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Chapter I
Introduction

This chapter serves to introduce the background to the "Macao Special Education Curriculum Design Project", illustrating new trends and concepts in special education, and explaining the positioning and usage of the "Supplementary Curriculum Guide (Special Education)" (hereafter referred to as "Supplementary Guide").
The "Supplementary Guide", a core document to the "Macao Special Education Curriculum Design Project", aims to inform schools and teachers of the philosophy, positioning, and implementation mode of the plan as they carry out Macao's special education curriculum in practice.

A. Origin and rationale for the Supplementary Guide

1. The latest trend in special education

Over the past three decades, the international community has witnessed transformative changes in the concepts and practice in special education. Since the publication of the Salamanca Statement by UNESCO in 1994, inclusive education (or integrated education) has become the dominant educational model for students with disabilities around the world. The Salamanca Statement emphasizes the concept of Education for ALL and holds that students with disabilities should have access to equal educational opportunities as ordinary students. This concept is applied to the domain of curriculum design and leads to the inclusive curriculum model (One Curriculum for All).

2. The growing trend in the promotion of inclusive curriculum

The fundamental ethos of inclusive education is that all students should have equal rights to education, and one exemplification of which is to the right to study according to the same curriculum. Therefore, special education curriculum must be guided by the principle of "inclusion"---the curriculum is considered "One Curriculum for All" only when it caters to students of different abilities (including students with serious or severe intellectual disabilities).

The General Assembly of the United Nations passed the Convention on the Rights of Persons with Disabilities (CRPD) (hereafter referred to as the Convention) in 2006 to promote and protect the rights of all persons with disabilities. The Convention states that necessary adjustments should be made under certain circumstances to ensure that persons with disabilities have equal access to their rights and the exercise thereof. The People's Republic of China signed the Convention in 2007 which was later passed and approved by the Standing Committee of the National People's Congress in 2008. This means that China has the obligation to implement the Convention and must take appropriate measures to this end.

The curriculum policies adopted by countries around the world in the practice of inclusive education share the common feature of establishing standards or goals that cover the capabilities of all students. It is important that these standard areas are all derived from the central curriculum of formal education and that they can also include the abilities of all students, including those with serious to severe intellectual disabilities.

3. Development and current situation of special school curriculum in Macao

For years the development of special education curriculum in Macao has been reliant upon the research and initiatives of individual schools themselves. Although there have been exchanges and mutual consultations among the schools in this process, there is still the lack of a unified curriculum structure, module contents, and assessment criteria. Also, the curriculum leans heavily towards catering to the needs arising from the weaker capabilities of students. The reference to the formal education curriculum in special education curriculum is limited to selecting contents from textbooks used in formal education and revising them to form the main body of the special education curriculum.

The Macao SAR government began to legalize the formal education curriculum in 2014, and has successively promulgated the Administrative Regulation No. 15/2014, "Curriculum Framework for Formal Education of Local Education System" (hereafter referred to as "Curriculum Framework") and Administrative Regulation No. 10/2015, the "Basic Academic Attainment Requirement of Local Education System" (hereafter referred to as "The Requirements of Basic Academic Attainments"). "The Requirements of Basic Academic Attainments" for Early Childhood Education, Primary Education, Junior Secondary School Education and Senior Secondary School Education have also been implemented year by year since the academic year 2015/2016. This means that the formal education curriculum in Macao is proceeding to standardization and unification in a programmatic fashion. The legislation of formal education curriculum in the territory can be regarded as the most appropriate time for Macao to design its special education curriculum, because the purposes, subject structure, and learning units of the formal education curriculum under the principle of equal educational opportunities should be applicable to students with special educational needs. The key is that teachers need to have a set of guidelines to supplement or adapt the formal education curriculum according to the learning abilities and learning modes of students with special educational needs. Therefore, the Macao Education and Youth Affairs Bureau (hereafter referred to as the DSEJ) invited the Centre for Advancement in Inclusive and Special Education (CAISE) of The University of Hong Kong, together with special education teachers from nine public and private schools in Macao, to initiate a three-year plan, namely, the Macao Special Education Curriculum Design Project. The core tasks of the plan include:

1) Developing and drafting the Learning Ability Progress Level (hereafter referred to as the Level) for six subjects (Chinese, Mathematics, General Studies, Science and Humanities, Arts, and Information Technology, Sports, and Health);

2) Compiling the "Supplementary Curriculum Guide (Special Education)".

The emphasis of the plan is that the compilation of the special education curriculum should be based on the formal education curriculum, which is the future direction for special education development in Macao and also the purpose of this plan. This direction not only guarantees students the right to study according to the same curriculum, but also ensures that the educational elements of the curriculum will not be compromised due to excessive emphasis on skill training. In addition, teachers can build a community with affiliated

schools and reach consensus on the assessment criteria when formulating the same curriculum structure. The plan also emphasizes that the Level and the Supplementary Guide should be compiled with special education teachers in Macao as the main contributors. The process of writing the Level and the "Supplementary Guide" involved gathering the fruits of specialist teachers' professional knowledge and years of accumulated teaching experience in each subject, which enabled the final writing to possess unique Macao characteristics.

B. Objectives of the Supplementary Guide

The purpose of the "Supplementary Guide" is to provide support for teachers in planning, developing and formulating curriculum for students with special educational needs. Teachers can make references to and combine the use of the guideline from the formal education curriculum, the "Curriculum Framework" and "The Requirements of Basic Academic Attainments". In general, the "Supplementary Guide" can help schools to develop an inclusive education system (Special education curriculum system) from the following aspects:

- Review and revise the present directions in special education and lay the foundation for developing a new special education system;
- Link up with Macao's formal education curriculum and identify priorities appropriate for the special education curriculum;
- Respond to students' diverse learning needs;
- Overcome barriers to teaching and assessment for full inclusion of all students.

C. Functions of the Supplementary Guide

The functions of the Supplementary Guide are provided in the following aspects:

- Provide information to help teachers plan, prepare, develop and design courses catered to students with different learning needs according to the characteristics of each subject; illustrate how to adjust the course contents so that all students can have the opportunity to study formal education courses according to their own abilities;
- Provide a spectrum of learning ability descriptors to demonstrate the levels of learning ability and learning outcomes;
- Establish the relationship between "The Requirements of Basic Academic Attainments" and the special education curriculum;
- Provide a coordination mechanism of learning assessment, with the emphasis on the principle of comprehensive judgment;
- Provide sample classroom activities, stimulate students' curiosity, teach students in accordance with their aptitude, and practice the important educational principle of teaching tailored to the individual students' abilities.

D. Characteristics of the Supplementary Guide

1. Designing inspiring learning activities

Chapter III of the Supplementary Guide shows relevant learning areas of various subjects and their importance to students with special educational needs. Teachers may have the impression that some of the complicated and abstract topics in certain subjects are beyond the understanding of students with special educational needs; some examples of teaching activities are demonstrated in Chapter V of the Supplementary Guide for teachers to adjust the teaching scenarios and goals. This ensures that even students with lower ability levels can study the contents of related subjects.

2. Adaptable to different learning needs with the formal education curriculum as its basis

Chapter IV of the Supplementary Guide, in conjunction with the "Curriculum Framework" and "The Requirements of Basic Academic Attainments", retains as many relevant contents within the learning area of each subject as possible. The curriculum objectives and learning outcomes are based on the formal education curriculum and can be adjusted according to the differences in learning.

3. Easy to identify students' abilities with the continuous description of various levels of learning abilities in the learning areas of each subject

To enable every student with special educational needs to find their entry point in each learning area of various subjects, the spectrum of learning ability level descriptors for each subject is provided in Chapter VII of the Supplementary Guide, covering learning abilities from the lowest level (or those appearing the earliest) to the highest level (or those compatible to be admitted to ordinary schools), for teachers to clearly identify the levels of students' learning ability in each learning area, which is the core element of the Learning Ability Progress Level.

4. Easy to know the progress of the teaching priorities in major education stages

In order to show clearly the levels of learning ability of students with special educational needs at different age groups, the Learning Ability Progress Level is divided into four phases according to the age of students. In these four phases, students are expected to make progress not only in learning experience in line with their age and social development, but also in subject knowledge so that they can accumulate knowledge and experience in the learning process. Teachers can also avoid unnecessary repetition to improve educational efficacy.

5. Uniform terms to describe different groups of students

We use "students with special educational needs" to replace terms which have been used to describe different groups of students, such as the hearing impaired students, visually impaired students, physically impaired students, slow learners, or students with mild, moderate, or severe intellectual disabilities. We believe that each student is on the same route of learning progress, with different needs in education. We do not explicitly classify students in the psychological and medical systems, because we design students' learning objectives mainly based on their ability levels in different subject areas. For example, a student who is classified as suffering from "cerebral palsy" in the psychological and medical system may have an average level of intelligence even if he or she cannot speak or can only sit in a wheelchair, or with relatively weak motor sensory ability. Based on the concept proposed in the Learning Ability Progress Level, a student's learning ability in Physical Education may be only at level L3, while his or her learning ability in Chinese "listening" may have reached level L10.

This method of describing the levels of students' learning ability can change the perception of students' learning potential among teachers or other stakeholders. At the same time, teachers can refer to different ability levels to set more suitable learning goals for students so as to raise their expectations of the students' learning ability.

E. How to Interpret the Supplementary Guide

The Supplementary Guide is designed to cover students with special educational needs aged between 3 to 21, including students in special education classes and in special education small classes, as well as inclusive students in regular classes. Students enrolled

in various special education classes are the focus of the Supplementary Guide, since most of the students in the above mentioned classes are at notably different levels of learning ability in different subjects. Nevertheless, teachers who teach students of different gender and ethnic, cultural, religious, and family backgrounds can all use the Supplementary Guide as a teaching reference.

In the Supplementary Guide, the term "teacher" may include homeroom teacher, teachers of various subjects, subject directors, teaching assistants, parents, therapists, counselors, social workers, psychologists, principals and all others who take care of students with special educational needs. When using the Supplementary Guide, teachers should refer to the curriculum guides of the DSEJ and school-based curriculum materials, for planning and compiling the teaching contents, according to different levels of education, as well as the learning ability level of students with special educational needs. The Learning Ability Progress Level also provides an accurate description of students' learning performance and ability.

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Chapter II
Objectives, Curriculum Framework and Teaching Principles of Mathematics Education

This chapter is written with reference to the formal education curriculum guide for Mathematics in Macao. The purpose is to show that the Mathematics curriculum for students with special educational needs is derived from the formal education curriculum, and every student enjoys the same learning opportunities.

A. Objectives of Mathematics Education

According to the Macao Special Administrative Region's Law on Non-Higher Education System Program and the Curriculum Guide for Primary Education, the educational objectives of Mathematics are concluded as follows:

- Develop abilities in critical thinking, creativity, conception, exploration, and mathematical reasoning, and the ability to use mathematics to solve problems in everyday life, Mathematics, and other related subjects;
- Develop the ability to communicate with others and express opinions through mathematical logic;
- Develop the ability to use numbers, symbols and other Mathematical tools;
- Establish the sense of numbers, symbols, space and measurement;
- Cultivate the ability to appreciate structures and rules;
- Foster a positive attitude towards Mathematics learning.

Mathematics-related topics can be widely found in our daily life. In a society with advanced science and information technology, to equip students with the ability to meet the requirements of Mathematics in future career or daily life and to be fully prepared for lifelong learning, the Mathematics curriculum should follow the following fundamental philosophies to cultivate students' Mathematical abilities and shape their attitudes:

- Mathematics is an indispensable part of human life and social development;
- Mathematics curriculum should be student-oriented, and emphasize real-life practices;
- A good perception of Mathematics helps students to develop their Mathematics ability;
- Mathematics teaching should pay attention to students' learning process ;
- Mathematics teaching should develop students' ability for logical thinking, promote students' development in emotions, attitudes and values, and lay an important foundation for students to adapt to life and society;
- Mathematics teaching should cultivate students' ability to communicate and discuss with others in independent and cooperative learning scenarios;
- Mathematics teaching should enhance students' confidence in using mathematics in daily life and form good study habits.

Based on the principle of "One Curriculum for All", the above objectives and philosophies, including learning objectives and learning content, also apply to students

with different learning difficulties (e.g., visual impairment, hearing impairment and physical weakness). Some students with special educational needs may be underdeveloped to certain degrees in intelligence, yet teachers can still adjust their learning objectives and learning strategies according to individual student's ability to help students overcome the difficulties, and provide them with a broad and balanced Mathematics learning experience.

B. Adjustment to the Mathematics Curriculum Framework

Considering the unique circumstances in each educational level, the Requirements of Basic Academic Attainments for formal Mathematics curriculum in Macao are divided into different learning areas based on different education level:

Educational Level	Learning Areas
"The Requirements of Basic Academic Attainments" in Early Childhood Education Learning Area: D: Mathematics and Science	1. Logic and Reasoning, 2. Graphics and Space, 3. Number and Quantity, 4. Scientific Attitude, 5. Science Skills, 6. Scientific Phenomenon
"The Requirements of Basic Academic Attainments" in Primary Education	A. Numbers and Operation, B. Graphics and Space, C. Quantity and Measurement, D. Statistics and Probability, E. Preliminary Knowledge in Algebra, F. Emotion, Attitudes and Values
"The Requirements of Basic Academic Attainments" in Junior Secondary Education	A. Numbers and Algebra, B. Graphics and Space, C. Statistics and Probability, D. Emotion, Attitudes and Values

In the process of drafting the Learning Ability Progress Level, to ensure that students with special educational needs can study different areas of Mathematics under the principle of "One Curriculum for All" and to give students a broad and balanced learning experience, the areas of Mathematics learning applicable to students with special educational needs are set with reference to "The Requirements of Basic Academic Attainments" for early childhood education, primary education, and junior secondary education in Macao. The principles are provided as follows:

- "3. Numbers and Quantity" in the early childhood education level, "A. Numbers and Operation" and "E. Preliminary Knowledge in Algebra" in the primary education level, and "A. Numbers and Algebra" in the junior secondary school education level are combined into "Numbers and Algebra";
- "Graphics and Space" in the early childhood education level, "B. Graphics and Space" and "C. Quantity and Measurement" in the primary education level, and "B. Graphics and Space" in the junior secondary school education level are combined into "Measurement, Graphics and Space";
- "D. Statistics and Probability" in the primary education level and "C. Statistics and Probability" in the junior secondary school education level are combined into "Statistics and Probability";
- "1. Logic and Reasoning" in the early childhood education level and "Emotion, Attitudes, and Values" in the primary and secondary education levels are built into the learning

content of various areas in Mathematics.

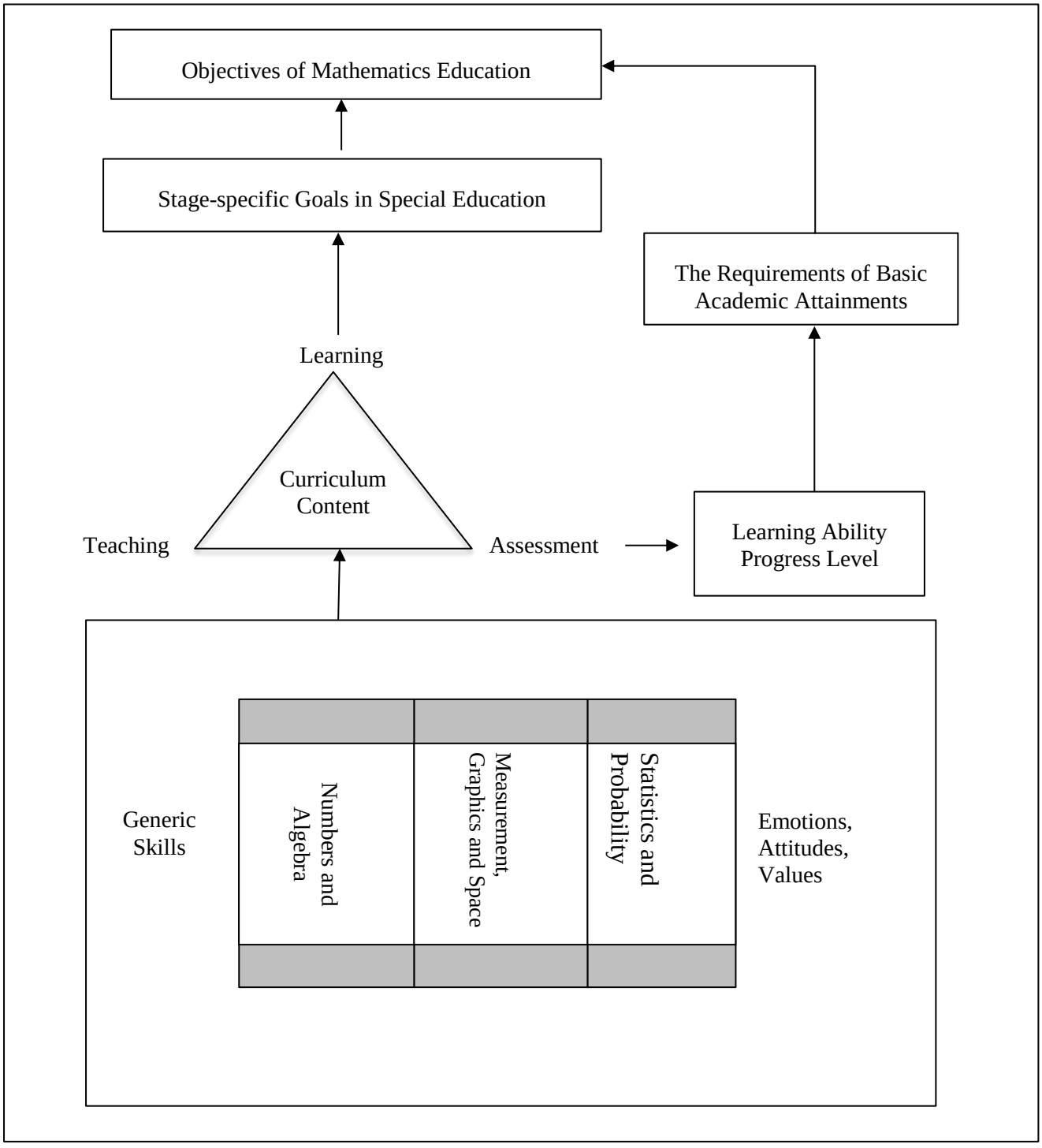
The re-organized learning areas of Mathematics for students with special educational needs are "Numbers and Algebra", "Measurement, Graphics and Space" and "Statistics and Probability". The focuses of the three areas are provided as follows:

- Numbers and Algebra: Emphasis is put on the development of sense of numbers and basic calculation ability, and on enhancing students' ability of conceptualizing, exploring, reasoning, and establishing and solving Mathematical problems through learning knowledge, concept and skills of dealing with numbers. Students are expected to appreciate Mathematics and apply Mathematics in various aspects. Students are also expected to try to experience the method of using equations to solve related Mathematical problems through utilizing alphabetical letters to represent the equivalent relationship between related amounts. Students' abilities of thinking, calculation, logical reasoning, induction and deduction will also be cultivated in the learning process.

- Measurement, Graphics and Space: Students will enhance hands-on practice to experience geometric figures and features through touching, measuring, arranging, and producing geometric figures. Students will also enhance their ability to conceive, explore, reason, set up and solve Mathematical problems, appreciate Mathematics and apply it in various aspects) through paying attention to abstract geometric concepts and geometric figures in real life. Students are expected to cultivate abilities of thinking, spatial reasoning, and the skills of applying tools in solving problems.

- Statistics and Probability: Emphasis is put on the understanding of statistical concepts and using statistical methods to solve simple practical problems. Methods and forms of statistical graphs are introduced in lower grades. Simple methods of data sorting and averaging are taught in the middle grades. More complex data collection and processing methods, as well as statistical tables and statistical charts are taught in higher grades. Students learn to process data in a systematic manner, master the preliminary knowledge of Statistics and Probability, and cultivate students' ability to induce, deduce, and search for information through discussion and sharing.

Curriculum Framework of Mathematics Education (Special Education):



C. Course Positioning of Mathematics Education

Mathematics is the science of studying quantitative relationships and spatial forms. Through the application and exploration of Mathematics, students' interest and habits of raising questions and thinking can be developed, and creativity can be enhanced. Meanwhile, knowledge and skills acquired in Mathematics help students to solve problems encountered in their daily life and lay the foundation for the Mathematics needed for future life.

The positioning of Mathematics education:

- To equip students with basic Mathematics knowledge, help them understand the interrelationship between Mathematics and daily life, and the interrelationship between Mathematics and social development, and experience the importance of Mathematics;
- To cultivate students' Mathematical abilities in, for example, calculation, statistics, spatial reasoning, logical thinking, deduction and reasoning and the ability to analyze and solve problems in daily life and other disciplines;
- To cultivate students' interest in learning Mathematics, to appreciate the beauty and subtlety of Mathematics, and try to develop the spirit of exploration and innovation in Mathematics;
- To train students to use Mathematics language to communicate and discuss with others in self-learning and collaborative study, and at the same time build self-confidence in learning Mathematics and respect others' opinions.

D. Teaching Principles of Mathematics

It is not difficult for teachers to find out, after reviewing the purpose, structure, and positioning of Mathematics education, that the main purpose of Mathematics is to cultivate students' logical thinking, which is an indispensable element in the learning and teaching of Mathematics. Mathematics has always been a main subject in primary and secondary education. Through learning Mathematics, students' sense of numbers, sense of space, sense of measurement and logical thinking can be developed. Teachers should facilitate students in Mathematics learning instead of simply cramming the students' mind with learning contents.

When designing Mathematics teaching and learning activities, teachers should pay attention to the following principles:

- To equip students with basic Mathematics knowledge, help them understand the interrelationship between Mathematics and daily life, and the interrelationship between Mathematics and social development, and experience the importance of Mathematics;
- To teach students some basic Mathematical skills, including using simple mapping and measurement tools and drawing statistical charts;
- To cultivate students' Mathematical abilities in, for example, calculation, statistics, spatial reasoning logical thinking, deduction and reasoning, and the ability to analyze and solve problems in daily life and in other disciplines;
- To cultivate students' interest in learning Mathematics, to appreciate the beauty and subtlety of Mathematics, and develop the spirit of exploration and innovation in Mathematics;
- To train students to use Mathematics language to communicate and discuss with others in self-learning and collaborative study, and at the same time build self-confidence in learning Mathematics and respect others' opinions.

To implement the “Requirements of Basic Academic Attainments for Primary School Mathematics in Macao”, the “people-oriented” concept is also proposed as its educational objective. Mathematics is to develop students’ thinking, space reasoning and skills in applying tools. Although students with special educational needs may progress differently in learning, undoubtedly they all possess the ability to learn and grow.

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Chapter III
Responding to Students' Learning Needs in Mathematics Education

This chapter discusses the basic characteristics of Mathematics education and its importance to students with special educational needs and proposes to adjust the learning content and curriculum implementation to ensure that all students have the opportunity to learn in all fields.

A. Importance of Mathematics Education to Students with Special Educational Needs

Numbers and shapes can be seen everywhere in daily life. Studying Mathematics can help discover students' potential to compare, identify similarities and differences, explore and establish relations between objects. These are the interdisciplinary learning abilities that students must possess in lifelong learning, so that they can meet the demands for Mathematics in work and daily life in this society with advanced technology and information. Learning Mathematics can develop students' logical reasoning and truth-seeking attitude, which is indispensable for human life and the development of society. Therefore, the Mathematics curriculum should be student-oriented, valuing the practice and application of Mathematics in real life.

In the early stage of its development, thinking is always based on specific scenarios and events. Students need to think hard and reflect on their experience and feelings brought about by changes in principles, numbers, space, and time. These experiences can help them to face difficulties in a more flexible manner, learn to improve results through trials in a chaotic situation, and make predictions according to experience and feelings gained. Students then learn to plan and reflect, recognize and evaluate different solutions. Through this process, students can gradually learn Mathematical skills and thinking based on perception and cognitive learning in the early stage.

Students may make progress in Mathematics from various learning opportunities:

- To broaden the experience of Mathematics;
- To make predictions and actively solve problems through recognizing the nature of Mathematics and then further using the related information;
- To develop the ability of presenting more complex and detailed Mathematical data in mind;
- To gradually express their understanding of Mathematics clearly to others;
- To use Mathematical data to make choices and decisions in different situations;
- To apply Mathematics to solve simple problems in everyday life.

B. Learning Contents of Mathematics Education

The main learning objectives listed below do not cover all of the expected learning outcomes. The purpose is to support teachers in setting appropriate learning objectives and providing appropriate learning opportunities for students with special educational needs. Only simplified teaching contents are focused in this part. Schools can adopt their own functioning teaching framework or other practices to implement the formal education curriculum more effectively.

Learning Areas	Items
Numbers and Algebra	• Establish awareness of numbers and quantities; •Understand the concept of integers, perform calculations and check the rationality of the results; • Establish and resolve issues related to numbers.
Measurement, Graphics, and Space	•Understand the basic concepts of Mathematics, including pairing, classification, ranking, association, and rule; • Identify lines, angles, planes, and solid figures; • Recognize the basic properties of planes and solid figures; • Recognize, describe, appreciate, and use figures and patterns; • Identify the four main directions; •Select and apply different types of non-standard or standard units to record the results of basic measurement activities; • Select and determine appropriate measurement tools and standard units; •Integrate knowledge of numbers, measurement, figures, and space to solve simple measurement problems.
Statistics and Probability	• Collect and process data according to the established criteria; •Draw and read simple charts which show the relation between displayed data; •Establish and solve simple problems caused by data or images.

According to "The Requirements of Basic Academic Attainments", common ability is the basis of learning which can also help students learn better. Students can develop common abilities through learning and teaching of different subjects or fields. These abilities can also be transferred to other fields of learning. The nine common abilities include collaboration, communication, creativity, critical thinking, IT skills, calculation, problem solving, self-management, and research skills.

The learning content of Mathematics clearly prioritizes cultivation of thinking abilities from different aspects, namely critical thinking, problem solving and calculating ability. However, other common abilities can also be cultivated in the process of learning Mathematics. For example, students can enhance collaboration skills through group work on the "statistical graphs" project, and demonstrate creativity and imagination in building various shapes using different plane figures in the "plane figures" project.

Values can be defined as important qualities that individuals or societies treasure. These qualities, shining with intrinsic values, are guidelines for conduct. Attitude is based on values, which in turn affects the establishment and practice of values. In addition to knowledge and skills, it is important to develop positive values and attitudes through Mathematics education. For example, responsibility, a sense of mission, positive attitude and willingness to accept new ways of thinking are essential to the students' future life and learning. These values and attitudes should be instilled in various learning areas and learning stages of the Mathematics curriculum. For example, through the "Preparation for the Christmas Party" activity, students discuss the shopping list together, learn how to

read the price and pay in shopping activities to cultivate their ability in sharing opinions, solving problems through cooperation, and taking responsibilities, etc.

C. Adjustment to the Mathematics Curriculum

Learning Areas	Adjustments
Numbers and Algebra	Before developing the counting skills, students apply the perceptual awareness to estimate, predict, and change their actions. Teachers can create situations which involve one, two, or three items, events, or different feelings to improve early perception and help students make progress. When students make progress, the number of objects and events, or types of feelings can be increased or reduced to change the scenario, construct one or more situations, or compare situations. Introducing counting at the appropriate time can enhance students' awareness of "calculating". Initially, teachers need to let students use physical objects, touch and experience "calculating", and then use graphics and images before using symbols and abstract thinking. In helping students develop the concept and skills of "calculating", teachers need to use basic characters or vocabulary that students can understand. The knowledge and skills of "algebra" include finding relationships, establishing connections, and deducing rules. Curriculum adjustment should start from an environment with which students are familiar in their daily practice so as to allow them to speculate on what will happen and what familiar results can be brought about by certain actions or reactions. The course should provide opportunities for students to identify association between symbols and events. For example, students can use a series of classroom photos or symbols to help them find out the assembly point in the school. In addition, teachers should provide opportunities for students to explore and study in real environments to help students establish their own rules and patterns. Meanwhile, teachers should see to it that basic Mathematics language provides students with learning opportunities to use their own gestures and symbols and help them share relevant concepts with others.
Measurement, Graphics, and Space	The adjustment in this category is based on how students respond to the same and different situations in terms of location, movement, size, weight and time. By examining and exploring simple activities, experience, and opportunities, students try to improve and make more precise responses in more complex situations. For example, students can change the stretching direction and extension of their hands to arrange graphics or to solve space problems. These learning experiences are related to "measurement, shapes, and space" can help students effectively organize and classify the materials in their daily life.

Statistics and Probability	The adjustment to the learning content of the "Statistics and Probability" category should be focused on helping students to develop new ways of thinking on familiar and regular activities. In the early stage of learning, it is advisable to make use of physical situations to make the information clear and easy to understand, and relevant photos and items can also be used to represent people and objects to explain the focus of the data, put emphasis on finding out similarities and differences from the data, and then summarize the changes and trends of the data.

Schools should take into consideration the condition of students with special educational needs and adjust the curriculum accordingly, so that students can obtain appropriate learning experiences in all education levels. Teachers should use different teaching strategies to teach students knowledge, skills and concepts in accordance with their abilities. To cater for the needs of students with special educational needs, teachers can adjust the mathematics curriculum through the following methods:

- To select learning priorities and materials from earlier or pre-school courses;
- To introduce new knowledge, skills and concepts while consolidating, strengthening and absorbing existing knowledge;
- To focus on and carry out detailed and in-depth studies on one or several topics that match students' age;
- To attract and maintain students' attention by daily activities, common life processes and events as a starting point for Mathematics learning;
- To integrate the concepts of Mathematics in different areas, in the process of formulating learning plans or learning outcome expectations for advanced learning stages, so that students can construct knowledge and skills therefrom.

Teachers may consider using the following adjustment strategies when teaching Mathematics in the three areas.

D. Enhancing the Effectiveness of Mathematics Education

Effective learning should be all-round, multi-angle, and student-centered. As guides in the teaching process, teachers promote students' learning effectiveness by creating favorable environments and adopting good teaching strategies. However, different types of students with special educational needs have their own specific needs, which must be taken into consideration when adjusting teaching so as to achieve better results. Some suggestions for promoting the efficacy of Mathematics learning are provided as below:

1. For students with hearing impairment, teachers can refer to the following suggestions:

- To use wireless tuner in the class, and avoid turning their back to the light and students;
- To set up loop sensing systems in the auditorium, classrooms, or students' gathering places;
- To arrange students to sit in positions which are near the front and can easily see the other students (about 1 to 1.5 meters from the teacher). Also, students should be arranged away from corridors and other auditory stimuli;
- To signal school bells and the fire alarm by light or text simultaneously with the sound, and have the message from the loudspeaker written on the blackboard or displayed on the electronic screen;

- To maintain natural and not over exaggerated speaking speed, pause and tone when talking with students, to help students to establish their concept of using the correct sentence structure and expressing complete meaning in speech;
- To pre-announce keywords, proper nouns, new characters and vocabulary, current number of pages, key points, assignments and assessment scope to students and write on the blackboard so that students can have a preview;
- To have students focus on the lectures, allow students to use recording equipment to record the lecture, or borrow notes from other students to copy the lecture content after class, to use gestures and facial expressions to assist students' understanding when teaching;
- To remind students in distinct ways when changing the topic , page number or activity;
- To provide visual teaching materials and teaching aids, such as lecture notes, videos, pictures, physical objects, and subtitled films to help students understand;
- To encourage students to express themselves in words or complete sentences and help them understand the basic grammar;
- To encourage students to use their remaining listening capacity to learn the language. To assist with teaching, teachers should choose suitable equipment according to the environment, such as computer and group hearing aids;
- To ask team members to speak clearly to classmates one by one, to avoid the need for students to deal with sounds from different sources at the same time during group activities.

2. For students with visual impairments, teachers can refer to the following suggestions:

- Teachers should try to use auditory, tactile and practical operations as the learning medium; provide auditory teaching materials and teaching aids, such as audio books, computer-assisted instructions, and audio computers; provide a safe environment for students, such as arranging furniture in a fixed position and providing facilities like handrails and sidewalk for the blinds;
- When speaking, teachers should first call the student's name to ensure that they are listening. Teacher's instructions and explanations should be clear and concise, and dictate the contents written on the blackboard;
- Teachers should allow students to use the recorder or provide photocopy of notes to record or write down the lecture content to assist students in reviewing;
- To assist with teaching, teachers should use teaching aids specially designed for the visually impaired, such as concavo-convex pictures and charts, character cards with large fonts, and bright-colored pictures and simple charts drawn with thick lines;
- When teachers use multimedia in teaching, they need to explain the content of the images to students at appropriate times;
- Teachers should provide auxiliary tools such as computers for the blind, braille books, video magnifiers, projectors, magnifying glass, etc.;
- Teachers should allow students to complete their assignment using computers, typewriters, or tape recorders, etc.

3. For students with physical disabilities, teachers can refer to the following suggestions:

- Schools can provide an accessible campus, provide tools and facilities such as wheelchairs and lifts; arrange classrooms in lower floors and seats closer to the door for students;
- School can provide writing aids, such as: Forearm writing instrument, oblique writing table and page turners; if students have great difficulty in writing, computer-aided facilities can be provided to replace hand-writing;

- Students with slow writing speed or inflexible hands can be given a reduced amount of work or use a recorder to complete the assignment. Teachers should allow students to answer questions in spoken form or by underlining key points and reduce the burden of writing by using numbers to complete exercises in multiple choices, true or false questions, linking and matching, etc.

4. For students with speech impairments, teachers can refer to the following suggestions:
- Teachers can provide auxiliary communication tools such as Augmentative and Alternative Communication (AAC), and a tablet and/or computer;
- Teachers should take an open and inclusive attitude towards students' ability to express, do not overcorrect so as to keep their speaking confidence, encourage active communication, and pay attention to the "content" rather than the "form" of expression;
- If the assignment involves oral expression, teachers should give students sufficient time to express themselves;
- Teachers should provide visual teaching materials and teaching aids such as handouts, pictures, objects, and videos with subtitles to improve students' understanding;
- Teachers should give additional hints or guidance (verbal or nonverbal clues) as necessary to assist students with expressing themselves. Teachers should provide additional information or modification to students' output during the conversation to better complete their answers;
- Teachers should allow students to answer questions in shorter spoken language, and if necessary, with the assistance of words, pictures and charts at the same time to make up for the insufficiency.

5. For students with autism spectrum disorder, teachers can refer to the following suggestions:
- Teachers should provide a structured teaching environment: paste the classroom flow chart, timetable, classroom rules in the classroom, clearly indicate the assignment collection location and students' seats with pictures or numbers, and write the content of the manual at a fixed position on the blackboard;
- Teachers should inform students in advance the changes they will face, such as class changes and holidays, through oral, visual and environmental forms of reminder like pictures, procedure cards, and timetables, so that students are mentally prepared;
- Teachers should simplify the written textbooks, list the focus of study in order of priority and use larger fonts or different colors to distinguish and reinforce learning priorities with supplementary images;
- Teachers should use structured teaching to maintain students at the state of having things to do and instructions to follow;
- When guiding students in solving applied problems, teachers can read out the question with students first, tell students to circle the key points in the question, and clarify the meaning of the question by showing physical objects or drawing pictures to help students understand the question;
- Teachers should reduce spoken or written ways of assessments and replace them with observation, verbal reports or hands-on operations.

6. For students with attention-deficit/hyperactivity disorder, teachers can refer to the following suggestions:
- Teachers should provide a quiet learning environment, and avoid arranging students to sit near the window or close to the door;
- Teachers should use tools or auxiliary equipment to cover the less important part of the textbook or assignment;

- If necessary, teachers should use desktop screen or earplugs to keep students away from outside interference;
- Teachers can use more verbal and body language, tone, activities, and diversified teaching aids to guide students to focus on learning projects;
- Teachers can use structured teaching to maintain students at the state of having things to do and instructions to follow;
- Teachers can use the procedure analysis method to divide the learning into several stages to shorten the activity time (less than 20 minutes each) and increase the times of learning;
- Teachers can ask more questions to improve students' concentration;
- Teachers can use visual cues such as larger font size, different fonts and colors to highlight the learning priorities;
- Teachers can carry out a rewards scheme, assist students in the completion of assignments, give timely and effective feedback, and help students develop good habits.

7. Cross-disciplinary collaboration

   In the process of Mathematics teaching, teaching efficacy can be improved by establishing a transdisciplinary teamwork model. The transdisciplinary team includes counsellors, occupational therapists, speech therapists, and physiotherapists, etc. The collaboration enables individualized educational programs to be tailored to individual student's situations. During the teaching process, the team members can enter the class and assist in teaching and in individual or group training according to students' condition. For example, the Mathematics teacher can ask the occupational therapist to assist students in imitating the teachers in drawing graphs. Through cooperation with the professional team and parents, teachers can help students learn effectively and promote learning effectiveness.

4

Chapter IV: Learning Ability Progress Level and Requirements of Basic Academic Attainments

Since 2015/2016 academic year, Macao has yearly and gradually implemented the "The Requirements of Basic Academic Attainments for Local Formal Education" on different levels of education. This chapter elaborates on the relation between the Learning Ability Progress Level and "The Requirements of Basic Academic Attainments", and further explains the function and application of the Learning Ability Progress Level.

A. Relationship between the Learning Ability Progress Level and the Requirements of Basic Academic Attainments

1. The Requirements of Basic Academic Attainments

The Macao Special Administrative Region promulgated "The Requirements of Basic Academic Attainments" in 2015, which has set out the basic academic attainment expectations for all levels of formal education in Macao, including early childhood education, primary education, junior secondary school and senior secondary school education. "The Requirements of Basic Academic Attainments" aim to provide specific requirements on the fundamental qualities expected for students upon completing various education levels, including basic knowledge, skills, ability, emotion, attitude and values. It also provides standards to guide and regulate teaching practice, and to assess teaching quality.

2. The Learning Ability Progress Level

In principle, the content of "The Requirements of Basic Academic Attainments" should cover all students. However, each student with special educational needs features differences in learning ability and learning progress, while "The Requirements of Basic Academic Attainments" designed and formulated based on various education levels fail to give an effective demonstration of their learning outcome. Students learn through a continuous process and make progress step by step. A progressing level design which covers the entire learning journey may better reflect the learning outcomes of students with special educational needs. Therefore, the Learning Ability Progress Level refers to

a set of systematic descriptions of performance indicators, where, starting from the very basic reflective act and the motor sensory perception, several progress levels are set to describe the ability of students, and demonstrate the learning progress of students with special educational needs within each learning area, and thus give a better exemplar of the uniqueness of special education.

3. The relation between "The Requirements of Basic Academic Attainments" and the Learning Ability Progress Level

"The Requirements of Basic Academic Attainments" and the Learning Ability Progress Level are both performance indicators within the subject area. "The Requirements of Basic Academic Attainments" describe the basic ability of the whole student community upon completion of a specific education level in the formal school; while the progress level refers to a continuously developing spectrum learning processes for an individual, targeting at the learning ability of each student with special educational needs. In line with curriculum regulations, the Progress Level refers to the descriptions on learning performance from the Requirements of Basic Academic Attainments at each education level to the greatest extent, to illustrate the learning efficacy of students.

B. Structure and Connotation of the Learning Ability Progress Level

1. Structure of the Learning Ability Progress Level

   The Progress Level is a system composed of different levels, where different levels of learning ability are arranged in a progressive order. The structure of the Learning Ability Progress Level can refer to the Learning Ability Progress Level chart:

- In correspondence with the ability of students with special education needs in Macao, the Learning Ability Progress Level is divided into 18 levels, which describes the features of motor sensory development of early-stage infants, and the learning ability of ordinary students in early childhood period, lower primary school period, higher primary school period and junior secondary school period.

- The levels are represented by the Letter "L", which is taken from its English translation Learning Ability Progress Level.

- Progress level for each subject is composed of two major parts, “the sensorimotor development stage” and the “curriculum subjects’ stage”. Progress level of both parts, based on learning development, is divided into different “levels”, from the learning model of the earliest stage (L1-1 to L3-2), to levels related to each subject (L4 to L18).

- The ability level at each stage during sensorimotor development is further divided into two sublevels to enable a better mastery of the learning progress by teachers and stake holders, as the sensorimotor stage is based on the cognitive development of infants in the early stage which requires description in more details. The ability descriptions from L1 to L3 are applicable to all subjects and learning areas. Subject related examples are provided to demonstrate the specific learning scenarios and experiences related to each subject.
- Descriptions regarding learning performance try to refer to the contents of “The Requirements of Basic Academic Attainments” at each educational level, with appropriate modifications in accordance with the characteristics of (students’) learning performance of students at each level.
- The progress level is classified into several areas based on the priorities in each subject:
  - ✧ Chinese: “listening”, “speaking”, “reading”, and “writing”;
  - ✧ Mathematics: “Numbers and Algebra”, “Measurement, Graphics and Space”, and “Statistics and Probability”;
  - ✧ Common knowledge, General Studies, Science and Humanities Education: “self-development”, “humanistic society and life”, “natural environment and life”, and “science and life”;
  - ✧ Physical Education and health: “sports skills”, “sports and fitness”, “sports and physical/mental health”, and “sports and social adaptability”;
  - ✧ Information technology: “communication and cooperation”, “application and creation”, and “concept and perception”;
  - ✧ Art: “developmental skills and process”, “artistic circumstances”, “creativity and imagination”, and “arts appreciation”.

Chart of the Learning Ability Progress Level

<table>
<tr><td>Senior secondary education level</td><td>Junior secondary education level</td><td>Primary education level</td><td>Infant education level</td><td colspan="3"></td></tr>
<tr><td colspan="4">Scope of learning ability for students with special educational needs</td><td>Learning Ability Progress Level</td><td>Learning ability for ordinary students</td><td>Special education levels</td></tr>
<tr><td rowspan="3">Minority</td><td rowspan="3"></td><td rowspan="6"></td><td rowspan="15"></td><td>L18</td><td rowspan="3">Junior secondary school</td><td rowspan="3">Senior secondary level</td></tr>
<tr><td>L17</td></tr>
<tr><td>L16</td></tr>
<tr><td rowspan="3">Part of students</td><td rowspan="3">Minority</td><td>L15</td><td rowspan="3">Higher primary school</td><td rowspan="3">Junior secondary level</td></tr>
<tr><td>L14</td></tr>
<tr><td>L13</td></tr>
<tr><td rowspan="6">Majority</td><td rowspan="3">Part of students</td><td rowspan="3">Minority</td><td>L12</td><td rowspan="3">Lower primary school</td><td rowspan="6">Primary level</td></tr>
<tr><td>L11</td></tr>
<tr><td>L10</td></tr>
<tr><td rowspan="6">Majority</td><td rowspan="3">Part of students</td><td>L9</td><td rowspan="8">Early childhood period</td></tr>
<tr><td>L8</td></tr>
<tr><td>L7</td></tr>
<tr><td rowspan="5">Majority</td><td>Minority</td><td>L6</td><td rowspan="9">Infant level</td></tr>
<tr><td>L5</td></tr>
<tr><td rowspan="2">Part of students</td><td>L4</td></tr>
<tr><td rowspan="2">Majority</td><td>L3-2
L3-1</td></tr>
<tr><td rowspan="4">All</td><td rowspan="4">All</td><td rowspan="3">All</td><td>L2-2
L2-1</td><td rowspan="4">Motor sensory development stage</td></tr>
<tr><td rowspan="3">All</td><td>L1-2
L1-1</td></tr>
</table>

2. Connotation of the Learning Ability Progress Level

- The scope of learning ability for students with special educational needs at each education level is assessed and evaluated based on the experience and observations of professional special-education teachers. In line with their growth and development, students with special educational needs are expected to reach L6 level to the utmost in the early childhood education stage, while students with special educational needs in senior

secondary school stage rarely exceed L18. It should be pointed out that students with special educational needs do have the potential to demonstrate learning ability exceeding the estimated scope at certain education levels. For example, a student with special educational need in the early childhood stage may exceed the L6 level, and a student with special educational needs in the senior secondary school stage may outperform L18 level. In these scenarios, the same curriculum structure should apply to the students to extend his/her learning level to L7 or the level of the formal senior secondary school education.

- The Learning Ability Progress Level describes the abilities of students demonstrated in the learning experience, arranged in a progressive learning process. The Learning Ability Progress Level only represents the significant indicators at each educational level for each subject, which shall not be considered as representations of the overall learning content, nor the specific curriculum. Therefore, descriptions of the Learning Ability Progress Level should not be considered as equal to the curriculum content or learning objectives.

C. Learning Development Stages

1. Sensorimotor Development Stage

Human development in (at) the infant stage is mostly reflected by the sensorimotor development. Motor sensory training plays an important role in fundamental education. All learning acts and cognitive behaviours of students start with information collection and analysis by effectively utilizing the motor sensory ability, followed by systematic processing of the information. The process of information selection highlights a sound rapport among the acute sensory motors and accurate sensory coordination, motors and technics. Therefore, whether students can receive and analyse information, extract and store knowledge in memory, and utilize knowledge in the proper time and condition is subject to his/her acute sensory ability, appropriate selection and react, and long term memory.

All children go through the sensorimotor development stage. Most children pick up these skills in a natural manner in daily life without taking specific courses; however, students with special educational needs are restricted to various
extents by a slower development in intelligence and learning progress, therefore students with special educational needs require special training and study to master relative skills.

Uzgiris & Hunt (1975) proposed the six scales of sensorimotor and cognitive foundations in early developmental stage, including:

- The development of visual pursuit and the permanence of objects
- The development of means for obtaining desired environmental events
- The development of vocal imitation and gestural imitation
- The development of operational causality
- The construction of object relations in space
- The development of schemes for relating to objects

The above mentioned six scales, universally applicable to all learning fields, constitute the foundation for cognitive development for infants. In other words, these abilities are the foundations for all subjects; students with special educational needs, especially students with severe learning disorder, develop quite slowly in the early stage. Therefore, these students may not be able to surpass L3-2 level within the complete special education learning stages. Under such circumstances, a broad and balanced curriculum system within their capability is of great significance as it enables the opportunity to get access to rich learning experience.

2. Early childhood stage

The early childhood stage, as the starting point of formal education, is recognized as an important stage to lay the foundation for lifelong learning and whole person development. The early childhood growth and development is a continuous spectrum with established sequences. Generally speaking, children reaching a certain age or developmental stage demonstrate corresponding changes in their physical ability, cognition, language, behaviour and social interaction patterns. These developments are subject to predetermined genetic factors as well as to acquired experiences and educational environment.

Though students with special educational needs fail to develop at the speed of ordinary children, their developmental process demonstrate(s) the same patterns. For example, a student learns to walk before mastering running, and learns to speak individual words before speaking full sentences. Thus, the purpose of establishing the Learning Ability Progress Level is to provide a stage-based reference for teachers and stake holders, so that the teachers can develop a better idea of the status quo of students and learning targets (direction). In compilation of descriptions on the level L4 to L9, special reference is taken from the materials regarding characteristics of early childhood development to include the developmental milestones in the description.

3. The stage of cognition and skill development

While students grow, they continue to make progress in physical ability, knowledge and skills on the basis of early childhood development. In accordance with the cognitive development theory proposed by Piaget, students reaching the mental age of six have entered the period of concrete operations. In this period, students are able to solve issues based on concrete experience and logical thinking, utilize specific objects to assist thinking, and better understand the principle of reversibility and conservation. They are fairly good at the use of inductive logic, and handling issues involving complicated and abstract standards.

As mentioned above, students with special educational needs are not different from ordinary children regarding the cognitive development process. If the mental age of students with special educational needs can reach the period of concrete operation, it is possible for them to learn more complicated and abstract content. However, due to the diverse and complicated patterns of students with special educational needs, their developmental process may not be the same as ordinary children. For example, they may not complete learning contents within one year that ordinary children are able to complete within one year. Therefore, the descriptions on ability and performance based on different levels enable teachers and stake holders to recognize the cognitive ability of students with special educational needs and their developmental curves. Starting from L10, each level is approximately equal to the learning content of the average child within one academic year.

4. The stage of higher-order thinking development

The recent decades witness a widely supported proposal on reforming the curriculum and teaching paradigms in the international community, which strongly calls for equipping students with higher-order thinking to cope with the ever-changing world. Yeung (2012) elaborated on the connotations of higher-order thinking, including four dimensions as below:

- Traditional thinking strategies
- Core thinking skills
- Integrated thinking models
- Thinking dispositions

Some students with special educational needs, especially those with severe learning disorders, may not be able to reach the stage of higher-order thinking regarding cognitive development, but this shall not rule out the possibility that they can cultivate(obtain) higher-order thinking upon abundant learning experience. Therefore, providing a broad range of balanced courses for

students with special educational needs can help them to broaden their experience and enhance their abilities, which is also the duty of teachers.

D. Application of the Learning Ability Progress Level in Learning and Teaching

1. The Learning Ability Progress Level has the following advantages：

- The Learning Ability Progress Level provides a systematic and clear description concerning the learning performance of students at each level, enabling the school, teachers, parents and other stake holders to better understand the learning ability of students and communicate with among stake holders;
- The Learning Ability Progress Level provides details on the assessment of learning progress, a framework for teachers to refer to in the process of identifying and reporting learning outcomes. The Learning Ability Progress Level can also provide assistance to formulation and modification of future learning objectives and plans to promote the learning outcome;
- Teachers need to collect massive data on the learning performance as evidence of learning outcome; Teachers should carefully observe the learning performance of students, enhance knowledge of students, which is conducive to adjust the teaching strategy;
- In collection of performance evidence, teachers should discuss on "evaluation coordination" to reach common consensus on student evaluation, which is conducive to enhancing teacher's understanding of the Level principles and their professional development.

2. Applying the Learning Ability Progress Level to promote learning

It is commonly believed that the subject area of formal education curriculum is too challenging, abstract and out of reach for students with special educational needs. The reason for this widely held perception lies in the current practice of prescribing levels of ability for each subject unit, which requires students to reach certain learning level at specific learning stages. For example, only students reaching primary school level are allowed to learn Tang poetry. As a matter of fact, the learning content should be considered as the vehicle of learning, while the core of learning should be put on the objective and the individual growth of students in each subject area, including knowledge, skills and attitude; Therefore, the method of establishing curriculum based on the framework and foundation of formal education in accordance with the ability level of students, can ensure that all students make balanced and extensive development. The level-based special education featuring high efficacy is also the foundation of inclusive education which can improve the students' ability via the learning content.

The textbook in each subject is the learning vehicle. The guiding principle for curriculum design is to broaden students' life experience, enable them access to objects at different levels

and develop knowledge together with individual experience and understanding. Students with severe learning disorders, due to genetic limitation, may not exceed the motor sensory development stage even with years of learning. However, learning that connects multiple subjects provides students with an extensive perspective, which is also the principle of depth and scope in curriculum design.

Students with special educational needs should adopt the same teaching topics and modules as those of the ordinary students to ensure the scope and balance of curriculum, though teachers with professional experience can exercise discretion to adjust the contents based on the learning ability of the students. This practice may properly address the lack of proper teaching textbooks for classes or students with special educational needs. When the teachers get hold of the learning progress of students, they should adjust the learning contents on the basis of regular curriculum, and design learning experience attending to the students with special educational needs. Schools should hold "learning units" for each level, each subject and each area, to satisfy the learning requirements of students at each educational stage, so that they won't be exposed to the same teaching units repeatedly.

3. Applying the Learning Ability Progress Level to assess learning efficacy

To enable students with special educational needs to learn under the curriculum framework of formal education, the key lies in designing a set of progress level that includes the fundamental abilities within the scope of each subject. We believe that all students, irrespective of their ability level, have the ability to learn, though to different degrees of development and progress. Therefore, the Level start(s) from the motor sensory development stage of infants; each student (including a student with severe learning disorder), in principle, could demonstrate their learning ability within the scope of each subject. In this way, teachers can set goals, design activities and set out expected outcomes in each subject area in line with the learning content. The learning experience of students is based on his/her performance within individual ability, thus the teachers may effectively cater to the differences among students based on their learning ability.

The Learning Ability Progress Level is also a tool to assess learning progress, and should not be used as part of the teaching content. Students with special educational needs may not make learning progress as expected, with fluctuations from time to time, thus the Learning Ability Progress Level shall not be applied to daily progress assessment, but rather the learning outcome of students upon a period of study.

Data on the Learning Ability Progress Level of each school should be collected and uploaded to the data processing platform., where the system, with a certain amount of data accumulated, can conduct data analysis for the purpose of teaching feedback and improving teaching efficacy, including analysis on the cross-school, cross-subject, cross-area and cross-year performance report, as well as the annual progress for certain students.

4. Applying the levels to promote professional development

The Learning Ability Progress Level provides teachers with a set of language to describe the learning performance of students. It not only can strengthen professional communications among teachers working in the same and different schools, but also help to establish the special education culture within a school. The set of language can also play a role in home-schooling practice, enabling parents to better understand the students and their learning performance.

When applying the Learning Ability Progress Level to identify the level of students' learning ability, teachers should collect examples of students' learning performance, which may include photos, videos and audios. Teachers should organize an "assessment coordination" meeting to discuss the learning level of the student concerned. These processes help teachers to have a more thorough understanding of the status of the student and design more relevant learning activities.

When teachers describe or interpret the Learning Ability Progress Level, they can experience the multiple feasibility of special education, and understand the concept of the same curriculum framework; within the appropriate curriculum framework, it is possible and necessary to provide formal education opportunities to all students (including students with special educational needs). Schools should develop common consensus on this perspective, which may help to consolidate the professional foundation for special education, and improve professional development of teachers in special education schools.

5. The Learning Ability Progress Level is not designed for the following purposes:
× to demonstrate the learning ability of students on a daily basis;
× to conduct progress assessment on a daily basis;
× to specify the learning content or to be used as a concrete development curriculum list;
× to assume the same levels for students in each learning area or teaching unit;
× to assume that the performance of students at a specific subject topic equals their annual progress, and form individual learning objectives on such basis;
× to be the label to describe students;
× to identify and recognize students with special educational needs.

5

Chapter V
Opportunities and Activities

This chapter focuses on the feasible learning opportunities and suggested teaching activities in Mathematics teaching for students with various learning needs at different educational stages.

In view of the fact that Mathematics learning is standard referenced, demonstrating stronger continuity than other subjects, the grouping strategy associated with homogeneous ability can be applied in teaching to enhance learning effectiveness. In addition, during the teaching process, teachers should particularly encourage students to apply logical thinking in daily life, which is also a unique element in Mathematics education.

This chapter provides teaching activities in the four educational levels. Each teaching activity takes into consideration the students' age, development and performance. Also, the expected learning outcomes for students with different ability levels should be specified. Teaching plans demonstrate that students with different ability levels have different learning performance under objectives of different learning areas. In order to show the distinction between students with different abilities in a more concise way, only three levels with significant differences in each education level are used as the examples for illustration, and the actual teaching should be adjusted according to the students' actual abilities. The following examples provide practical suggestions for teaching contents and activities and serve as models for future schemes of work. Please refer to Appendix IV.2 for the table.

A. Example of Teaching Activity in Early Childhood Education

Subject:	Mathematics	Learning Areas:	Measurement, Graphics and Space	Stage:	Infant Education
Duration of Learning:	6 lessons				

Unit Name:	Learning the graphics
Formal Teaching Goal:	Students learn the concept of object permanence; Students can distinguish shapes of objects (circles, triangles, and squares)
Teaching Objectives:	Through this unit, students can: ● Find out objects that are completely hidden ● Find out the hidden objects under three layers of covers ● Distinguish the shapes of objects (circles, triangles and squares)
Keywords:	circles, triangles, and squares

Teaching Objectives	Examples of Feasible Teaching and Learning Activities and Experience	Performance Descriptors	
Find out objects that are completely hidden	Students can play with toy blocks of different shapes; Students can observe the teachers hiding toy blocks of various shapes under the cloth or hiding them away; Students with different abilities can conduct different tasks: • Take away the cloth or go to the hiding location and take the toy blocks (L2-1). • Look for the hidden toy blocks under several layers of covers (L3-2). • Draw the shape cards and look for toy blocks of similar shape (L5).	L2-1	Able to find out the toy blocks that are hidden completely
Find out the hidden objects under three layers of covers		L3-2	Able to find out the hidden toy blocks under covers
Distinguish the shapes of objects (circles, triangles and squares)		L5	Able to identify the shape of objects; able to find a triangle-shaped toy block after drawing a card with a triangle shape on it.

B. Example of Teaching Activity in Primary Education

Subject:	Mathematics	Learning Areas:	Numbers and Algebra	Stage:	Primary Schools
Duration of Learning:	6 lessons				

Unit Name:	Counting numbers
Formal Teaching Goal:	Students learn to count every 3 and 5 objects.
Teaching Objectives:	Through this unit, students can: ● Imitate teachers to pair up objects ● Pair up every 3 objects ● Count numbers with 5 as one group
Keywords:	Pair up objects, count every 3 objects and every 5 objects

Teaching Objectives	Examples of Feasible Teaching and Learning Activities and Experience	Performance Descriptors	
Imitate the teachers to pair up objects	Students help to prepare for celebration activities, distribute dining wares and food. Students with different abilities can conduct different tasks: • The teacher demonstrates a set of a plate and a fork and shows the students how to pair them up. The students imitate the act of the teacher to pair up the plate and fork (L3-2). • The teacher puts 3 plates on the table. Students pair each fork up with each plate (L5). • Students put 5 biscuits on one plate to pass on the biscuits among the classmates (L9).	L3-2	Able to imitate the teacher to pair up the fork and plate.
Pair up every 3 objects		L5	Able to pair up every 3 objects, to pair up 3 forks with 3 plates.
Count numbers with 5 as one group		L9	Able to count numbers with 5 as one group, to put 5 biscuits in one group.

C. Example of Teaching Activity in Junior Secondary School Education

Subject:	Mathematics	Learning Areas:	Measurement, Graphics and Space	Stage:	Junior Secondary Schools
Duration of Learning:	6 lessons				

Unit Name:	Time
Formal Teaching Goal:	Students learn to answer questions about time.
Teaching Objectives:	Through this unit, students can: ● Identify morning and evening of the day ● Identify hours and half an hour ● Use time unit, such as “hour”, “minute” and “second” to tell time
Keywords:	Morning, evening, hours, half an hour, hour, minute, second

Teaching Objectives	Examples of Feasible Teaching and Learning Activities and Experience	Performance Descriptors	
Able to identify morning and evening in the day	Students firstly listen to the teacher telling the story picture book of “One Day of Mr. In-a-Hurry”, and put the graphic cards in the time sequence. Students with different abilities can conduct different tasks:	L5	Able to find the picture cards representing morning and evening from the ranked cards.
Able to identify hours and half an hour	• Find out the picture cards representing morning and evening respectively (L5). • Find out the picture cards representing hours and half an hour (L5).	L9	Able to find out the picture cards representing hours and half an hour from the ranked cards.

Able to use time unit, such as “hour”, “minute” and “second” to tell time	• Use “hour”, “minute” and “second” to tell time in accordance with the picture cards, and tell the content of the activities (L12).	L12	Able to use time unit “hour”, “minute” and “second” to tell time based on the time provided in the picture cards.

D. Example of Teaching Activity in Senior Secondary School Education

Subject:	Mathematics	Area:	Measurement, Graphics and Space	Learning stage:	Senior Secondary Schools
Duration of Learning:	4 lessons				

Unit Name:	Currency
Formal Teaching Goal:	Students learn to use legal currency in Macao.
Teaching Objectives:	Through this unit, students can: ● Identify, calculate and give changes with the legal currency in Macao
Keywords:	Currency, calculation, and giving changes

Teaching Objectives	Examples of Feasible Teaching and Learning Activities and Experience	Performance Descriptors	
Able to identify, calculate and give changes with the legal currency in Macao	Students watch the teacher show some supermarket leaflets, and learn about the different prices for goods shown in the leaflets (from MOP5 to MOP80, including currency in dollars and coins). Students with different abilities can conduct different tasks: • Find out goods below the price of MOP10, pick one favorite object, and tell the price of it (L9). • Choose presents for 12 classmates, calculate the total price of the presents, and calculate the changes with MOP1,000. (L12). • Pick out a favorite object, randomly pick out the discount coupon, calculate the discounted price first, and calculate the changes with MOP500 (L15).	L9	Able to identify goods below the price of MOP10. Able to tell the price of goods described in the leaflet.
		L12	Able to calculate multiplication of dollars and coins. Able to give the change.
		L15	Able to calculate the discount. Able to give the change.

6

Chapter VI
Assessment and Rating Coordination Mechanism

This chapter explicates the methods to apply the Learning Ability Progress Level to student's assessment, putting the emphasis on professional consultation. In daily teaching practice, teachers are encouraged to observe the learning performance of students, collect examples and identify the learning outcome. It is suggested to read this chapter together with Section 4 in Chapter IV on the application of the Learning Ability Progress Level in teaching and learning.

A. Need for Rating Coordination

It is inadequate and unreliable to judge the students' ability level based on the observation of one single learning event. Examples for student assessment should be accumulated from multiple learning scenarios over months. Teachers, based on the examples collected from different learning opportunities and scenarios, can make professional decisions concerning the students' ability to proceed to learning in a new level.

Teachers should adopt the principle of "comprehensive judgment", based on the data and results of school assessment, to determine the appropriate level when judging the level of students' ability. However, different opinions may arise among teachers on the performance for some students. In order to reach valid and consistent judgment, it is necessary to develop a rating coordination mechanism within the same school or among schools.

"Comprehensive judgement", as is indicated by the name, refers to the practice of determining the ability level of students through multiple examples. It is not compulsory for students to obtain the learning outcomes fitting all the descriptions for the level concerned, yet they do need to fit a majority of the descriptions to be qualified for the level considered. To be more specific, among the 6 described items in the specific level, the student should fit 4 or 5 items and demonstrate potential in the remaining items for which he/she may temporarily fail to meet the standard due to environmental factors or physical disability. In other words, more rigorous standards should be adopted to determine student performance.

The "rating coordination" mechanism, which enables teachers and stake holders to review, revise and determine the descriptions concerning rating judgments of students' abilities, is initiated to help schools to achieve reliability and consistency in student performance assessment. A solid assessment procedure can thus be established via regular "adjustment" practice. An effective adjustment cycle starts from a team of teachers launching the assessment project, followed by the whole school participation which helps to enhance the skills and confidence on assessment validity, and finally develops into a robust assessment procedure with cross-school identification.

Conducting "rating coordination" among teachers within one school can generate the following effects:

- To have focus group meetings to discuss student ability;
- To familiarize teachers with the application of the Learning Ability Progress Level;
- To consolidate the teachers' understanding on descriptions of levels;
- To promote teachers' understanding of the assessment and promote their professionalism;
- To enable dialogues among teachers, staff and professionals for the purpose of reaching proper judgment based on personal observation and experience.

Schools can also improve the quality of "rating coordination" via discussions with students and their family. The teachers should realize that:

- discussion with students on their homework and sharing with student their progress contributes to student's perception of their own study and ability;
- discussion on student progress with people who interact with the students at various environments is beneficial to decide the most appropriate "ability and performance" of students;
- Informal discussions among teachers could offer important insights into the student development in other areas, which is conducive to enhance all the teaching staff's recognition and perception of the students' ability.

B. Practice of Rating Coordination

The rating coordination mechanism is a simple process designed to ensure the reliability and adequacy of the assessment approaches teachers adopt. Participants in rating coordination can be teachers and other professionals within the same school, or teachers from other schools. Teachers firstly conduct preliminary rating for an individual student in accordance with the levels on the basis of the collected examples for students' performance. Teachers should share their assessment decision and supporting examples on the rating coordination meeting, and discuss with colleagues to reach consensus on the reliability of the judgment. In this process, teachers will discuss the examples of performance for students of similar levels on the same subject to reach judgment consistency. The rating result should be recorded in the table provided in Appendix 4.1.

The rating coordination mechanism is based on professional dialogue. Teachers can adjust their judgment and reach consensus in the rating coordination process, to reach an agreement on the reliable examples that can powerfully support the level of ability students have achieved. The rating coordination mechanism aims to ensure the effectiveness and consistency of the teacher's judgement, and to promote teachers' professional development. Subject directors as well as other professionals also play an important role in the process of rating coordination.

A school should conduct rating coordination activity within the school each academic year, to ensure a unified judgement of teachers on the understanding and learning outcomes of the assessment principles; the following approaches are suggested for rating coordination activity:

- Teachers collect examples regarding the learning performance of students via various learning opportunities and scenarios.
- Teachers apply the principle of "comprehensive judgment" to decide the levels of students' ability based on the collected examples and other materials.
- The school should hold rating coordination meeting to discuss the students' learning ability and reach consensus.

- Teachers discuss the learning ability of other students based on the principle and examples in the first discussion.
- It may be necessary to revise the results achieved in the first discussion to keep the consistency of judgment.
- The school should design a specific system to appropriately save the records of performance examples for each individual student and upload the rating level into the level database for further analysis.
- The assessment based on the levels and rating coordination meetings is suggested to be conducted once each academic year.

After the rating coordination meeting, teachers can save the examples supporting the level judgements as part of the school assessment framework, and discussion materials for joint activities among schools (if applicable) concerning the rating coordination mechanisms.

C. Notes on Example Collection

It is very important for teachers to collect multiple learning examples to support the judgment. Examples and evidence can be from various sources in diversified forms, including:

- Pictures and video clips
- Observation records
- Class quiz
- Anecdotes
- Reports
- Self-evaluation of students
- Peer review
- Students' works
- Other forms of works and practices

Teachers can keep records based on their own observation, or the observation reported by other people, to assist and support judgment on students reaching a certain level of learning ability. The providers may include:

- Other teachers
- Teaching assistants
- School staff
- Speech therapist
- Physiotherapist
- Occupational therapist
- Social worker
- Parents
- Siblings
- Classmates
- Peers, etc.

Learning environment has a significant impact on students' behavior. Factors in the learning environment, such as lack of experience, limited opportunities, overly low or high expectations, and inappropriate teaching practice, may become obstacles to learning and hinder the students from understanding their potential. When students get along with strangers in an unfamiliar environment or a formal learning environment, they will feel

great pressure, and thus fail to learn or demonstrate their ability in an effective manner. In other words, students, in familiar surroundings and accompanied by trusted teachers, can reliably repeat some reactions. However, students should be able to transfer what they have learned to new scenarios or generalize for similar situations.

Teachers can observe the performance and reaction of students outside the classrooms, to develop a more thorough understanding of the students' ability to apply the learned knowledge to the new scenario. In addition, it is also crucial to record the response of students at home, in the community, different classrooms and other learning opportunities and activities. Scenarios outside the classroom can provide a good opportunity to judge the performance and ability of students in applying the communication skills, literacy, social interaction and computation.

No matter what kind of examples teacher collect, they should provide background information for record and supporting judgement. Relevant background information includes:

- Date and time of the performance recorded;
- The scenario. For example: in class, in the community, or at home;
- The people with the students, such as therapist, teaching assistant or peers;
- Related resources used, such as the computer or teaching equipment;
- Whether the response is "new" (first time), "manifesting" (new but unstable response), or "established" (expected response of students under certain occasions and conditions);
- Degree of guidance, support or prompts offered to the students in making the responses, such as demonstration, imitation or verbal prompts;
- Usage of communication assisting tools (reasonable assistance);
- Whether the teacher has made adjustments or revisions to demonstrate the learning process, such as the learning outcomes to be replaced, or specific examples recorded.

Most importantly, teacher can develop a clear understanding of the current ability of students and their expected learning progress in the process of collecting examples. The examples of learning performance include:

- Examples of what students "are capable of";
- Evidence collected over a long period from different learning situations;
- Works of students completed without assistance (the degree of assistance also need to be recorded. The gradually declining assistance is also a recognition of progress.);
- Learning outcomes that fit the level, but not included in the descriptions;
- Reasonable usage of assisting tools to help students achieve learning outcome;
- Exemption of learning performance due to special needs of students;
- Non-monolithic learning event;
- Learning outcomes beyond the descriptions;
- Example of students' interest in looking for content they have not yet mastered.

7

Chapter VII
Attainment Level Descriptors of Learning Ability Progress Levels in Mathematics Education

This Chapter is composed by "Seed Teachers" with reference to the curriculum guides, "The Requirements of Basic Academic Attainments", textbooks, and in conjunction with their teaching experience. The levels are divided into two parts: motor sensory development stage and disciplinary development stage, covering learning performances from early childhood education to senior secondary education. The motor sensory development stage applies to all learning areas, and the disciplinary development stage has three learning areas: "Numbers and Algebra", "Measurement, Graphics and Space", and "Statistics and Probability".

A. Motor Sensory Development Stage (applicable in all learning areas)

L1-1：Students start to act and undergo experience which enables them to:

- Look hesitatingly at slowly-moving objects. For example, students can look hesitatingly at the globe moving slowly in front of his/her eyes.
- Attempt to make visual contact with objects. For example, students turn their heads towards a familiar teacher.
- Make sounds other than cry or laugh in a stable mood. For example, students can make a "coo-coo" sound.
- Show interest in simple action that students are familiar with but not attempt to imitate the action. For example, when the teacher waves goodbye, students would pay attention to the teacher's hand movements without imitating the movements.
- Start to show conscious movements. For example, students can consciously get closer to an illuminating circle with body movements.
- Attempt to observe objects. For example, when students hear a sound, they would attempt to turn their heads towards the round toy making the sound.
- Make reflexive responses. For example, when the teacher holds a ball in the hand and moves closer to the students' eye, the students would react with blinking.

L1-2: Students gradually notice movements and gain experience from the movements:

- Able to notice a gradually moving object disappear. For example, students can track a slowly moving triangle column in front of their eyes. When the triangle column disappears, students would turn their heads back to the place where the triangle column once appeared.
- Able to focus on some people, events, objects or parts of objects, and try to touch these objects. For example, when the teacher shows a cylinder within the students' sight and puts the cylinder within their reach, the students could try to grasp it with their hands.
- Respond to sounds similar to those made by babies and try to imitate these sounds, without success. For example, when the teacher talks about the number "5", students could make sounds not so similar to the sound of "5".
- Show interest in simple actions that students are familiar with but not attempt to imitate the actions. For example, when the teacher waves goodbye, students would try to imitate the movement, though the imitation is not precise.

- Able to repeat arm (or body) movements to maintain the dynamics of the object. For example, students can hold in their hands a cylinder (a rain barrel) that can make sounds and continually shake their arms.
- Able to find the location of a sound-making object and fixate on the source of the sound with their eyes. For example, when the teacher stands behind the students and shakes a sound-making cylinder (rain barrel) to the left, right or above the students in a random sequence, they can find and fixate on the source of the sound with their eyes.
- Start to explore objects with their mouth. For example, a student could put the cylinder into his/her mouth to lick and feel it.

L2-1: Students begin to show more consistent responses to familiar people, things and objects:

- Able to find out completely covered objects. For example, when the teacher covers the cylinder with cloth within the students' sight, the students will pull the cloth away and take the cylinder.
- Able to repeat an action (such as shaking the arms systematically) to gain an interesting experience. For example, students hold the sound-making cylinder (rain barrel) in their hands, shaking their arms continuously to make sound with joyful facial expressions.
- Able to imitate similar sounds. For example, when a student hears ""8", he/she can imitate and make sounds similar to "8".
- Able to imitate familiar actions immediately. For example, when the teacher shows the "give-me-five" gesture, students can imitate the action immediately.
- Able to participate in and explore activities together. When the activity stops, students can make a distinct gesture to show "request". For example, when the teacher plays a number song and suddenly stops playing the song, students can clap the table to indicate willingness to continue to listen to the song.
- Able to look at quickly moving objects. For example, when the teacher holds some "number building blocks", drops the blocks within the students' sight while keeping the hands in the original position, students' eyes can follow the track of the falling building blocks and look down.
- Able to visually check several objects at the same time to inspire response or interaction. For example, students can look at several solid objects, and take up one of the solids on the table to knock over another solid.

L2-2: Students begin to take the initiative in interactional activities:

- Able to quickly find the completely covered object from the correct location among three different locations. For example, when the teacher shows three upside-down cups within students' sight, and hides a "number biscuit" in one of the cups, students can uncover the right cup and take the biscuit out.
- Able to take the initiative in interaction. For example, students can take the initiative to move and get the cylinder (sea wave drum) to play with it.
- Able to imitate a familiar single tone. For example, when the teacher says "2", students can imitate the sound of "2".
- Able to show the intention to imitate unfamiliar actions. For example, when the teacher uses both arms to demonstrate the "X" action for the first time, students can imitate the action intentionally.
- Able to take the initiative to make "request" action. For example, students can take the initiative to get some cups to indicate that they want to drink water.
- Able to operate in an experimental exploration and memorize the results for the time being. For example, students can put coins into a cup, turn the cup upside down, and get the coins out.
- Able to express feelings in his/her usual way. For example, when the familiar game is suspended, students can make consistent response to express dissatisfaction.

L3-1: Students begin to consciously communicate with people:

- Able to stay focused for a short time, can find out an object from three layers of covers. For example, the teacher shows three upside down cups while students are watching, and hides a number biscuit in one of the cups. When the teacher slowly and randomly moves the three cups, the students try to find the cups with the number biscuit and take the biscuit out.
- Able to remember the knowledge learned for a long period. For example, students, based on their experience, pull the rope to get the building blocks cart which is led by the rope in a distance.
- Able to imitate unfamiliar pronunciation, but not very precise with less satisfying quality. For example, when the teacher shows students how to pronounce "Mathematics", students are able to imitate the sound of "Mathematics" with imprecise pronunciation.
- Able to imitate unfamiliar actions. For example, when the teacher uses his/her arms to make the action "O" shape for the first time, students are able to imitate the action and make the shape of "O".
- Able to make continuous actions or expressions so that the events or activities they are interested in will continue. For example, when a student sees the teacher making funny actions, he/she would tap the teacher gently to express hope to continue the activity if the activity is suspended.
- Able to explore an object in a more sophisticated approach. For example, when the teacher releases a ball on top of a slope, students seeing the ball falling will imitate the same action to put the ball on top of the slope and release the ball.
- Able to make conscious communication to express their needs. For example, when the teacher demonstrates a transparent jar with shaped biscuits, the student pulls the teacher's hand to indicate that he/she wants to open the biscuit jar.

L3-2: Students can gradually apply conventional communication methods:

- Able to find out the covered object hidden under one layer out of the three layers of covers. For example, when the teacher puts a cubicle under one of the three layers of cloth within the students' sight, the students are still able to find the cubicle.
- Able to attempt to solve issues with feasible methods in a systematic manner. For example, students should be able to tilt the transparent water jar to take out the "number cubicles" in the water jar.
- Able to apply conventional communication methods and make similar sounds by imitation. For example, students are able to imitate the teacher to sing "one, two, three".
- Able to observe and imitate unfamiliar actions at the same time. For example, when the teacher demonstrates the number song in action for the first time, students are able to simultaneously observe and imitate the teacher's actions.
- Able to predict the result if the event takes place repeatedly. For example, when the teacher repeatedly sings the numbers "1, 2", students should be able to expect the teacher to sing "3" then.
- Able to keep long-term memory for the knowledge learned. For example, students are able to arrange the number cups in the order of the size without demonstration.
- Able to take the initiative to explore objects for a long time. For example, students are able to play with the tangram for a long time.

B. Disciplinary Development Stage (including "Numbers and Algebra", "Measurement, Graphics and Space", and "Statistics and Probability")

L4: Numbers and Algebra:

- Able to sing the numbers from 1 to 5. For example, when the teacher gives the cue of "1", students can sing the numbers from 1 to 5.

- Able to pair up identical objects within 3 pairs. For example, students can put 3 candies of the same size into three boxes of the same size.
- Able to recognize the concept of number "1". For example, students can pick 1 object among 5 identical objects following the teacher's instruction of getting 1 object.
- Able to recognize numbers from 1 to 3. For example, when the teacher demonstrates the number card, students can tell the numbers on the cards.

L5: Numbers and Algebra:
- Able to sing numbers from 1 to 10. For example, students can sing numbers from 1 to 10 by themselves.
- Able to understand the concept of numbers, including 1 and all (within 5). For example, when the teacher first demonstrates 5 identical building blocks on the table, students can pick up one or all of the building blocks based on the teacher's instruction.
- Able to pick up the corresponding number of objects (within 3). For example, when the teacher demonstrates the number "3", students can pick up 3 building blocks from the pile and bring them to the teacher.
- Able to identify numbers from 1 to 10. For example, when the teacher demonstrates the card, students can identify the numbers provided in the card.

L6: Numbers and Algebra:
- Able to sing the numbers from 1 to 30. For example, students can sing numbers from 1 to 30.
- Able to match objects within 5 pairs. For example, students can put 5 identical candies into 5 identical boxes one by one.
- Able to accurately calculate the number of objects within 5. For example, students can calculate the number of objects and pair the result with the right number based on the teacher's instruction.
- Able to compare numbers (within 5). For example, students can arrange two piles of building blocks with apparently different quantities, and discover which pile has more building blocks.

L7: Numbers and Algebra:
- Able to sing numbers from 1 to 50. For example, students can sing numbers from 1 to 50.
- Able to accurately calculate the number of no more than 10 objects. For example, when the teacher demonstrates the number "8", students can put 8 building blocks into the basket or take out 8 building blocks from the basket.
- Able to identify combinations within the number of 3. For example, when the teacher demonstrates 2 building blocks and 1 building block, students can tell/point out that the total number is 3.
- Able to continue counting numbers within 10. For example, when the teachers says the number 6, students can continue to count the number 7, 8. 9, and 10 in sequence .
- Able to identify ordinal numbers within 5. For example, students could tell/point out that he/she is the third in the team when standing in a line.

L8: Numbers and Algebra:
- Able to accurately count objects within the number of 20. For example, students can put 10 building blocks into the basket one by one or take out 18 building blocks from the basket one by one in accordance with the instructions.
- Able to demonstrate groups of 2 (less than 10). For example, students can follow instructions to put 2 building blocks into one pile, with a total of 5 piles.
- Able to continue counting numbers within 20. For example, when the teacher says the number 13, students can then continue to count 14 to 20.

- Able to count down the numbers from 10 to 1. For example, students can sing the numbers from 10 to 1.
- Able to demonstrate combination and decomposition within 5 objects. For example, when the teacher demonstrates 3 building blocks, students can make up with another 2 building blocks.

L9: Numbers and Algebra:

- Able to demonstrate combinations and segregation within 10 objects. For example, students could follow the teacher's instruction (such as demonstrating the number 6) to put 6 building blocks into combinations of 1&5, or 2&4, or 3&3.
- Able to understand a group of 5. For example, students could follow the teacher's instruction to put 5 building blocks into one pile.
- Able to compare numbers within 10. For example, based on the two numbers provided by the teacher (such as 2 and 8), students can tell that 8 is larger, while 2 is smaller.
- Able to understand the meaning of odd and even numbers, and tell the even numbers apart from the odd numbers within 10. For example, when the teacher demonstrates 7 toy cars, students could count the numbers by 2, and tell that 7 is an odd number.
- Able to add and subtract numbers within 10. For example, students could calculate that 4 plus 3 equals 7 in real scenarios (4+3=7).

L10: Numbers and Algebra:

- Able to demonstrate the group of 2, 5 and 10 and tell the total number. For example, students could follow the teacher's instruction to put 5 number cubicles into one pile, and calculate the total number of cubicles of 6 piles.
- Able to compare numbers within 100. For example, when the teacher demonstrates two numbers (35 and 87), students could tell/point out that 35 is smaller and 87 is larger.
- Able to describe the meaning of 0. For example, students could use 0 to indicate nothingness.
- Able to do two-digit addition calculation with no carrying. For example, students could calculate that 11+23=34
- Able to do two-digit non abdication subtraction calculation. For example, students could calculate that 78-25=53
- Able to solve addition and subtraction problems. For example, if Sio Meng has 64 candies, how many are left once he has eaten 30 candies? Based on the problem description, students should be able to calculate the result by writing the formula 64-30=34.

L11: Numbers and Algebra:

- Able to calculate multiplication within 10 (including 0 and 1). For example, students should be able to calculate that 3×9=27
- Able to do two-digital with-carry addition to solve problems. For example, if the brother has $18, and the sister has $36, then how much do the brother and the sister have altogether? Based on the description, students should be able to work out that 18+36=54.
- Able to calculate two-digit with-abdication subtraction to solve problems. For example, if the fruit shop has 61 apples, 46 were sold in the morning, how many apples are left? Based on the description, students should be able to work out that 61 apples minus 46 apples is 15 apples.
- Able to do two-digit mixed calculation with addition and subtraction to solve problems. For example, the brother originally has $76. Now father gives him $87. The brother spent $63 to buy reference books. How much money does the brother have right now? Based on the problem description, students should be able to write down the formula 76+87-63 and work out the answer $100.

- Able to understand the concept of continuous addition and calculate simple multiplication. For example, students should be able to point out that 3+3+3+3 equals to 3×4, and the answer is 12.
- Able to understand the concept of division, averaging and inclusion, and do basic division calculation. For example, students should be able to divide 16 candies evenly into 4 shares, with 4 candies in each share.

L12: Numbers and Algebra:

- Able to calculate four-digit with-carry addition to solve problems. For example, if there are 3,487 visitors in the park in the morning, 2,985 visitors in the park in the afternoon, then how many visitors are there in the park the whole day? Based on the problem description, students should be able to write down the calculation formula 3,487+2,985, and work out the answer 6,472 (visitors).
- Able to calculate three-digit with-abdication subtraction to solve problems. For example, father's salary was $7,021 last month. His salary this month is $1,732 less than last month. How much is father's salary this month? Based on the problem description, students should be able to write down the calculation formula 7,021-1,732, and work out the answer $5,289.
- Able to calculate multiplication of one digit by two digits to solve problems. For example, there were 12 pieces in one box of cakes. Sister bought 6 boxes altogether. How many pieces of cakes were there? Based on the problem description, students should be able to write down the calculation formula 12×6 and work out the answer 71 (pieces).
- Able to calculate division of three digits by one digit. For example, 5 notebooks are sold at the price of $125 then what's the price for each notebook? Based on the problem description, students should be able to write down the calculation formula 125÷5 and work out the answer $25.
- Able to do mixed calculation of addition and multiplication, or multiplication and subtraction, to solve problems. For example, students should be able to work out the perimeter of a rectangle based on the formula (45+24) × 2 and work out the answer 138.
- Able to compare fractions of common numerator or common denominator. For example, when the teacher demonstrates two fractions, 1/7 and 1/9, students should be able to tell that 1/7>1/9.

L13: Numbers and Algebra:

- Able to calculate multiplication of two digits by three digits to solve problems. For example, 128 chocolate are put into one box, then how many chocolate are there in 53 boxes? Based on the problem description, students should be able to write down the formula 128×53 and work out the answer 6,784 (bars).
- Able to calculate divisions of three digits by two digits to solve problems. For example, if we divide 256 chocolate to 15 people equally, how many bars can each person get? How many bars will be left? Based on the problem description, students should be able to write down the formula 256 ÷ 15 and work out the answer 17 chocolate for each person with 1 chocolate left.
- Able to do mixed arithmetic operation including addition, subtraction, multiplication and division. For example, each chair is priced at $25. The price of a table is three times that of the chair. How much is needed to buy a chair and a table? Based on the problem description, students should be able to write down the formula 25＋25×3 and work out the answer $100.
- Able to compare fractions with different denominators. For example, when the teacher demonstrates two fractions 5/6 and 3/4, students should be able to tell that 5/6>3/4.
- Able to do addition and subtraction of fractions with the same denominator. For example,

a road construction team completed 3/11 km of the task on the first day, and completed 5/11 km on the second day. How many km were completed within the two days? Based on the problem description, students should be able to write down the formula 3/11+5/11 and work out the answer 8/11 km.

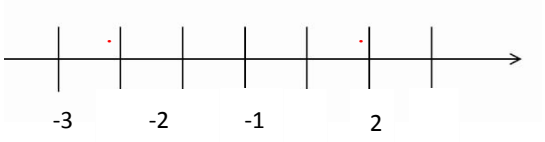
- Able to do mixed calculation with fraction addition and subtraction to solve problems. For example, the juice is $3.2, lemon tea $4.5. If I pay $10, how much is the change? Students should be able to write down the formula 10 - (3.2 + 4.5) and work out the answer $2.3.

L14 Numbers and Algebra:

- Able to do mixed arithmetic operations including addition and subtraction of fractions with different denominators. For example, students should be able to work out that the answer for 3 7/10 -2 4/5 +1/3 is 1 7/30.
- Able to do mixed arithmetic operations including addition, subtraction, multiplication and division of decimals. For example, students should be able to work out that 2.5 ×10-75.7 ÷ 10 + 2.3 equals 19.73.
- Able to analyze prime numbers and composite numbers. For example, when the teacher demonstrates four numbers (31, 48, 65 and 79), students should be able to find out that 31 and 79 are prime numbers, while 48 and 65 are composite numbers.
- Able to compare fractions and decimals. For example, students should be able to make comparison among 0.47, 7/11, and 5/12. The answer is that 5/12<0.47<7/11.
- Able to solve simple equations of multiplication and division which requires one-step operation. For example, students should be able to solve the equation 6y=78, and work out the answer y=13.

L15 Numbers and Algebra:

- Able to convert percentiles, decimals and fractions. For example, students should be able to work out that 2 2/5=2.4=240%.
- Able to do mixed operations including addition, subtraction, multiplication and division of fractions, decimals and percentiles. For example, students should be able to work out that the answer for 8.7-12 ÷ 4 +1.8 is 7.5.
- Able to solve problems about percentage. For example, the pencil box is sold at $60. Now a 35% discount is offered to clear the stocks, then what is the price of the pencil box upon discount? Based on the problem description, students should be able to work out the answer for 60 × 35% is 21.
- Able to show positive and negative numbers using dots on the line. For example, students should be able to use dots on the line to demonstrate positive and negative numbers. As is shown in the picture below, A represents -2, while B represents +2.



- Able to describe the meaning of direct ratio and inverse ratio. For example, the task is to complete 600 spare parts. If 10 spare parts can be completed within one hour, then it needs 60 hours to complete the whole task. If 20 spare parts can be completed within one hour, then it needs 30 hours to complete the whole task. The more spare parts could be completed within one hour, the less time it needs to complete the whole task. Based on the description, students should be able to tell that the description reflects an inverse ratio relationship.

L16：Numbers and Algebra:

- Able to calculate the arithmetic operations of directed numbers. For example, students should be able to work out the answer for (-8)-(-6) + (-2) × (+5) is -12.
- Able to solve problems using two-step equations. For example, if a number multiplying 8 and subtracting 16 equals 72, students should be able to work out the number, 11.
- Able to analyze the concept of equation. For example, students should be able to point out that in an equation "X<60", X could be 59, 48.5 or 37, etc.
- Able to describe the meaning of functions. For example, students should be able to explain in simple terms the meaning of function, the correlation between two variables where each input value corresponds to one output value. In other words, each element in the X set of numbers corresponds to elements in the Y set of numbers.
- Able to solve linear equations with one unknown. For example, students should be able to work out the answer for 2y-3=5, which is y=4.

L17: Numbers and Algebra:

- Able to do polynomial operation. For example, students should be able to work out the answer for 2(5x+3y), which is 10x+6y.
- Able to solve perfect square expression. For example, students should be able to work out the answer for $(\boldsymbol{a} + \boldsymbol{2})^2$, which is a^2+4a+4.
- Able to do factorization of polynomials. For example, students should be able to work out the answer for 3x+3y, which is 3(x+y).
- Able to solve linear equation in two unknowns. For example, students should be able to solve the equations y=x+2, 5x+3y=14 and work out the answer to be x=1, and y=3.
- Able to solve comparison problems in daily life. For example, if A and B is to divide $1000 by the ratio of 1:4, students should be able to find that A will get $200, and B will get $800.
- Able to describe the meaning of "rational number". For example, students should be able to describe rational number to be any number that can be reduced to a fraction where the numerator and denominator are integers, including integers, finite decimals, fractions and circulating decimals.

L18：Numbers and Algebra:

- Able to use scientific notation method to express very large or small numbers. For example, students should be able to use scientific notation method to write 486,274,621 into $\boldsymbol{4.86\times10^8}$.
- Able to solve binary quadratic factorization. For example, students should be able to solve binary quadratic factorization for $\boldsymbol{x}^2 + \boldsymbol{2xy} - \boldsymbol{3y}^2$ =(x-y) (x+3y).
- Able to solve linear equation in one unknown. For example, students should be able to solve the linear equation in one unknown, $\boldsymbol{4x} + \boldsymbol{13} \geq \boldsymbol{7} - \boldsymbol{2x}$, and work out the result, $\boldsymbol{x} \geq -\boldsymbol{1}$.
- Able to work out the value for integral exponents. For example, students should be able to work out the value for $9^{-3}\div(3^{-3})^2$ to be 1.

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L4: Measurements, Graphics and Space:

- Able to establish the size concept of objects. For example, in the throw-pick-ball activity, students should know that open arms would be needed to hold a 50 cm-diameter ball.
- Able to pick the right object out of two options to match shapes (square, triangle, and circle). For example, when the teacher first demonstrates the triangle and circle on the table, students then should be able to match shapes of the same type according to the teacher's instruction.

- Able to imitate the action of building blocks. For example, when the teacher demonstrates the action of putting three blocks into the "品" shape, students could imitate the action and put the blocks into the same shape.
- Able to identify the relation between the whole and the part of an object. For example, when the teacher demonstrates 4 parts of a fruit, students should be able to put the parts back to a complete fruit model.

L5: Measurement, Graphics and Space:

- Able to compare objects of remarkably different size/length based on perceptual intuition. For example, students can pick out the smaller/longer object out of two objects of remarkably different sizes/lengths.
- Able to identify the relation between the whole and the part of a picture. For example, when the teacher demonstrates a picture of a basketball, students should be able to put three puzzle pieces back into the basketball picture.
- Able to imitate and draw simple lines. For example, students should be able to use crayons to draw horizontal lines or straight lines.
- Able to classify basic flat shapes (square, triangle and circle). For example, students should be able to follow the teacher's instruction and put squares and triangles separately.
- Able to recognize the shape of an object (square, triangle and circle). For example, students should be able to follow the teacher's instruction and pick out the required shapes.
- Able to identify the locations and directions with students at the center (top, bottom, front, behind, inside, and outside). For example, students should be able to follow the teacher's instruction to pick up the object in front of them.

L6: Measurement, Graphics and Space:

- Able to compare two objects with slight differences in size. For example, in accordance with the teacher's instructions, students should be able to choose the larger ball from two balls slightly different in size through playing with balls or other methods.
- Able to compare people or objects with remarkable difference in height based on perceptual intuition. For example, students should be able to follow the teacher's instructions to tell who is the taller person between two people of quite significantly different heights.
- Able to identify the morning and evening in a day. For example, students should be able to say "Good morning" in the morning and "Good night" before going to bed.
- Able to differentiate flat shapes and solid shapes. For example, students should be able to pick out a cylinder and roll it.
- Able to understand symbols describing locations. For example, students should be able to tell the walking direction based on the symbols.
- Able to put objects in designated locations (top, bottom, inside, outside, front, back). For example, students should be able to follow the teacher's instructions to put the building blocks inside a box.

L7: Measurement, Graphics and Space:

- Able to compare two objects with obvious differences in thickness, width and weight. For example, students should be able to follow the teacher's instruction and pick out the thicker book from two books with obvious differences in thickness.
- Able to draw basic shapes (square, triangle and circle). For example, students should be able to follow the teacher's instructions and draw a square figure.

- Able to distinguish the positional relationship between two objects (top and bottom, front and back, inside and outside). For example, students should be able to tell that the cup is under the table.
- Able to move objects toward certain directions (up, down, forward, backward). For example, students should be able to follow the teacher's instruction and move the toy car forward.
- Able to compare the moving speed of two objects. For example, when the teacher demonstrates two toy cars moving at different speeds, students should be able to tell/point out the faster one.
- Able to match 3 types of solid shapes (circular cylinder, triangular cylinder and the cuboid). For example, when the teacher demonstrates the circular cylinders, triangular cylinders, and the cuboids on the table, students should be able to put solid shapes of one type together.

L8: Measurement, Graphics and Space:

- Able to identify the difference between a day and a week. For example, students should be able to say that Monday to Friday are school days, while Saturday and Sunday are holidays.
- Able to describe the basic content in a calendar. For example, students should be able to tell that today is Monday, February 29, 2016.
- Able to use the tangrams to build shapes with meaning. For example, when the teacher demonstrates how to build a house shape by tangrams, students should be able to build a similar house shape (not on the original picture).
- Able to tell the directions of left and right based on his/her own location. For example, students should be able to follow the teacher's instructions to pick up a pen found to his/her left.
- Able to put three objects in order based on their size, length or quantity. For example, when comparing the length of three pencils, students should be able to put the pencils in order and point out the shortest pencil.

L9: Measurement, Graphics and Space:

- Able to differentiate Macao Patacas in the unit of dollar ($1, $2, $5 and $10). For example, students should be able to pick out a $1 in accordance with instructions.
- Able to read the price within 10 (in the unit of "dollar"). For example, when the teacher demonstrates a price of $8, students should be able to tell that it is $8.
- Able to differentiate the hour hand and minute hand. For example, when the teacher shows a clock, students should be able to follow the teacher's instructions to point out the hour hand.
- Able to differentiate the hour sharp and half an hour. For example, when the teacher shows a clock of 9 o'clock, students should be able to tell that it is 9 o'clock.
- Able to compare the distance of two objects. For example, students should be able to follow the teacher's instructions to pick out the towel that is closer.
- Able to differentiate the basic shapes composing a simple picture (square, triangle and circle). For example, students should be able to find out all the triangles in the picture.
- Able to identify an object and the left and right position of the object. For example, students should be able to follow the teacher's instruction to put the toy car to the right of the toy bear.
- Able to differentiate yesterday, today and tomorrow. For example, students should be able to reply to the question about where they went to yesterday.

L10: Measurement, Graphics and Space:

- Able to describe the relative positions between objects. For example, students should be able to look at the picture and tell that the blackboard is to the left of the door; the door is to the right of the blackboard.
- Able to differentiate more planar shapes (triangle, square, rectangle, pentagon, hexagon and circle). For example, students should be able to look at pictures and say/point out that this is a pentagon.
- Able to differentiate solid shapes of various types (cylinder, cone and ball). For example, students should be able to look at the object and tell that it is a ball.
- Able to use appropriate measurement tool to calculate the length of objects. For example, students should be able to use a soft tape to measure the length of the table.
- Able to identify the value of Macao Patacas. For example, students should be able to point at a 50-cent coin and tell that it is 50 cent.

L11: Measurement, Graphics and Space:

- Able to use meter as the unit to measure and compare the length of objects and distance between objects. For example, students should be able to use a meter ruler to measure the length of a blackboard.
- Able to describe the basic features of cones and cylinders. For example, students should be able to describe the sharp tip and round bottom of the cone.
- Able to use the 12-hour chronograph method to keep time. For example, students should be able to tell that it is 4 o'clock p.m.
- Able to differentiate the four major directions (east, south, west and north). For example, students should be able to use the compass to find the eastward direction.
- Able to calculate addition and subtraction of currencies. For example, students should be able to work out that $21 and 50 cents adding $34 equals $55 and 50 cents.
- Able to describe different types of angles. For example, students should be able to tell the acute angle, right angle and obtuse angle from the picture.
- Able to use gram, kilogram and ton as the unit to measure and compare the weight of objects. For example, students should be able to tell their body weight in kg.

L12: Measurement, Graphics and Space:

- Able to choose the appropriate measurement tool, to measure and compare the length of objects in line with the standard-length unit (millimeter, centimeter and kilometer). For example, students should be able to use the ruler to measure the length of a pencil (93 millimeters).
- Able to describe the features of square and rectangle. For example, students should be able to tell that a square has four sides of equal length and 4 right angles.
- Able to describe triangles of different shapes. For example, students should be able to identify the isosceles triangle, the right triangle, equilateral triangle and the irregular triangle from the picture.
- Able to calculate the time needed for an activity. For example, students should be able to work out the swimming class to be 40 minutes, based on the starting time and ending time.
- Able to point out time based on the 24-hour chronograph method and its relation with afternoon and morning. For example, students should be able to tell that 17 o'clock is in the afternoon.
- Able to use formulas to calculate the perimeter of a square and a rectangle and write down the unit of measurement (meter, or centimeter). For example, students should be able to work out the perimeter of a rectangle in the picture to be 12 meters.
- Able to use formulas to calculate the size of a square and a rectangle and write down the unit of measurement (square meter, square centimeters). For example, students should be able to work out the size of the rectangle in the picture, which is 24 square centimeters.

L13: Measurement, Graphics and Space:

- Able to choose the appropriate measurement tool, use volume unit (liter, milliliter) to measure and compare the volume of objects. For example, students should be able to measure the volume of a water cup in "millimeter".
- Able to differentiate a vertical line and parallel line. For example, students should be able to find out vertical lines and parallel lines from different graphic patterns.
- Able to differentiate a parallelogram. For example, students should be able to find out the parallelogram from different planar shapes.
- Able to describe the features of common quadrangles (such as rhombus, trapezoid, and parallelogram). For example, students should be able to tell that the two opposite sides of a parallelogram are parallel and of the same length.
- Able to calculate the perimeter of a polygon. For example, students should be able to work out the perimeter of a polygon to be 23 centimeters.
- Able to differentiate the axisymmetric graph and a rotationally symmetric graph. For example, students should be able to find out the axisymmetric graph and the rotationally symmetric graph from different graphic patterns.
- Able to differentiate and use the 8 directions, east, south, west, north, northeast, southeast, southwest and northwest. For example, students should be able to tell that the school in the picture is in the northeast of the park.

L14: Measurement, Graphics and Space:

- Able to use formulas to calculate the size of an object. For example, students should be able to apply the formula to work out the size of a trapezoid, $\frac{(24+46)X29}{2}$=1015 cm^2
- Able to use the segmenting or imputing method to work out the size of a polygon. For example, students should be able to apply the segmenting method, writing down the calculating formula, (12+16) ×9÷2+16×2, to work out the size of the polygon, 158 cm^2. (the picture is not included in translation)
- Able to calculate the surface area of a cuboid or a cube. For example, students should be able to write down the calculating formula based on the side length of the cuboid, (**12**×**4** + **12**×**6** + **6**×4)×2, and work out the surface area of the cuboid, 288 m^2. (the picture is not included in translation)
- Able to use a protractor to measure the degree of angles. For example, students should be able to use a protractor to measure ∠AOB is **42**°. (the picture is no included in translation)
- Able to calculate the volume of cuboids and cubes. For example, students should be able to write down the formula 4x4x4 based on the side length of a cube and work out the volume is 64 cm^3.
- Able to calculate the volume for objects of irregular shapes. For example, if 12 colored glass beads are put into the water tank, based on the change of water level in the tank, students should be able to work out the volume for each colored glass bead, which is (floor size of the water tank × the increased height in the water level) ÷12.

L15: Measurement, Graphics and Space:

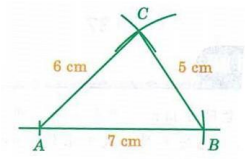
- Able to use formulas to calculate the circumference and size of a circle. For example, students should be able to work out the circumference of the circle based on the information provided in the picture (the picture is not included in translation)
- Able to describe the features of a cylinder and cone. For example, students should be able to describe the differences between a cylinder and a cone based on the picture.
- Able to apply formulas to calculate the surface area and volume of a cylinder. For example, if the radius and height of a cylinder are 1 m and 1.5 m respectively, students

should be able to work out the surface area of the cylinder, 15.7 m^2.

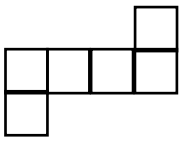
- Able to work out the side length of zoomed graphics. For example, if a square with 6 cm side length is zoomed in at the ratio of 2:3, students should be able to work out the side length of the zoomed square, 9 cm.
- Able to solve problems related to discount in daily life. For example, if the TV set is originally priced $5,760, now the TV set is sold at 85% discount. Based on the description, students should be able to work out the discounted price, $4,896.
- Able to solve problems related to interest in daily life. For example, if Miss Lee deposits $90,000 into the bank for half a year at an annual interest rate of 0.5%, students, based on the description, should be able to work out the total interest, $225.

L16: Measurement, Graphics and Space:

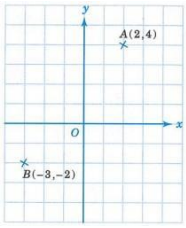
- Able to analyze the relation among a dot, a line and a flat surface. For example, students should be able to link dots to form lines, and link lines to form a plane.
- Able to draw simple geometric shapes. For example, students should be able to draw a triangle with designated side length using a drawing compass.



- Able to draw the expanded shapes of solid figures. For example, students should be able to draw the expanded shapes of a cubic.

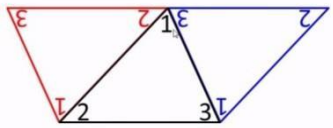


- Able to analyze the shape of the transection for a solid figure. For example, if the solid figure given is of a novel cylindrical shape, students should be able to tell that the transection of the cylinder is in an oval shape.
- Able to understand the principle of Pythagoras theorem. For example, if the length of two sides of the right triangle are ***a*** and ***b***, the hypotenuse ***c***, students should be able to tell that $a^2+b^2=c^2$.
- Able to identify the location of dots on a plane rectangular coordinate system based on the given coordinates. For example, in the picture, the location for Dot A in the plane rectangular coordinate system is (2,4), Dot B (-3, -2).

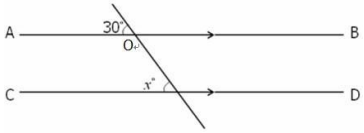


L17: Measurement, Graphics and Space:

- Able to explain that the sum of interior angles for a triangle is180°. For example, students should be able to use a graph provided below to describe that 180° is the sum of interior angles for a triangle.



- Able to apply formulas to work out the sum of interior angles for a polygon. For example, students should be able to apply the formula (n-2) ×180° to work out the sum of interior angles for a polygon.
- Able to analyze the principle of the mid-point theorem. For example, students should be able to describe that the line connecting the mid points of two sides of a triangle is parallel to the third side, and is half the length of the third side.
- Able to apply the principles of congruent triangles to decide whether two triangles are congruent triangles or not. For example, in ∆ABC, if AB=4, BC=5, AC=6; in ∆DEF, DE=4, EF=5, DF=6. Based on the description, students should be able to tell that ∆ABC ≅∆DEF(S.S.S)
- Able to understand the concept of corresponding angles, alternate angles and same-side interior angles. For example, if 「$\boldsymbol{AB//CD}$, $\angle \boldsymbol{O} = \mathbf{30°}$, what is the value for $\angle \boldsymbol{x}$」? Based on the description, students should be able to answer that $\angle \boldsymbol{O}$ and ∠ x are mutually corresponding angle, therefore $\angle \boldsymbol{x} = \mathbf{30°}$.



- Able to apply formulas to calculate the size of a sector. For example, students should be able to apply the formula, ($\frac{angle\ of\ the\ sector}{360°} \times \boldsymbol{\pi r 2}$), to work out the size of a sector.

L18: Measurement, Graphics and Space:

- Able to explain the meaning of rotational symmetry. For example, students should be able to explain that, when a graph is rotated for one full circle (360 degree), the new shape has more than one overlap with the original graph so this picture is called a rotational symmetry graph.
- Able to explain what the slope of a straight line refers to. For example, students should be able to describe that the slope of a straight line refers to the degree of its inclination towards the x axis.
- Able to use formulas to calculate the volume of a cone and solve simple practical issues. For example, students should be able to use the volume formula for cone $\frac{1}{3}\boldsymbol{\pi r^2 h}$ to work out the volume of a cone-shape sand pile.
- Able to use formulas to calculate the surface size of a pyramid and solve simple practical issues. For example, students should be able to apply the formula $\frac{ph}{2}+\boldsymbol{A}$ to work out the surface size of a pyramid-shape toy.

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L4: Statistics and Probability:

- Able to choose one from two objects and match the identical objects. For example, when the teacher shows a building block and water cup of the same color and size, students should be able to put their building block and water cup next to the ones on the table.

- Able to notice the nature of objects in daily life. For example, students should be able to wear the watch on the wrist.
- Able to notice change of objects in certain aspects or properties. For example, students should be able to notice the change of the size of a balloon when it is being inflated.

- Able to choose one from two colors and match the identical colors. For example, when the teacher demonstrates the same-size building blocks in red and yellow on the table, students should be able to follow the teacher's instruction and put another same-size red building block next to the original red one.

L5: Statistics and Probability:

- Able to choose and match one color for an ordinary object from three colors. For example, when the teacher demonstrates a red apple, students should be able to pick out the red color card from three color cards.
- Able to match three objects. For example, when the teacher demonstrates baskets holding bananas, apples and oranges respectively, students should be able to put the banana, apple and orange in their hands into the corresponding baskets.
- Able to find objects where the objects are not normally placed, and understand object permanence. For example, students should be able to look for the water jar in the toys corner.
- Able to match familiar objects based on their function or symbolic relations. For example, students should be able to pair the pictures of umbrellas with pictures describing rainy days.

L6: Statistics and Probability:

- Able to find the different item from a pile of identical objects. For example, students should be able to find out the eraser from a pile of pencils.
- Able to classify objects of the same nature based on the given condition (choose one from three). For example, students should be able to classify three water cups with different colors in accordance with their colors.
- Able to process materials in accordance with instructions. For example, when the teacher presents star stickers, students should be able to put the stickers next to their photos.
- Able to follow the sequence of events in daily life and arrange the sequence of three events. For example, after washing hands, students should be able to wipe their hands with paper tissue, and throw the used paper tissues into the dustbin.

L7: Statistics and Probability:

- Able to establish the sense of connection such as inclusion or affiliation between objects. For example, students should be able to put the pencil box into the schoolbag.
- Able to follow the pattern and arrange objects in an ABAB sequence. For example, when the teacher demonstrates objects in an ABAB sequence, students should be able to continue arranging objects in the ABAB sequence.
- Able to classify three objects with different natures. For example, students should be able to identify fruits, stationery and toys from a pile of objects and put them into three baskets respectively.
- Able to do simple data processing. For example, students should be able to arrange the sequence of three different lunch boxes based on their types.

L8: Statistics and Probability:

- Able to follow the pattern and arrange objects in an ABCABC sequence. For example, when the teacher demonstrates objects in an ABCABC sequence, students should be able to continue arranging objects in the ABCABC sequence.
- Able to identify the cause-effect relation of two events in daily life. For example, when the teacher demonstrates two pictures, students should be able to apply their life experience to put the picture showing a child with a stomach ache in front, followed by the picture showing the child visiting the doctor.
- Able to do data processing on their own. For example, students should be able to arrange the sequence of five different drinks based on their types.
- Able to use the tables provided to record information in image (see below) in simple classification activities, and respond to factual information. For example, students should be able to tell that three forms of transportation from the picture below are with wheels

	With wheels	Without wheels
Transportatio		

L9：Statistics and Probability:

- Able to follow the pattern and arrange objects in an AABCAABC sequence. For example, when the teacher demonstrates objects in an AABCAABC sequence, students should be able to continue arranging objects in the AABCAABC sequence.
- Able to arrange five objects of different sizes in the normal or reverse order. For example, when the teacher demonstrates five graphs of different sizes, students should be able to arrange the five graphs in an ascending order.
- Able to identify the sequence of three events in daily life. For example, when the teacher demonstrates three graphs, students, based on their life experience, should be able to put the picture describing a child getting up first, followed by the picture describing the way to school, and finally the picture describing the child greeting teachers at school.
- Able to find out needed information from a simple list. For example, students should be able to find out the names of their classmates who chose Set A from the lunch list.

L10: Statistics and Probability:

- Able to arrange five types of objects (within the number of 30) in a one-to-one matching, and compare the amount of two types of objects. For example, students should be able to arrange five fruits (apple, orange, banana, watermelon, and mango) in a one-to-one match, and tell that there are three more apples than oranges
- Able to classify five types of objects (within the number of 30), and use symbols or the word"正" to count numbers to complete a frequency table. For example, students should be able to classify 28 objects into five types based on the shape (triangle, square, circle, star, and heart shape), and count numbers to complete a frequency table using the word "正".
- Able to read the block chart and answer relevant questions (total number, the item with the largest and smallest number). For example, when a student reads the block chart, he/she should be able to tell that most people like badminton.
- Able to use known data (within the number of 30), and make a block chart using the "one block representing one unit" method. For example, students should be able to use

"one block representing one unit" and make a block chart for "the favorite color of students in Class A".

L11: Statistics and Probability:

- Able to read the bar chart and explain the meaning of items on the x and y axis in the chart. For example, students should be able to tell that the y axis represents the toy types, while the x axis represents the number (box).
- Able to read a bar chart which shows that "one column represents one unit" and answer questions (the quantity in one column, the amount of the statistical items, and the amount of an item which is the sum of two items). For example, when students read a bar chart which shows that one column represents one unit, he/she should be able to tell that the amount of the remote-controlled cars sold is the sum of the toy models and Chinese checkers sold.
- Able to search for relevant data based on the frequency table, and use the shape or the character "正" to count numbers. For example, students should be able to use the frequency table to find out "the favorite snacks of students in Class 2A" " (candies, raisons, biscuits, chips and seaweeds), and to count the numbers using the character "正".
- Able to use the known data and make a bar chart (the vertical type and horizontal type) using the "one column representing one unit" method. For example, students should be able to use the "one column representing one unit" method to make a bar chart of "the amount of juice sold at the fruit shop in the morning".

L12: Statistics and Probability:

- Able to read a bar chart which shows that "one column represents two, or ten units", explain what the x axis and y axis represents, and tell the value each column represents. For example, students should be able to read a bar chart which shows that "one column represents five units", and tell that the x axis represents the number of people, with each column representing 5 people.
- Able to read a bar chart which shows that "one column represents two, five or ten units", and fill in the statistical form with numbers. For example, students should be able to read the bar chart describing "the favorite color of students in Class 3A" (one column representing two units), and fill in the form with the numbers of people whose favorite color is red, yellow, blue and green.

Color	Red	Yellow	Blue	Green
No. of people	10	6	12	7

- Able to use the data gathered to decide and make a bar chart (horizontal type or vertical type) which shows that "one column may represent two, five or ten units". For example, students should be able to make a bar chart of the seasonal sales volume of fridges which shows that "each column represents ten units", in accordance with the monthly sales volume of fridges in the electric appliances shop.
- Able to judge the certainty and uncertainty of an event. For example, if there is an apple, an orange and a mango in the box, students should be able to decide whether it is (definite/possible/not possible) to pick out the apple.

L13: Statistics and Probability:

- Able to describe and compare the differences between a parallel composite bar chart and a connected composite bar chart. For example, students should be able to tell that the connected type is easier to reflect the sum of each part of connected data.

- Able to apply the parallel composite bar chart or the connected composite bar chart to demonstrate the statistics. For example, students should be able to tell that the parallel composite bar chart is needed to describe "the sales volume of air conditioner and heater of an electric appliances shop from July to November".
- Able to use the known data to draw the parallel composite bar chart or the connected composite bar chart. For example, students should be able use the known data to make a parallel composite bar chart on "the number of students from certain schools taking extra-curricular courses", including the amount of boys and girls.
- Able to analyze composite bar chart (parallel type and connected type). For example, after analyzing the parallel composite bar chart on "the sales volume of air conditioner and heater of an electric appliances shop from July to November", students should be able to tell that more heaters are sold in October and November than air conditioners because of the colder weather.

L14: Statistics and Probability:

- Able to read the data on the frequency table and work out the average value of the data. For example, based on the frequency table of "the scores of five tests for Chinese and English in Chi Weng School", students should be able to calculate the average score in Chinese and English tests.
- Able to apply average value in daily life. For example, students should be able to tell that he spends $100 pocket money on average each week.
- Able to use the known data and a graph paper to make a line chart. For example, students should be able to use the known data and a graph paper to make a line chart on the "business turnover of a hotpot restaurant for the first half of the year".
- Able to analyze data in a line chart. For example, students should be able to analyze the line chart on the "business turnover of a hotpot restaurant for the first half of the year", and tell that the two successive months March and April showed the biggest decline in business turnover due to the increasingly warm weather.

L15: Statistics and Probability:

- Able to read a pie chart, and calculate the number for each item based on the percentage. For example, students should be able to read the pie chart on "number of people watching different movies in the cinema last year", and calculate the number of people watching different types of movies last year.
- Able to use a protractor to measure the central angle of each data sector, read the pie chart, and calculate the percentage of each item. For example, students should be able to use a protractor to work out the central angle of the targeted item, which is 90 degree, and find out that the targeted sector accounts for 25% of the sum.
- Able to use a data set to make a pie chart. For example, students should be able to use a data set to make a pie chart on "the number of different fruits brought to school by students in class 6A".
- Able to analyze the known data to decide the proper type of statistical charts (block chart, bar chart, composite bar chart, line chart and pie chart) to demonstrate statistics. For example, students should be able to use the pie chart to demonstrate the "learning hours for each subject in class 6A", and to clearly show the percentage of each subject in the total learning hours.
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L16: Statistics and Probability:

- Able to set up statistical items by themselves, collect needed data, and fill in the frequency distribution table. For example, students should be able to set up the statistical items, "Grade 7 students internet surfing time each day", collect data via questionnaires, and fill in the frequency distribution table.

- Able to make inference from data of different types (continuous data and discrete data), and analyze the difference. For example, students should be able to tell that "the number of the goals each of the 20 students made within 1 minute" is discrete data, and analyze the differences between continuous data and discrete data.
- Able to analyze the known data and organize data either by grouping or not. For example, students should be able to analyze the height of students of different ages in one school based on different age groups.
- Able to use the collected data to make a stem-and-leaf diagram and analyze the data. For example, students should be able to make a stem-and-leaf diagram on the math exam results of grade 7 students, and analyze their performance in the exam.

L17: Statistics and Probability:

- Able to analyze the known data and make an appropriate statistical chart (pie chart, line chart, organizational chart, two-sided stem-and-leaf diagram, and scatter plot), and justify the decision. For example, students should be able to analyze the monthly profit of a company in one year, and make a line chart, and justify the decision: the line chart can clearly show the change of profit made by the company within a certain period, which is helpful to predict the trend of profit fluctuations.
- Able to read cumulative frequency polygon and cumulative frequency curve, and calculate the median, the quartile (upper quartile and lower quartile), and the percentile. For example, students should be able to use cumulative frequency polygon and cumulative frequency curve to work out the median, the quartile and percentile of the height of grade 8 students.
- Able to choose the appropriate chart to visualize data, and understand the significance of statistical visualizations to data analysis. For example, students should be able to use the pie chart to show "monthly expense distribution of a family" to clearly show the percentage of each expense item.
- Able to analyze the statistical charts and identify the errors in the charts. For example, students should be able to analyze the line charts on "profit of Company A in the first half of the year" and "profit of Company B in the first half of the year". Students should also be able to find out that the error of different scales used for the y axis led to the perception that Company B's profit was twice more than that of Company A.

L18: Statistics and Probability:

- Able to make inference on whether a daily event is an inevitable event, an impossible event or a random event, and use the enumeration methods (listing method and tree diagram method) to calculate the probability that an event might occur. For example, students should be able to make an inference that rolling the dice is a random event. Students should also be able to use the enumeration method (listing method) to calculate that there are 11 possibilities for the total sum of two dices rolled at the same time.
- Able to calculate the arithmetic mean, median and mode value of a group of numbers, and analyze the concentration trend of the known data. For example, students should be able to calculate the arithmetic mean, median and mode value of the math test score of the class, and predict the concentration trend of the test performance.
- Able to calculate the weighted average value for a group of data. For example, students should be able to calculate the weighted average value of test scores based on the performance of Chinese, English, Mathematics and Science tests, and their percentage in the final score.
- Able to analyze statistical materials, and find out the misleading elements from the misuse of average calculation examples. For example, students should be able to find out that the monthly salary as indicated by the recruitment poster "the average monthly

salary could be as much as $11,000”-is actually the mode value, while most employee’s monthly salary is below $11,000. Therefore, it is misleading to use the mode value to indicate average value.

Appendix 1

References

Uzgiris, I.C., & Hunt, J.M.（1975）. Assessment in infancy: Ordinal scales of psychological development. Chicago: University of Illinois Press.

Human rights in China: Convention on the Rights of persons with Disabilities (CRPD), from

Equal Opportunity Commission, from http://www.eoc.org.hk/eoc/GraphicsFolder/default.aspx

Piao Yong-xin（2004）：“Inclusive education and learning in regular class” in “Educational Research and Experiment”, V4, 37-40.

Centre for Advancement in Inclusive and Special Education (2009):”The Teacher’s Guide for Inclusive Curriculum-based SCALE Instrument”，Hong Kong: Centre for Special Education Research and Development, University of Hong Kong.

Centre for Advancement in Inclusive and Special Education, Faculty of Education, University of Hong Kong (2015): “Preparation Report for Preliminary Work Plan: Curriculum Compilation for Special Education in Macau”, Hong Kong: Centre for Advancement in Inclusive and Special Education, Faculty of Education, University of Hong Kong.

Education Bureau of Hong Kong Notice 2003, No.33/2003, “Equal Opportunity Principle”. From http://www.edb.gov.hk/UtilityManager/circular/upload/embc/EMBC03033C.pdf

Webpage of Education Bureau of Hong Kong: Curriculum development: Needs for Special Education. From http://www.edb.gov.hk/tc/curriculum-development/major-level-of-edu/special-educational-n eeds/index.html

DSEJ: the curriculum development website: the requirements of basic academic attainments (including each education level and subjects), from http://www.dsej.gov.mo/crdc/edu/requirements.html

DSEJ: the curriculum development website: curriculum guidance (including guidance for each subject), from http://www.dsej.gov.mo/crdc/guide/guide.html

DSEJ: School operation guideline（2018/2019）, from http://portal.dsej.gov.mo/webdsejspace/internet/category/teachorg/Inter_main_page.jsp?id=66096

Shirley S. Y. Yeung (2012): Conceptualizing higher-order thinking for reforming school curriculum and teaching, published on Hong Kong Teacher’s Centre Journal, V11,131-144.

Wikipedia： Mainstreaming education, from https://zh.wikipedia.org/wiki/融合教育

Curriculum Development Council (ed.)（2012）：The Education Bureau of Hong Kong SAR suggested schools to adopt the Teacher’s Guide of Learning Progression Framework for Students with Intellectual Disabilities, Hong Kong: the Education Bureau.

Macao SAR（2015）：“Curriculum Framework for Formal Education of Local Education System”, Macao: Official Bulletin of Macao SAR. The webpage of DSEJ, from http://portal.dsej.gov.mo/webdsejspace/internet/Inter_main_page.jsp

SAME Curriculum Project（2008）： “”SAME Curriculum Project: Curriculum Design and Supplements, Hong Kong: Centre for Special Education Research and Development & The SAME Network for Quality Education, Faculty of Education, University of Hong Kong.

Appendix 2

Key words

Curriculum Framework for Formal Education of Local Education System

- It refers to a set of curriculum framework formulated by the government to apply to ordinary schools. The content of the framework generally includes the aim, objective and development principle of the curriculum framework, classification of the subjects, arrangement of educational activity period, as well as the learning contents for major subjects at each education level. The formal curriculum in Macao is determined through legislative process.

The Requirements of Basic Academic Attainments

- The Requirements of Basic Academic Attainments refer to the basic qualities that students should possess upon completion of the education levels including the early childhood period, primary school, junior secondary school and senior secondary school education, covering progress in basic knowledge, skills and competence, as well as development in emotion, attitude and values.

Formal Education Curriculum

- The Formal Education Curriculum refers to the curriculum suggested by the government towards all schools, including a series of curriculum documents which specify the curriculum objective and target, learning objective, structure of the subjects, generic skills, values, attitudes and subject instructions.

School-based Curriculum

- The School-based Curriculum refers to the curriculum developed by the school and teachers, in line with the learning status quo of students for the purpose of helping students to realize the educational aim and objective. School-based Curriculum is the balanced outcome between the central curriculum guidance and the professional autonomy of the school and teachers.

Learning Ability Progress Level

- The Learning Ability Progress Level refers to a set of descriptions regarding performance indicators, which are used to express the learning level of students in a progressive manner. The Learning Ability Progress Level of Macao is divided into 18 levels (from L1 to L18), which correspond to the motor sensory development in infancy period, and the learning abilities of students in early childhood, lower primary school, higher primary school and junior secondary school period. Therefore, the Learning Ability Progress Level serves as a shared framework for reference for teachers to assess and report the learning outcome of students.

Attainment Level Descriptors

- The Attainment Level Descriptors, corresponding to the Learning Ability Progress Level, are the textual descriptions on the learning ability of students at each level. The Attainment Level Descriptors apply to all students, including students in formal schools or students with special educational needs in special education schools. Each

descriptor provides reference on the ability level of students within the learning area. The contents of the Attainment Level Descriptors do not represent the whole curriculum nor the learning outcome.

Education Level

- The Education and Youth Affairs Bureau of Macao classifies formal education in Macao into four different educational levels, the early childhood education (3 years), primary education (3 years), junior secondary education (3 years), and senior secondary school education (3 years). Each education level has its own special curriculum framework and requirement for basic academic attainments.

Learning Stage

- The Learning Stage refers to different learning periods for a student in the whole learning process. Generally speaking, a three-year learning period is defined to be a learning stage. The learning stages in Macao include the early childhood stage, lower primary school stage, upper primary school stage, junior secondary stage, and the senior secondary school stage. The learning stage carries slight difference compared to the education level formulated by the Education and Youth Affairs Bureau of Macao.

Students with Special Educational Needs

- Students with Special Educational Needs usually carry one or multiple features of learning difficulty, thus they are in need of special education service. The primary categories of learning difficulty include, listening disorder, visual disorder, physical disorder, mental disorder, learning disorder, emotional and behavioural issues, attention-deficit/hyperactivity disorder, autism, dyslexia, and education for intellectually gifted students.

Motor Sensory Training

- Motor Sensory Training plays a significant role in fundamental education. To learn or to engage in cognitive behaviour of any kind, students first need to effectively appropriate and perceive, to collect and analyse data or materials. All students need to receive motor sensory training. While most students have naturally mastered the skill in daily life, some students with special educational needs need to enhance and grasp this skill via special motor sensory training experience.

Scheme of Work

- Scheme of Work is the template for the learning units in each subject. Every Scheme of Work specifies the teaching objective of the unit, students' ability level and learning activities, while providing an enumeration of the expected performance for students of different ability levels.

Learning Outcome

- The Learning Outcome refers to the expected learning performance of students upon completion of a course or a certain learning stage. The learning outcome is devised based on the learning objective and learning focus. Therefore, the learning outcome could promote learning by serving as the basis for learning performance assessment

and by reflecting the expected learning performance of students upon completion of a course.

Learning Focus

- The Learning Focus refers to the key contents developed in accordance with the learning objective, providing reference to schools in curriculum design and teaching. The learning focus provides a detailed description on the knowledge and ability to be mastered, as well as the interest, attitude and habits to be cultivated in different learning areas and various learning stages.

Learning Diversity

- The Learning Diversity refers to the learning differences among students in the learning process. In teaching practice, we should cherish the unique talents of each student, attend to their diversified learning needs, adapt teaching methods based on individual needs, help students to discover their aptitude and talents, and provide opportunities for students to create and release their potential towards obtaining appropriate achievements.

Appendix 3

Frequently Asked Questions

1. Is the Learning Ability Progress Level equal to the curriculum? If not, what is the relation between the Learning Ability Progress Level and the curriculum?

   The Learning Ability Progress Level refers to a set of systematically progressive Attainment Level Descriptors. The Learning Ability Progress Level, composed of selected indicative contents from the Curriculum Framework for Formal Education of Local Education System and the Requirements of Basic Academic Attainments, serves the function of of assessing the learning ability and learning progress of students. Teachers can refer to the assessment results based on the Learning Ability Progress Level so as to adjust the learning objectives and activities, and to determine the expected learning outcome. However, the Learning Ability Progress Level does not represent the overall content of what ought to be a broader curriculum.

2. Why "The Requirements of Basic Academic Attainments" cannot be directly used to describe learning ability and learning performance?

   "The Requirements of Basic Academic Attainments" refer to the basic qualities that students should possess upon completion of the education levels including the early childhood, primary school, junior secondary school and senior secondary school education. The philosophy behind this concept is based on the generalized performance of the targeted population. For students with special educational needs, designing or formulating learning ability objective merely on the basis of education levels may not adequately reflect their learning process. Therefore, introducing the Learning Ability Progress Level enables full display of the ability level for students with special educational needs at the Progress Level for each learning area, attending to individual differences while improving the step-by-step learning progress.

3. What is the relationship among "The Requirements of Basic Academic Attainments", the Learning Ability Progress Level, and classroom teaching?

   "The Requirements of Basic Academic Attainments" are targeted at students who have completed a certain educational level; the Learning Ability Progress Level refers to the level of learning performance and ability at a certain process, which is aimed at individual students. The former refers to the requirement on learning outcome, while the latter focuses on the learning process. In class teaching, a teacher should always examine students' learning outcome based on "The Requirements of Basic Academic Attainments", and adjust expected learning performance in accordance with their ability level. It should be noted that neither "The Requirements of Basic Academic Attainments" nor the Learning Ability Progress Level constitutes part of the teaching content.

4. When should rating be conducted? Do students all advance by one ability level each year?

   Rating for the purpose of ascertaining learning performance baseline for reference can be conducted at the beginning or at the end of each academic year, or conducted every two years depending on different school conditions. However, rating more than once each year is not recommended. Students with special educational needs exhibit ability diversity. Some students may advance by one or two ability levels within one year, while others may improve one ability level every few years. There are also cases where students with severe learning disorder stay at one certain ability level or even regress due to various physical conditions within more than 10 years of learning experience.

5. As the fundamental stage for the learning area of each subject starts with the motor sensory development stage, will a student with severe learning disorder stay in the initial motor sensory development stage from early childhood period to senior secondary school period, without making progress to learn proper subject knowledge? If so, what is the point of dividing into six subjects?

   Textbook content for each subject is the carrier of learning. The principle for curriculum design is to expand the students' learning experience. The six subjects expose students to different learning situations and objects of different levels, enabling them to develop individual cognition combining their personal experience and perception. Though it is possible that students with severe disorder may stay at the motor sensory development stage even after years of learning, the linked subjects will broaden and enhance student's learning experience. This is the concrete practice of the principle of width and depth in curriculum design. Otherwise, students with severe learning disorder will be exposed to repeated motor sensory trainings over a long time, which goes against the principle of integrated education, or the special education we aspire to achieve.

6. A student starts receiving education at 3 and completes education at 21. If the curriculum is not compiled based on education level, or even if the ability level of students is specified based on a region in the Learning Ability Progress Level, does it mean that students without making improvement in learning ability for over 10 years have to learn the same content from 3 to 21? How are the operational specifications explained?

   The purpose of designing the Learning Ability Progress Level for six subjects is to make it a tool to assess the learning process, rather than to define it as the teaching content. Teachers should adjust the learning content and design the learning experience for individual students on the basis of the regular curriculum. The school should prepare sufficient Scheme of Work for each grade and each subject within each area to cover each learning level, so that students will not learn the same unit repeatedly.

7. Why is the peak level of learning ability set at Form 3 of formal education for special education curriculum in Macao?

   Based on past experience, when highly competent students with special educational needs reach Form 6, their learning performance is similar to formal education students at Form 3. Therefore, we made reference to the learning outcome at junior secondary school in formal education curriculum to describe the levels in senior secondary school (L16-L18) in the Learning Ability Progress Level. If a student's learning performance reaches the level of Form 3 in formal education curriculum, it is not necessary for the student to study in a special education class.

8. Is the teacher for special education required to use the textbooks prepared for the educational level of the students and design the teaching content in accordance with the level of the students' learning ability? Do students learn the same content at different education level?

   The answer is yes. The learning topics/units for students with special educational needs should be the same as students in regular schools, to keep the breath and balance of the curriculum. The age and learning experience of students with special educational need should be taken into consideration by teachers who are specialized in adjusting the teaching content based on the learning ability of students.

9. Currently, most teaching materials for special education class are compiled by the teachers. How will the issue of students' use of textbook in special education class be tackled?

   All teachers should design adequate teaching materials for students. Schools with special education classes may consider forming a network to compile and share the Scheme of Work, which is ideally the long-term development objective for special education in Macao.

10. When the Learning Ability Progress Level and the Curriculum Supplements are completed, how should teachers apply them to teaching practice? What else should be used together with the Learning Ability Progress Level and the Supplementary Guide? How can they benefit the teachers in teaching practice?

    The Learning Ability Progress Level is used to identify indicators of students' learning performance, serving as the shared language for teachers to describe learning performance, which enables teachers to master the learning progress of students. Teachers should not consider the Learning Ability Progress Level to be formal teaching content. The Supplementary Guide serves as guiding documents for special education curriculum, to supplement the formal education curriculum document with special education descriptions. The Supplementary Guide specifies the principles, forms and direction for special education curriculum development. The Learning Ability Progress Level and the Supplementary Guide combined will benefit teacher to understand the ability of students and decide appropriate teaching content.

Appendix 4

Forms

The appendices provide useful documents for teachers to develop the Learning Ability Progress Level. Depending on their concrete situations, schools may adapt these forms accordingly.

1. Record of examples of students' learning performance
   This form is used for the rating coordination mechanism. Schools may use this form to record the collected examples and contents, or to reassess students' learning performance. Details on how to use this form is provided in chapter VI: Rating coordination mechanism and example collection.

2. Scheme of Work
   The Scheme of Work presents the opportunities and feasible practices for students with special educational needs to be educated according to the formal curriculum. The form lists the learning performances of students with different learning ability under different learning areas and objectives. The Scheme of Work can also provide practical suggestions to the teacher to design and improve the teaching plan, teaching contents and activities.

Appendix 4-1

XXX School

Record of examples on student learning performance

<table>
<tr><td>Subject:</td><td>Learning Areas:</td><td>Learning Stage:</td></tr>
<tr><td>Name of Student :</td><td colspan="2">Learning Diversity:</td></tr>
<tr><td colspan="2">Unit Name:</td><td>Date:</td></tr>
<tr><td colspan="3">Teaching Activity:</td></tr>
<tr><td colspan="3">Types of Learning Performance Examples:
□ performance in class activity
□ homework
□ assessment/test
□ case exploration/ case study
□ multimedia files(videos/pictures/audios)
□ self-evaluation
□ peer review
□ others</td></tr>
<tr><td colspan="2">Content and description of the examples-ini learning performance:</td><td>Content and description of the examples-review learning performance:</td></tr>
<tr><td colspan="2">Initial Rating:</td><td>Review Rating:</td></tr>
<tr><td colspan="3">Comprehensive Rating:</td></tr>
<tr><td colspan="2">Rating Director: Rater/Subject Teacher:</td><td>Date:</td></tr>
</table>

Appendix 4-2

Annual Scheme of Work of XXX school in xxx Year

Subject:		Learning Areas:		Stage:	
Duration of Learning:					

Unit Name:	
Formal Teaching Goal:	
Teaching Objectives:	Through this unit, students can:
Keywords:	

Teaching Objectives	Examples of Feasible Teaching and Learn Activities and Experience	Performance Descriptor	

Item description:

Item	Description
Unit Name	• selected from the formal curriculum • a common topic that helps to broaden students' learning experience • could inspire students' learning interest
Formal Teaching Goal	• selected from the formal curriculum, specifying that the teaching content originates from the formal curriculum • have enough content for a given teaching session • include the basic knowledge that most students are able to master • in this teaching unit
Teaching Objectives	• divide the formal teaching goal into three to four tasks to reach formal learning goal of the teaching unit • outline the learning objectives within the reach of the students' ability through a given teaching unit, with a precise description of the learning areas for students with special educational needs at various learning levels • use assessable descriptions and encourage students to get involved. For example, students should be able to tell/differentiate/apply the formats of letter writing .
Keywords	• list the vocabulary (around 10 words would be sufficient) students need to use for learning the teaching unit • include keywords that are important and relevant to the subject, so as to enrich the students' ability to express ideas in relation to the subject • place important keywords in prominent locations in the classroom
Examples of Feasible Teaching and Learning Activities and Experience	• adopt student-centered teaching • describe the activities carried out by students • make reference to the formal curriculum when designing activities, adding local cultural elements • design activities targeting the whole class participation in large scale activities to motivate and enhance learning experience • specify activity requirements for students with different learning abilities • nature of activities in line with the age and social experience of students
Performance Descriptors	• describe the performance with reference to the targeted teaching objectives, not the activity performance • refer to the descriptions on the progress level • specify observable learning performance

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In case of any discrepancy between the English version and the Chinese version, the Chinese version shall prevail.