limbs etc.). Construct a chart using the information on the number of animals	ACTIVITIES In groups, place a healthy potted plant in dark cupboard overnight. Then, completely cover about three leaves with aluminium foil (to prevent exposure to light) and place the plant in the sun for about two hours. Observe as the teacher conducts the starch test on three covered and three uncovered leaves. Record and offer simple explanations for their observations. In groups, use the information from the grass and leaf investigations to develop a presentation (electronic/non-electronic) and share with the class. As a class, discuss and summarise the importance of sunlight to plants. (*Teacher should ensure that light is identified as a necessity for the production*

GRADE SPECIFIC

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ACTIVITIES Examine and compare a selection of storage roots, for example, carrot, sweet potato, cassava and turnip. In groups, assign one of the storage roots to research what it stores. Share findings with the class. As a class, discuss the storage of food as another function of roots. Explore other ways in which the root serves the plant. (E.g. absorbing substances and reproduction). Produce a class display to illustrate their findings, giving appropriate examples. In groups place the shoot of a soft stemmed plant (such as *Impatiens* or Celery) in coloured water (red food colouring recommended). Observe after about 40 minutes and record findings in a variety of ways. Suggest what they think is the function of the stem. Share observations and ideas with the class. As a class, visit a zoo or view animals in their natural habitats. Investigate how the animal moves, eats, behaves and blends in the environment. For example, examine how the lizard, grasshopper blends in the environment by changing colour when a predator or prey is near. Suggest reasons for changing colours. In groups, investigate the movements and behaviour of fish in an aquarium and compare this to monkeys in a cage. Compare the use of the tail in other animals. Present findings to the class in a variety of ways.	**ACTIVITIES** In groups, place a healthy potted plant in dark cupboard overnight. Then, completely cover about three leaves with aluminium foil (to prevent exposure to light) and place the plant in the sun for about two hours. Observe as the teacher conducts the starch test on three covered and three uncovered leaves. Record and offer simple explanations for their observations. In groups, use the information from the grass and leaf investigations to develop a presentation (electronic/non-electronic) and share with the class. As a class, discuss and summarise the importance of sunlight to plants. (*Teacher should ensure that light is identified as a necessity for the production*

GRADE SPECIFIC

Grade 4 Term 1 Unit 3	Grade 5 Term 2 Unit 1
ASSESSMENT CRITERIA • A variety of plants and animals correctly identified • Accurate observations noted • Creative presentations with correct information • Drawings and labels completed to acceptable standard • Acceptable comparisons made • Animals correctly identified • Charts contain accurate information • Logical conclusions drawn about why animals are suited for their environments • Animals correctly classified based on external features • Creative presentation contains accurate information	ASSESSMENT CRITERIA • Food samples correctly matched to parts of the plant. • Accurate observations made • Acceptable explanations offered for results obtained. • Presentation accurately captures entire investigative process including results obtained. •

APPENDIX V—THE NSC GRADES 1-3 CURRICULUM

The Integrated NSC Grades 1-3 Curriculum

One may have the impression so far, that the reason for unifying curriculum elements is because of the necessity to teach multigrade classes. This is only one reason. The NSC grades 1-3 curriculum is, in fact, **predicated on integration** as all best practice tells us that young children learn optimally , not in a context of discrete subjects , but one in which these young learners are taken through complete experiences that allow them to begin to develop different skills and abilities they need to acquire. We do well to remember that the approach to curriculum delivery **throughout** the NSC Grades 1-3, despite being written for monograde classes, is integrated, and not so much because of the multigrade necessity, but because it is a good way for young children to learn.

The following is extracted from the NSC Grades 1-3 curriculum guide:

An integrated curriculum is an approach that starts with the holistic experience of the child and purposefully draws together knowledge, skills, attitudes and values from within or across subject areas to develop a more powerful understanding of key ideas. It provides an interconnected and interwoven approach in which learning experiences are inextricably linked and become more meaningful for the young learner. However, the design of an integrated curriculum also addresses the skills and understandings that are specific to the individual key learning areas. These discipline-specific skills are included in the early learning standards, which are used to generate the integrated units. They form an 'underpinning architecture' on which the integrated curriculum is based and on which the curriculum for Grades 4 upwards may be developed.

The following instructions to the teacher also appear in the (monograde) Grades 1-3 curriculum guide:

Teachers will need to ensure that they:

- Read the entire Unit before starting to plan their integrated lessons for the term. This will give teachers a holistic overview of everything that is to be covered under the theme of the Unit and develop a better understanding of the complete context and content for the learning of their class for the term.
- Create the learning maps
- Use the 5Es instructional design to plan and write the lesson
- Read the discrete Language Arts and Mathematics programme for the term and identify opportunities where concepts can be infused and reinforced during the integrated curriculum
- Plan their lessons carefully to ensure that they are able to cover all of the identified curriculum for the term
- Make lessons enjoyable and exciting for children and use other ideas and strategies that they may have to compliment the integrated curriculum
- Plan their weekly timetable to ensure that children have a holistic curriculum and a variety of different activities distributed throughout the week to ensure that they are receiving a broad and balanced curriculum
- Familiarize themselves with the definitions used in the curriculum documentation. The definitions for the core curriculum language used, can be found on the final pages of the Grades 1, 2 & 3 Teacher's Guides
- Identify key resources that will enable the delivery of the curriculum
- Identify any items or resources that they will need children to bring to school or that parents can assist with, for example photographs of themselves for the Unit entitled Who Am I?

Grade 1

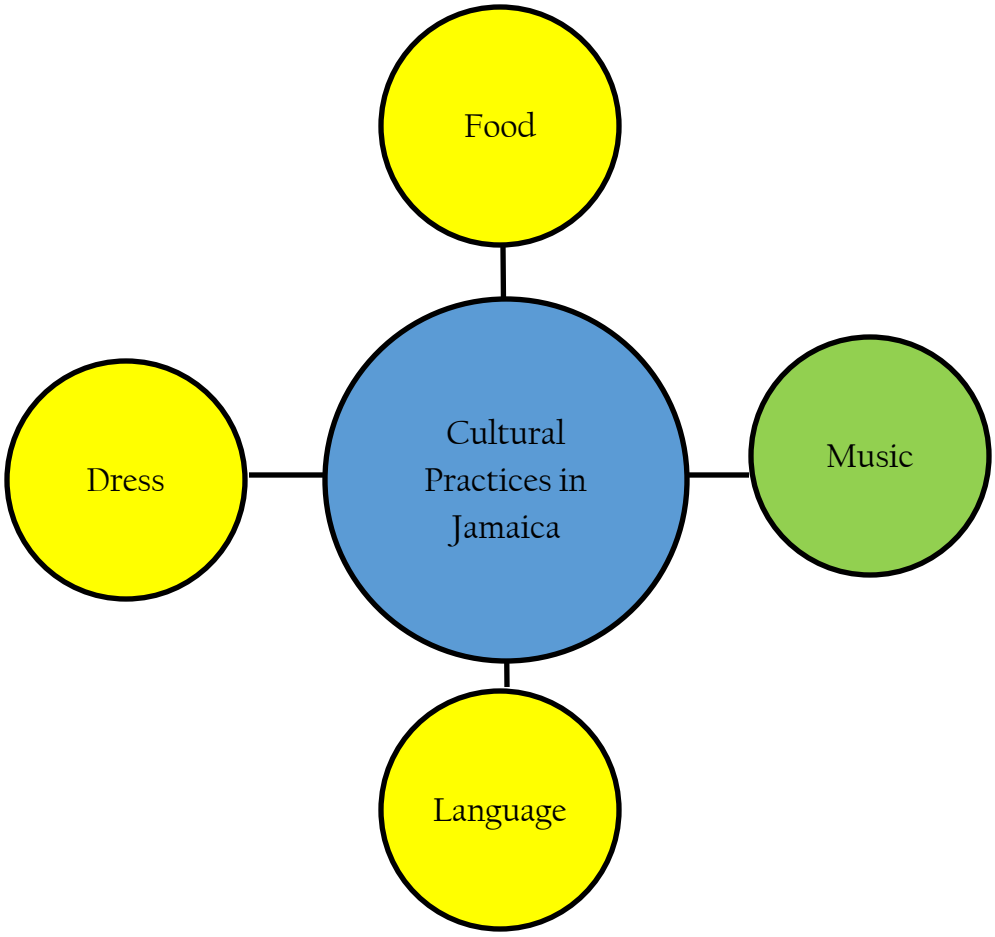
It is the practice in many multigrade settings in Jamaica, nevertheless, to have teachers working with grade 1 on its own. Sometimes grade 1 is combined with grade 2, (in which case, the teacher utilizes similar strategies to combine grade 2 with grade 3) but many times teachers find it necessary to work separately with grade 1 to ensure that the beginning skills are adequately developed. Since no specific adjustment would now be necessary for a multigrade combination, the lessons for Grade 1 in the NSC guides may be used as presented. By the same token, teachers have been advised that it is awkward to combine Grades 3 & 4 since it will be challenging to combine the integrated Grade 3 curriculum with an independent Grade 4.

Subject: Language Arts
Grades 4 & 5
Strand: Listening and Speaking
Duration: One hour

Grade 4	Grade 5
Focus Question How do I effectively share ideas about cultural practices which have helped to shape our national and regional identity?	**Focus Question** How do I construct meaning from information about machines?
Objectives • Monitor their own listening and that of their peers by applying specific strategies • Extract relevant information from different media and respond to information gleaned • Speak fluently and confidently using SJE/JC • Demonstrate respect for other participants and their ideas	**Objectives** • Listen to, recall/recount specific information • Listen to and communicate understanding of intended messages • Translate common JC phrases to SJE • Participate in discussions and react sensitively to other speakers • Use ICT tools to research and communicate information
Key Vocabulary	
Proverb, graphic organiser	Proverb, graphic organiser
Skills	
Interpreting proverbs, translating proverbs, extracting relevant information ,speaking fluently and confidently in SJE/JC, working cooperatively	Interpreting proverbs, translating proverbs, extracting relevant information , speaking fluently and confidently in SJE/JC
Materials	
Basket of proverbs Video on cultural practices in Jamaica Chart with blank web on cultural practices	Basket of proverbs Graphic organiser with traditional machines

Grade 4	Grade 5
Activities	
Engage (20 minutes)	
Each student will select a proverb from the basket, and say what he/she thinks it means in SJE. Examples of such proverbs are: *Me nuh nyam rice when it hot* *Cow neva know de use of him tail till it cut off* *One one cocoa full basket* *A nuh every pan knock we fi dance* The teacher will explain that students should not take the proverbs literally, and will use a proverb to explain Teacher will explain that the activity on Jamaican proverbs is an introduction to exploring other aspects of Jamaican culture.	
Explore & Explain	
Students will be given a video (on cultural practices in Jamaica) to watch. They will be given a template in the form of a web to capture information from the video.	Students will carry out research on traditional machines used in Jamaican homes and offices. They will be provided with graphic organisers to provide the uses of some of these machines and tools. Students will then select one of the machines and carry out online research to identify its modern counterpart. They will make a presentation to the rest of the grade group on the advantages or improvements of the new machine (or version of it) over the old.

GRADE 5 ORGANIZER



Match the machines or tools used in early Jamaican homes and offices with their uses.

Machine/Tool	Use
Sugar mill	
Grater	
Strainer	
Corkscrew	
Can Opener	
Mortar and Pestle	
Rolling pin	
Typewriter	
Duplicator	

Elaborate & Evaluate

Grade 4 students will present their web to the rest of the class and invite clarifying questions.

Grade 5 students will present their graphic organiser and the results of the research on their selected machine to the rest of the class. The presenters will invite the audience to ask questions on any part of the presentation.

The presentations will be assessed by the teacher and students - selected by the teacher, using a simple rubric which will cover aspects such as:

- *The level of confidence and fluency displayed by the presenters (Grades 4 and 5)*
- *The level of attention paid to the presenters by the audience (Grades 4 and 5)*
- *The level of respect shown to the ideas of the presenters (Grades 4 and 5)*
- *The level of sensitivity shown to the other members of the audience while they ask questions and get their questions answered (Grades 4 and 5)*
- *The completeness of the information filled out on the web (Grade 4)*
- *The completeness of the graphic organiser - using information gained from online research (Grade 5)*

Students will write two paragraphs on one cultural practice in Jamaica *(The teacher will evaluate the ability of the students to extract information from the video and the presentation)*	Students will write three paragraphs on the evolution of a machine in current use in Jamaica. *Listening and communicating understanding of messages*

Grades: 4 and 5
Subject: Science
Multigrade Unit Topic: Plants and Animals and Nutrition
Composite Lesson Topic: Plants, Animals and Nutrition
Duration: 2 1hour lessons

Content Outline	
Grade 4	**Grade 5**
• Plants can be divided into two groups; those that produce flowers (flowering plants) and those that do not. • The main parts of the flowering plant are the root, shoot and the flower. • The root, which is usually below the ground, anchors the plant, transports water and nutrients from the soil, and in some cases stores food. • The shoot system is above the ground and consists of the leaves, buds, flowers and stems. The stem holds the leaves and transports and stores food, while the leaves are needed for the plants to make food. • A habitat describes a place where an animal or plant lives. All the needs of the animals are provided by the habitat. • Animals have a basic structure which includes a head, body, limbs, tail and sense organs (e.g. eyes and ears) • Animals can be differentiated based on where they live, what covers their body and whether they have bones on the inside or outside.	• Plants make their own food and store the excess. • Green plants need sunlight to produce their food. • All food chains begin with a plant (producer). • Food chains represent feeding relationships and the flow of energy from plants through each feeding level/organism in the food chain. • All living organisms are inter-dependent.

Grades: 4 and 5
Subject: Science
Multigrade Unit Topic: Plants and Animals and Nutrition
Composite Lesson Topic: Plants, Animals and Nutrition

Grade 4	Grade 5
Focus Question What are the functions of some external features of plants and animals?	**Focus Question** How do plants and animals interact?
Attainment Target: • Recognise the variety of living things, their interdependence and their inter-relationship with the environment.	**Attainment Target:** Recognise the variety of living things, their interdependence and their inter-relationship with the environment.
Objectives – Lesson 1	
• Identify and name a variety of common plants and animals including wild and cultivated/ domesticated types • Identify, draw and label the basic structure common to flowering plants and animals • Construct graphs and analyse data collected from investigations on plants and animals • Make labelled drawings of the external parts of plants • Show curiosity in exploring plants and animals in the surroundings	• Recognise the importance of plants as the food source at the start of all food chains • Classify organisms in a food chain as producers and consumers • Construct food chains involving producers, herbivores, carnivores and omnivores • Work cooperatively in groups

Grade 4	Grade 5
Objectives – Lesson 2	
• Investigate the functions of different structures of plants (root and shoot systems) and animals • Handle plants and animals with care • Show concern by being responsible towards plants and animals	• Appreciate that arrows in a food chain indicate the direction of energy flow from producers to consumers • Explain how plants and animals are interdependent in relation to the food chain • Appreciate the feeding relationships among living things • Infer how environmental changes can affect organisms in a food chain • Work cooperatively in groups
Key Vocabulary	
Root, shoot, flower, leaf, stem, head, limb, body, fur, scales, skin, feathers, wings, legs, aquatic, land, desert, forest,	Food chain, producer, consumer, herbivores, carnivores, omnivores, predator, prey, interdependence.
Skills	
Observe, make labelled drawings, communicate, collaborate, investigate, manipulate, measure, plot graph, research, think critically – compare, classify, draw conclusions, interpret,	Collaborate, research, communicate, observe, create, manipulate, think critically – classify, analyse, synthesise, draw conclusions
Materials	
Samples of different plants and animals, video/ pictures of animals in different habitats (fresh water, ocean, desert, grassland, forest), live animals (fish, lizards, insects, grasshoppers etc.). School grounds or (Protected parks and zoos), teacher-made worksheet and tables, digital camera, Internet, computer.	Multimedia materials on food chains, producers and consumers. Pictures of animals and plants, charts, pamphlets and other written materials on food chains Stiff cardboard, scissors, paste, string/ yarn etc., or other suitable material, paper clips or tape, computer, internet access and any other available technologies

Grade 4	Grade 5
Explore	
Students will observe and make simple drawings of the external features of the plants and animal samples taken from their 'nature walk'. Students will compare all the plants and all the animals and say what are common to both groups. The terms leaf, root, stem, flower, head, limbs, body, tail, sense organs will be given and students asked to place these on a generalized drawing of an animal/ or plant.	**Students will** examine samples of the plants and animals collected to determine what each animal eats. Given additional examples (pictures) of animals students will group them using a Venn Diagram into those that eat plants only, animals only or both.
Explain	
Students will present findings of the plants/ animals they found and say what is common to the different groups. Students will present their labelled diagrams and indicate how the names were assigned.	Students will present their diagrams and suggest the terms used to describe these animals as herbivores, carnivores and omnivores. Students will peer-assess the diagrams presented to determine correct grouping.
Elaborate	
Students will be asked to count the number of plants and animals found in the different areas visited. The information given will be placed on a bar chart. Students will suggest why more animals or plants are found in different places. *Teacher will guide students to note that animals and plants may differ in the habitats/ environments in which they are found.*	Students will trace some of the foods they eat such as meats and vegetables and where these foods originate. The feeding relationships between the humans, animals and plants will be depicted and arrows used to show what is eaten by whom. Students will then need to determine where all the chains start. The position of producers (from plants) will be highlighted. Students will also suggest where the plants get their energy to make foods. In groups, students will construct definitions for producers and consumers. *Teacher will introduce the term food chains to describe the feeding relationships.*

Grade 4	Grade 5
Evaluate	
• Students will complete the observation sheet provided by the teacher. • The graphs constructed with the information collected from the nature walk and conclusions made by students will be assessed.	• Students will peer-assess the Venn Diagrams created. • Given the names (or pictures) of selected animals and plants, students will construct food chains will the ultimate source of energy traced back to the Sun.
Extended Learning: Grade 4 students will make labelled drawings of a plant following instructions given by the teacher.	**Extended Learning:** Students will write a paragraph about their experience outdoors observing plants and animals, and about the precautions they took to care for the environment.
Engage: Lesson 2 Students will view a video of different environments/ habitats. Students will discuss what would happen in these environments if plants were removed. The important role of the plants in providing food and shelter for animals will be highlighted.	
Explore and Explain	
In groups, students will note the animals and plants shown in the video. They will suggest what external features are different among the plants (e.g. Grass plant and shrub) and animals (lion, fish, bird etc.). Differences in roots and leaves (for plants) and body covering (for animals) will be brought out. Students will be asked to group the plants and animals based on these features and explain their choices.	From the video presented, students will construct as many food chains as possible, noting the producer, consumer, predator and prey. Food chains will be drawn on cardboards for display. Teacher and students will assess the food chains presented.

Grade 4	Grade 5
Evaluate	
• Students will complete the observation sheet provided by the teacher. • The graphs constructed with the information collected from the nature walk and conclusions made by students will be assessed.	• Students will peer-assess the Venn Diagrams created. • Given the names (or pictures) of selected animals and plants, students will construct food chains will the ultimate source of energy traced back to the Sun.
Extended Learning: Grade 4 students will make labelled drawings of a plant following instructions given by the teacher.	**Extended Learning:** Students will write a paragraph about their experience outdoors observing plants and animals, and about the precautions they took to care for the environment.
Engage: Lesson 2 Students will view a video of different environments/ habitats. Students will discuss what would happen in these environments if plants were removed. The important role of the plants in providing food and shelter for animals will be highlighted.	
Explore and Explain	
In groups, students will note the animals and plants shown in the video. They will suggest what external features are different among the plants (e.g. Grass plant and shrub) and animals (lion, fish, bird etc.). Differences in roots and leaves (for plants) and body covering (for animals) will be brought out. Students will be asked to group the plants and animals based on these features and explain their choices.	From the video presented, students will construct as many food chains as possible, noting the producer, consumer, predator and prey. Food chains will be drawn on cardboards for display. Teacher and students will assess the food chains presented.

Elaborate and Explain	
Students will discuss why some animals are only found in some environments/ habitats. For example, What external features would enable the fish to live in the sea and the polar bear to live in the Arctic? Suggest the importance of features such as fins, scales, fur, hair, large eyes etc. in a teacher-prepared table.	From the food chains created and video shown earlier, students will suggest how the food chains will be affected if certain animals were removed (or increased) or if certain environmental conditions changed (e.g. flooding, drought etc.). Students will be given worksheet questions to complete.
Evaluate:	**Evaluate:**
Table showing the importance of the external features will be assessed. Students will group animals and plants given based on external features.	Created food chains will be assessed using a rubric. Worksheet questions will be marked by the teacher.
Extended Learning:	**Extended Learning:**
Grade 4: Research an animal not common to them and make a presentation (in different ways) on the features of the animal, where it lives, what it eats and what threatens its survival.	Grade 5: Investigate the formation of food webs. Use the food chains created to form a food web.
Links to Other Subjects: Mathematics, Language Arts, IT and Art	
Post Lesson Reflection:	

Subject: Mathematics
Grades 4 & 5
Strand: Number
Composite Lesson Topic: Sets
Duration: 3 Hours

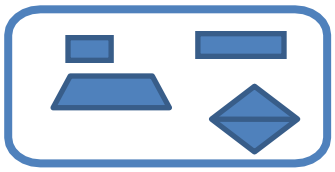
Grade 4	Grade 5
Focus Question What do I need to know about sets?	**Focus Question** In what ways are sets represented?
Objectives • Define the concept " set" • Describe a set • Name and list members of any given set.	**Objectives** • Describe a set as being finite, infinite or empty • Differentiate between sets of counting, whole, odd, even, prime, composite and fractional numbers
Key Vocabulary	
Sets, members, elements, finite, equal, equivalent, empty, well-defined	Sets, members, elements, finite, equal, equivalent, empty, real
Skills	
Sort objects, describe groups, sketch groups, label sets, list members, define terms, and brainstorm	Describe sets, differentiate between sets.
Materials	
Collection of objects with similar and different characteristics, grade level activity sheets on sets	Collection of objects with similar and different characteristics, grade level activity sheets on sets
Activities	
Engage	
Students will be engaged in a brainstorming session to determine their prior knowledge of sets. In groups, students will sort solid objects from the classroom into sets according to their sizes, shapes, colours, texture, and purposes. They will sketch and label what each set looks like, and discuss and describe each set of objects that was sorted.	

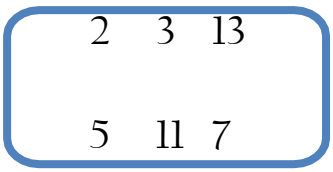
Grade 4	Grade 5
Explore	**Explore**
Students will engage in a discussion and demonstration that will enable them to conclude that a collection of objects with similar characteristics is called a set. In pairs, students will list as many items as possible that they can find within the classroom or in the school and sort them according to similarities. Students will be guided by the teacher to conclude that the items listed are called members or elements, and that the "well defined" objects belonging to a set are called members or elements of the set.	Students will complete a written exercise which will require them to recall the definition of the terms: *sets*, *members/ elements*, *finite*, *equal*, *equivalent*, *empty*, *well-defined*, *real*. The activity will also introduce the terms: *intersection*, *union*, *subset*, *universal set*. In groups, students will be allocated selected scenarios outside of the school environment (supermarket, hospital, post office, etc.) and asked to create as many sets as possible from the site allocated.
Explain	
Students will identify the characteristic which determined the members of the sets they created. With the assistance of the teacher, they will, in pairs, give a suitable name to describe the set they have created (finite, infinite, null/empty). They will then share the name of their sets with the other members of their grade group.	Students will present the sets they have created to the other members of their grade group, giving reasons why each element was included in a particular set, and naming the type of set created.
Elaborate	
Students will work in pairs in an exercise to name given sets, and to list members of given sets.	Students will be given an exercise with examples of sets with real numbers. They will be required to differentiate between them, using the appropriate symbols (e.g. $\{\}$, $=$, $\cap$, Σ)

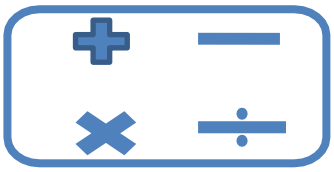
Grade 4	Grade 5
Key Concepts	
A set is a well-defined collection of objects. That is, all the objects have something in common and can be identified as belonging to the set. For example: • The set of classrooms in St. John's Primary School. • The set of counting numbers from 1-10	
Evaluate	
Students will be given an exercise to determine the most suitable name for each given set, giving reasons for their choice. They will also be asked to name sets of four elements from five elements given, and state in each case, why the fifth element is not a member of the set (See an example of the Grade 4 worksheet on sets below)	Students will be given a timed exercise to determine types of sets and relationships between them.
Open Project	
Students will be asked to create an e-album or scrap book showing different types of sets. They will present the album in class on a day announced by the teacher. They may use printed or hand-written material, but students with access to electronic technology may use PowerPoint or video presentation or any form of software/devices that will enhance the presentation. The projects will be rated using an appropriate rubric for each grade level.	

GRADE 4 WORKSHEET ON SETS

I. Give the most suitable name to each of the following sets. Give a reason for your answer.







_____ _____ _____

_____

_____

_____

II. Give two descriptions of each of the following sets so that:

- All the members listed are a part of the set;
- At least one member would not belong to the set.

State which one does not belong. The first one has been done for you.

Example: 1. **zebra**, lion, elephant, kitten

___Set of Animals

___Set of wild animals. **The kitten is not a wild animal**

2. tack, pliers, wrench, screwdriver ____
3. half, four-ninths, eight-sixteenths, six-twelfths _____
4. bar graph, pie chart, questionnaire, tally chart _____
5. two, four, six, seven _____
6. pen, pencil, crayon, ruler _____
7. centimetre, degrees Celsius, kilometre, millimetre _____
8. leave, arrive, depart, go ____
9. horse, puppy, chick, duckling ____
10. newspaper, radio, book, magazine ___
11. eyes, nose, mouth, foot ____

GRADE 5 WORKSHEET ON SETS

We know that a set is **finite** when we can write down or count all the members.
A set is **infinite** when it is not possible to write down or count all the members.

1. State, whether each set is **finite or infinite**:

(i) {5, 7, 9...} _____
(ii) {1, 2, 3, 4} _____
(iii) {20, 30, 40, 50... 300} _____
(iv) {7, 14, 21... 2401} _____
(v) {All people in the world} _____
(vi) Set of integers _____
(vii) {Multiples of 5} _____
(viii) {Fractions between 1 and 2} _____
(ix) Set of trees in the world _____
(x) Set of prime numbers _____
(xi) Set of leaves on a tree _____
(xii) Set of children in all the schools of Jamaica} _____

We know, two sets are **equal** (=) when they have the same elements. The order does not matter. Two sets **are equivalent** when they have the same number of elements whether the elements are the same or not.

2. State, whether each pair of sets, given below, has **equal sets** or **equivalent sets**:

(i) {3, 5, 7} and {5, 3, 7} _____
(ii) {8, 6, 10, 12} and {3, 2, 4, 6} _____
(iii) {7, 7, 2, 1, 2} and {1, 2, 7} _____
(iv) {1 4, 9, 16, 25} and $\{1^2, 2^2, 3^2, 4^2, 5^2\}$ _____

We know, the set which contains no element is called an empty set. It is also known as null set or void set.

3. Which of the following sets are **empty**?

(i) Set of counting numbers between 5 and 6. _____

(ii) Set of odd numbers between 7 and 19. _____

(iii) Set of odd numbers between 7 and 9. _____

(iv) Set of even numbers which are not divisible by 2. _____

(v) {0} _____

(vi) { } _____

(vii) {Prime numbers between 7 and 11} _____

The intersection of two sets is the set of elements common to both sets. The union of two sets is the set of elements contained in both sets. An element is written only once. The symbol for intersection is ∩ and the symbol for union is ∪.

4. State whether the following are **true** or **false:**

(i) If A = {3, 4, 5} and B = {4, 8, 12, 16}; then A ∪ B = {3, 4, 5, 8, 12, 16}._____

(ii) If P = {a, b, c} and Q = {b, c, d}; then p ∩ Q = {b, c}. _____

Union of two sets is the set of elements which are common to both sets.

_____

Adapted from: https://www.math-only-math.com

APPENDIX VI

Monitoring/Evaluation Instruments for Teachers and Students

Example of a Rubric for Evaluating a Product -Social Studies- Grades 4-5

Criteria for a Model of the Solar System

- All the planets must be represented.
- The planets are placed in the right order and distance from the sun indicated
- The relative sizes of the planets are represented and ringed planets are shown.
- The model is sturdy and is generally a good representation of the solar system

Characteristics	Accurate	Needs Improvement	Poor
Representation of the planets	All 8 planets are present and labelled (2)	The eight planets are present but only 6 or 7 labelled (1)	Less than or more than eight planets represented (0)
Order of planets and distance from the sun	The order of planets is correct and distance of each from the sun indicated (2).	The order of the eight planets is correct but the distance from the sun is not indicated for all 8 planets(1)	Order of the planets incorrect and distance from the sun not indicated. (0)
Relative sizes of the planets and indication of rings	The relative sizes of the planets are portrayed and rings are indicated where present (2).	The relative sizes of the planets are portrayed but ringed planets are not indicated (1).	The relative sizes of the planets are not portrayed and ringed planets are not indicated (0)
Appearance and sturdiness of model	The model is sturdy and is a good representation of the solar system (2)	The model is sturdy and is a fairly good representation of the solar system (1)	The model is fragile and not a good representation of the solar system(0)
Rating of Total Scores: 8 – Excellent, 6-7 Good, 4-5 Needs improvement, 0-3 Poor.			

A SAMPLE LANGUAGE ARTS PRESENTATION RUBRIC FOR GRADES 1-3

Place a tick (✓) under the right face for each sentence

Sample Rubric For Stories
Grade 2

My Smiley Faces	What My Story Has
	My story has a title.
	My story has a beginning.
	My story has a middle.
	My story has an end.
 	My story has complete sentences.

Sample Rubric For Stories
Grade 3

My Smiley Face	The Elements of My Story	My Mark
	My story has a title.	20%
	My story has a title. My story has a clear beginning. I have shown the beginning on my graphic organiser.	40%
	My story has a title. My story has a clear beginning. My story has a clear middle. I have shown the beginning and middle on my graphic organiser.	60%
	My story has a title. My story has a clear beginning. My story has a clear middle. My story has a clear end. I have shown the three parts on my graphic organiser.	80%
	My story has a title. My story has a clear beginning. My story has a clear middle. My story has a clear end. I have shown the three parts of the story on my graphic organiser. My story has complete sentences.	100%

A Sample Language Arts Presentation Rubric for Grades 1-3

Place a tick (✓) under the right face for each sentence

I Make My Presentation	Still Learning	Sometimes	Always
I wait until the people I am speaking to are ready.			
I have a title.			
I plan a beginning, a middle and an end.			
I use pictures and drawings.			
I use other things (e.g. models, toys, songs) to help me in my presentation.			
I look at the people I am speaking to (my audience)			
I speak that others can hear me clearly			

A Sample Language Arts Presentation Rubric for Grades 1-3...continued

Place a tick (✓) under the right face for each sentence

I answer questions from my audience			
I thank my audience for listening			

Teacher's Classroom Checklist

1 Getting Students' Attention

#	Item	✓ or X
1	I engage students at the beginning of a lesson (I ask an interesting, speculative question, show a picture or video, tell a little story, or read a related poem to generate discussion and interest).	
2	I frequently use dramatic presentations.	
3	I frequently use storytelling.	
4	I use mystery (e.g. conceal for a while, an object related to an up-coming lesson)	
5	I use auditory signals (music, bell, etc.)	
6	I vary my tone of voice.	
7	I use visual signals (raising of the hands until silence is achieved)	
8	I speak clearly and give clear signals	
9	I use colour (coloured paper, coloured dry erase markers on the whiteboard, etc.)	
10	I model the excitement I would like students to portray	
11	I use eye contact.	

Teacher's Classroom Checklist

II Focussing Student's Attention

12	I project my voice to make sure I can be heard clearly by all students.	
13	I lessen competing sounds in the environment	
14	I get students sitting close as possible to me during a whole class session	
15	I explain the aim of the lesson and relevance to every-day life	
16	I incorporate demonstrations and hands-on presentations whenever possible.	
17	I use graphic organisers and other means to help students to organise information	
18	I use visuals (pictures, diagrams, gestures, manipulatives, etc.)	
19	I use copious illustrations	
20	I remove material from the board or screen which I don't want students to focus on.	
21	I allow students to write down what they understand in their own words.	

Teacher's Classroom Checklist

III Maintaining Student's Attention

22	I move around in the classroom to maintain my visibility.	
23	I teach thematically whenever possible, allowing for integration of ideas/concepts across topics and grade levels.	
24	I have students participate in lessons at a lively, brisk pace.	
25	I avoid lag time in student engagement.	
26	I use pictures, diagrams, gestures, manipulatives, and high interest materials.	
27	I use higher-level questioning techniques, using questions that are open-ended, require reasoning, and stimulate critical thinking and discussion	
28	I keep students engaged in student-centred activities	
29	I structure the lesson so that pairs or small groups can be engaged for maximum student involvement and attention.	
30	I allow students to assign roles in cooperative learning groups (e.g. recorder, reporter time-keeper, etc.)	
31	I allow-students to report on their group work using the whiteboard, multimedia projector, or other equipment/materials	
32	I use the computer with relevant exercises for practice and skill building	

MULTIGRADE LESSON PLAN CHECKLIST

Please check the most appropriate box

Teacher's Classroom Checklist

Lesson Evaluation	1 Needs Improvement	2 Satisfactory	3 Very Good
1. Is the plan reflecting more than one curriculum?			
2. Are the objectives unified?			
3. Are the objectives SMART?			
4. Is the timeframe for teaching the lesson realistic? • Does the lesson flow well? • Is it well-paced?			
5. Is the content correctly and adequately covered and/or appropriate for the age and stage of the students?			
6. Are the activities aligned to the objectives? **Are activities in logical and effective sequence?**			
7. Does the lesson cater to students' varied needs? - Range of abilities - Age and stage of development etc.			
8. Is the lesson student- centred?			
9. Are the 5 E's appropriately reflected in the plan?			
10. Are the strategies and approaches appropriate?			

MULTIGRADE LESSON PLAN CHECKLIST

Please check the most appropriate box

Teacher's Classroom Checklist

Lesson Evaluation	1 Needs Improvement	2 Satisfactory	3 Very Good
11. Is the lesson appropriately structured for students? E.g. ◊ Small groups ◊ Individual ◊ Whole class ◊ Hands on activity ◊ Taking notes			
12. Are the resources appropriately used? E.g. • Manipulative • Visual displays • Hand-outs/ text • Audio-visuals (TV, Videos)			
13. Is there evidence of appropriate assessment throughout the lesson? • Pre lesson— • the methods that will be used • Informal/formal? • Post Lesson—were learning outcomes achieved?			

A SAMPLE CHECKLIST FOR EDITING A LETTER

(Can be used by students in self and peer editing)

Item	Scoring (✓ or X)
Format	
The address is correctly written	
The date is written	
The salutation (or greeting) is present	
The body of the letter is in the correct position	
The complimentary close is present	
Mechanics	
Sentences begin with a capital letter and end with a full stop (or? or!)	
The tenses are correctly used	
Subjects and verbs agree	
There is proper punctuation	
Words are correctly spelt	
Content	
The message is clear and addresses the instructions/context given	
Thoughts are complete and well organized (sequenced ---beginning, middle and end)	

Scoring The value of each item is one mark. The highest possible mark is therefore 10. The work may be rated depending on the marks received, for example:
9-10: Excellent/ 7-8: Good /5-6: Satisfactory /1-4: Unsatisfactory

APPENDIX VIII

Examples of Stories for Use with the Subtheme:
Who am I?

Examples of Stories for Use with the Subtheme Who am I?

STORIES FOR AGES 3 - 7

Literacy 1-2-3 Series distributed by the Ministry of Education.

A, My Name is Alice by Jane Bayer and Steven Kellogg (Steven Kellogg, Illustrator) Publisher: Puffin Books (1987)
The well-known jump rope ditty which is built on letters of the alphabet is illustrated with animals from all over the world. Help children think of similar chants of their own names!

Meet Bintah by Ihenyen Ejodame. (Richard Paisley, Illustrator) Publisher: Carlong Publishers (2018)
Bintah, an endearing girl turtle, lives on Spring Island which is located vaguely somewhere in the Caribbean. We also meet Bintah's family and friends and find out what Bintah likes to eat.

Catalina Magdalina Hoopensteiner Wallendiner Hogan Logan Bogan Was Her Name by Tedd Arnold. Publisher: Scholastic (2004).
This publication presents the words--and varying forms of the name--of a classic camp song that dates at least from the 1940s. She had two holes on the bottom of her nose--one for her fingers, and one for her toes! Though she has two arms that drag along the ground, two feet bigger than a bathroom mat, and just two teeth in her mouth, life for Catalina is full and fun!

Chrysanthemum by Kevin Henkes Publisher: Mulberry Bools (2008)
This work is also available as a big book, as a DVD and in other formats. Chrysanthemum thinks her name is absolutely perfect, until her first day of school. "You're named after a flower!" teases Victoria. "Let's smell her," says Jo. Chrysanthemum wilts. What will it take to make her blossom again?

Edmund for Short: A Tale from China Plate Farm by Chris Jackson. Publisher: Harper Collins Canada (1998)
When Edmund the pig discovers that the cows on China Plate Farm all have grand names based on their body markings, he decides to mark himself so he can have a grand name of his own, but nobody notices, as a new calf is being born on the farm.

Andy: That's My Name by Tomie DePaola. Publisher: Aladdin (1991)
Andy's friends construct different words from his name: "an" words, "and" words, and "andy" words.

Call Me Little Echo Hawk by Terry EchoHawk. Publisher: Cedar Fort (2005)
Every child has a name, and the story of Echo Hawk will motivate children everywhere to seek out stories about their own names. In "Call Me Little Echo Hawk," children will also learn to be proud of their heritage and their ancestors.

Christopher Changes His Name by Itah Sadu Christopher (Roy Condy, Illustrator) Publisher: Firefly Books (1998)
Mulamba is tired of being one of three boys with the same first name in his class, so he picks out a series of new names honouring a variety of black heroes, from the star of his aunt's Trinidadian folktales to scientist Elijah McCoy to Michael Jordan, but in the process his own name gets lost.

The First Thing My Mama Told Me by Susan Marie Swanson (Christine Davenier, Illustrator) Publisher: Harcourt Inc. (2002)
A young girl celebrates the name that was chosen just for her. "When I was born, the first thing my mama told me was my name". Lucy remembers lots of things about her name. Seven-year-old Lucy describes special memories about her name from each of her birthdays.

Hope by Isabell Monk. (Janice Lee Porter, Illustrator) Publisher: Turtleback Books (2004)
Isabell Monk's depiction of how a girl learns about her rich biracial heritage will help all children see themselves with pride and self-respect.

I Am Renè, the Boy by Rene Colato Lainez.(Fabiola Graullera Ramirez, Illustrator) Publisher: Piñata Books (2005)
When Renè learns that his name is also a girl's name, he does some research and relates the name's meaning and letters to his homeland of El Salvador and the things that make him special.

Ivan to Make You Laugh: Jokes about Novel, Nifty, and Notorious Names by Scott K. Peterson, Ann Walton, Sam Schultz, Rick Walton Publisher: Lerner Publishing Group (2004).

The writers present a variety of jokes about people's names.

Josephina Hates Her Name by Diana Engel. Publisher: The Feminist Press (1999)
After Grandma explains that she named Josephina after her talented, daring older sister, Josephina starts to appreciate her unusual name.

A Lion Named Shirley Williamson by Bernard Waber. Publisher: HMH Books for Young Readers (2000)
The lions at the zoo are jealous of the new lioness because of her fancy name and because of the special treatment she receives from the Zookeeper.

Merry Christmas, What's Your Name by Bernice Chardiet and Grace Maccarone. Publisher: Scholastic (1990)
When a little girl changes her name to one she likes better, she starts a trend among her classmates that leads to complete confusion.

Mommy Doesn't Know My Name by Suzanne Williams (Andrew Sachat, Illustrator) Publisher: Houghton Mifflin Company (1996).
This loving and humorous story depicts frustrated Hannah, who tries to get her mother to call her by her real name rather than the pet names she uses.

My Name Is Yoon by Helen Recorvits. Publisher: Square Fish (2014)
Disliking her name as written in English, Korean-born Yoon, or "shining wisdom," refers to herself as "cat," "bird," and "cupcake," as a way to feel more comfortable in her new school and new country.

Name Games: Using Children's Names to Link Oral Language and Print by Traci Ferguson Geiser. Publisher: Creative Teaching Press (2005)
This teacher resource is rich in phonics and oral language practice. Each of the ten complete lesson cycles culminates in a unique bookmaking activity. Loaded with reproducibles, teacher preparation time is kept to a minimum.

The Name Jar by Yangsook Choi. Publisher: Random House Children's Books (2013)
Being the new kid in school is hard enough, but what about when nobody can pronounce your name? Having just moved from Korea, Unhei is anxious that the children will like her. So instead of introducing herself on the first day of school, she tells the class that she will choose a name by the following week. Her new classmates are fascinated by this no-name girl and decide to help out by filling a glass jar with names for her to pick from.

Nutty Names: A Book of Name Jokes by Mark Ziegler. Publisher: Picture Window Books (2005)
The only thing kids think is funnier than a good joke is... more good jokes! These supercharged joke books contain more jokes than ever. Get ready to laugh!

The Other Emily by Gibbs Davis. Publisher: Houghton Mifflin Company (1990)
Emily believes her name belongs to her alone, but on the first day of school, she discovers she is not the only Emily in the world.

A Perfect Name by Charlene Costanza. Publisher: Dial Books for Young Readers (2002)
Mama and Papa Potamus try out many different names for their newborn daughter before finding just the right one in time for her naming ceremony.

Rumpelstiltskin by Paul O. Zelinsky. Publisher: Paw Prints (2009)
A strange little man helps the miller's daughter spin straw into gold. In this highly inventive and splendid rendering of a favourite Grimm fairy tale, award-winning storyteller and illustrator Paul O. Zelinsky evokes a world of Medieval magic.

Santa's Book of Names by David McPhail. Publisher: Little, Brown Books for Young Readers (1997)
A young boy who has trouble reading, helps Santa with his yearly rounds and receives a special Christmas present.

Three Names of Me by Mary Cummings Publisher: Albert Whitman (2014)
A girl adopted from China explains that her three names--one her birth mother whispered in her ear, one the babysitters at her orphanage called her, and one her American parents gave her--are each an important part of who she is. Includes scrapbooking ideas for other girls adopted from China.

Tikki Tikki Tembo by Arlene Mosel, Publisher: MacMillan Audio (2009)
This story tells why the Chinese no longer honour their firstborn with an unusually long name such as "Tikki tikki tembo-no sa rembo- chari bari ruchi-pip peri pembo" This re-creation of an ancient Chinese folktale has hooked legions of children, teachers, and parents, who return, generation after generation, to learn about the danger of having such an honourable name, especially when one falls into a well.