

# e-Textbook Writing Guidelines for Mathematics Education Key Learning Area

## 1. Introduction

The purpose of this set of guidelines is to familiarise interested e-textbook publishers with the curriculum aims and objectives, guiding principles for writing e-textbooks, etc. of Mathematics Education in a bid to ensure that the e-textbooks are written in accordance with the specific requirements of the curriculum, “The Seven Learning Goals of Primary Education” ([www.edb.gov.hk/en/curriculum-development/7-learning-goals/about-7-learning-goals/primary.html](http://www.edb.gov.hk/en/curriculum-development/7-learning-goals/about-7-learning-goals/primary.html)) and “The Seven Learning Goals for Secondary Education” ([www.edb.gov.hk/en/curriculum-development/7-learning-goals/about-7-learning-goals/secondary.html](http://www.edb.gov.hk/en/curriculum-development/7-learning-goals/about-7-learning-goals/secondary.html)) (For details, please refer to *Basic Education Curriculum Guide – To Sustain, Deepen and Focus on Learning to Learn (Primary 1-6)*(2014) and *Secondary Education Curriculum Guide* (2017)). For the general principles and requirements for writing textbooks, publishers should refer to the latest edition of the *Guiding Principles for Quality Textbooks* available from the Education Bureau’s Textbook Information website ([www.edb.gov.hk/textbook](http://www.edb.gov.hk/textbook)).

## 2. Curriculum Aims and Objectives

The overall curriculum aims of the Mathematics Education Key Learning Area are to develop in students:

- the ability to think critically and creatively, to conceptualise, inquire and reason mathematically, and to use mathematics to formulate and solve problems in daily life as well as in mathematical contexts and other disciplines;
- the ability to communicate with others and express their views clearly and logically in mathematical language;
- the ability to manipulate numbers, symbols and other mathematical objects;
- number sense, symbol sense, spatial sense, measurement sense and the capacity to appreciate structures and patterns;
- a positive attitude towards the learning of mathematics and an appreciation of the aesthetic nature and cultural aspect of mathematics.

## 3. Guiding Principles

### 3.1 Content

#### Key Stages 1 and 2

- Content of the e-textbooks for P1-P6 should cover all the **Learning Objectives** of the Learning Units in the *Supplement to Mathematics Education Key Learning Area Curriculum Guide: Learning Content of Primary Mathematics* (2017).
- The curriculum is organised into five strands, namely, **Number, Algebra, Measures, Shape and Space** and **Data Handling**. The textbooks should

include adequate amount of activities on Inquiry and Investigation, such as activities on STEM education, and optional **Enrichment Topics**.

- In writing the content of the e-textbooks, publishers should make reference to the corresponding **Learning Objectives** (including the Remarks) and the **Time** for the Learning Units in the curriculum documents.
- Content of the e-textbooks should be accurate. The development and explanation of concepts should be accurate and could cater for students' abilities and cognitive development. The data quoted should be accurate and reasonable.
- To deal with the depth of treatment of each learning unit, reference should be made to the corresponding **Time** and **Remarks** columns in the Tables of the Learning Objectives in *Supplement to Mathematics Education Key Learning Area Curriculum Guide: Learning Content of Primary Mathematics* (2017).
- An appropriate amount of activities on Inquiry and Investigation, and enrichment topics could be included in the e-textbooks. The suggested enrichment topics in the curriculum documents or other appropriate topics could be chosen as the enrichment topics in the e-textbooks.
- The enrichment topics should be labelled clearly in the table of contents and in the main text of e-textbooks.

### Key Stage 3

- Content of the e-textbooks for S1-S3 should cover all the **Learning Objectives** of the Learning Units in the *Supplement to Mathematics Education Key Learning Area Curriculum Guide: Learning Content of Junior Secondary Mathematics* (2017).
- The curriculum is organised into three strands, namely, **Number and Algebra, Measures, Shape and Space** and **Data Handling** and a **Further Learning Unit**. Adequate amount of activities on **Inquiry and Investigation**, such as activities on STEM education, should be included. The curriculum is designed for the whole population of secondary school students. To meet the needs of students of different abilities, the content of the curriculum is divided into the **Foundation Topics** and the **Non-foundation Topics**, together with optional **Enrichment Topics**.
- In writing the content of the e-textbooks, publishers should make reference to the corresponding **Learning Objectives** (including the Remarks) and the corresponding **Time** for the Learning Units in the curriculum documents.
- Content of the e-textbooks should be accurate. The development and explanation of concepts should be accurate and could cater for students' abilities and development. The data quoted should be accurate and reasonable.
- An appropriate amount of enrichment topics could be included in the e-textbooks. The suggested enrichment topics in the curriculum or other

appropriate topics could be chosen as the enrichment topics in the e-textbooks.

- The content associated with the Non-foundation topics and enrichment topics for S1-S3 should be labelled clearly in the table of contents and in the main text of e-textbooks.

#### Key Stage 4

- The curriculum consists of a **Compulsory Part** and an **Extended Part**. The Compulsory Part is organised into three strands, namely, **Number and Algebra**, **Measures, Shape and Space** and **Data Handling** and a **Further Learning Unit**, which is made up of **Further Applications** and **Inquiry and Investigation**. Adequate amount of activities on **Inquiry and Investigation**, such as activities on STEM education, should be included.
- For each set of the e-textbooks for S4-S6 of the current curriculum of the Compulsory Part, all the Learning Objectives of the Learning Units in the corresponding part in *Mathematics Curriculum and Assessment Guide (S4-6)* (with updates in November 2015) should be covered. The revised curriculum of the Extended Part and the Compulsory Part will be implemented progressively with effect from 2019/20 school year and 2023/24 school year respectively. All the Learning Objectives of the Learning Units in the corresponding part in the *Supplement to Mathematics Education Key Learning Area Curriculum Guide: Learning Content of Senior Secondary Mathematics* (2017) or *Mathematics Curriculum and Assessment Guide (S4-6)* (with updates in December 2017) should be covered.
- To cater for the needs of individual groups of students, the content of the Compulsory Part is categorised into **Foundation Topics** and **Non-foundation Topics**. The Foundation Topics of the Compulsory Part, which all students should strive to learn, together with the Foundation Part of the Secondary 1-3 Mathematics Curriculum constitute a coherent set of essential concepts and knowledge. The Non-foundation topics cover a wider range so as to provide students who study only the Compulsory Part with a foundation for their future studies and career development.
- The Extended Part, which includes two modules, namely **Module 1 (Calculus and Statistics)** and **Module 2 (Algebra and Calculus)**, is designed for students who need more mathematical knowledge and skills for their future studies and careers, and for those whose interests and maturity have been developed to a level that enables them to benefit from further mathematical study in different areas.
- Students are allowed to take at most one of the two modules and students should study both the Foundation Topics and Non-foundation Topics in the Compulsory Part if they study either one of the modules from the Extended Part.
- Content of the e-textbooks should be accurate. The development and explanation of concepts should be accurate and could cater for students'

abilities and development. The data quoted should be accurate and reasonable.

- To deal with the depth of treatment for each learning unit of the current curriculum of the Compulsory Part, reference should be made to the corresponding **Time** and **Remarks** columns in the Tables of the Learning Objectives in *Mathematics Curriculum and Assessment Guide (S4-6)* (with updates in November 2015). *Explanatory Notes to Senior Secondary Mathematics Curriculum – Compulsory Part* (2009) aim at further explicating the requirements of the Learning Objectives. For the revised curriculum of the Compulsory Part and the Extended Part, it should be made reference to the corresponding **Time** and **Remarks** columns in the Tables of the Learning Objectives in *Supplement to Mathematics Education Key Learning Area Curriculum Guide: Learning Content of Senior Secondary Mathematics* (2017) or *Mathematics Curriculum and Assessment Guide (S4-6)* (with updates in December 2017).
- The content associated with Non-foundation Topics for S4-S6 should be labelled clearly in the table of contents and in the main text of e-textbooks.

### 3.2 Learning and Teaching

- The learning and teaching activities and the assessment activities included in the e-textbooks should be in line with the aims and objectives of the curriculum.
- The e-textbooks should include diversified learning and teaching activities and suitable examples to facilitate students to master mathematical concepts, including appropriate exploratory activities and performance tasks. For example, hands-on activities and drawing figures in Primary Mathematics and geometric exploratory activities and hands-on model making in Secondary Mathematics. Developing students' higher order thinking skills and generic skills should also be emphasised.
- The e-textbooks should suitably include learning and teaching materials which are interesting and linked to students' daily-life experience. These learning and teaching materials should be well used to foster students' positive attitudes and values.
- Sufficient amounts of examples and exercises with different levels of difficulty should be provided to cater for students' learning diversity. Examples and exercises should be arranged appropriately according to the levels of difficulty and complexity.
- The e-textbooks should include appropriate assessment activities for each topic, such as adequate amount of class practice, homework, activities or tasks. However, questions involving repetitive drilling and overcomplicated calculations should be avoided.
- Accurate answers for the class practices and exercises should be provided in e-textbooks for secondary levels.

### 3.3 Structure and Organisation

- e-Textbooks should cover all the learning units laid down in the curriculum and the learning units should be arranged in a logical and well-organised sequence.
- The user's guide should be provided in the e-textbooks to illustrate the structure and organisation of the e-textbooks and the effective ways to use the e-textbooks.
- Table of contents, headings, page numbers and the numbering of questions should be clear and systematic. A summary for consolidating learning should be appropriately provided in each unit. Appropriate navigation of content, such as electronic links of each page to the Content page, next page and previous page should be built up.
- Diagrams, charts and photographs related to students' experience should be included.

### 3.4 Language

- The language used should be appropriate to students' language ability. It should be clear, precise and accurate.
- Mixing languages (e.g. an English term followed by its Chinese translation or vice versa) in the e-textbook should be avoided.
- The mathematical terms used in the e-textbook should be accurate and consistent and be related to the curriculum. All the Chinese and English equivalents of mathematical terms should be consistent with those listed in [\*An English-Chinese Glossary of Terms Commonly Used in Mathematics\*](#) prepared by the Mathematic Education Section, Education Bureau.
- Commonly-used mathematical symbols and formats should be used. The mathematical symbols and their formats should be consistent throughout the e-textbooks.
- The International System of Units (SI) and metric units should be used in the e-textbooks.
- The Chinese names of people and places of the Mainland China should be translated according to their Putonghua phonetic symbols.

### 3.5 Pedagogical Use of e-Features

- The e-textbooks should provide appropriate interactive activities for effective learning, teaching and assessment. The activities should be designed, with reference to learning objectives, for guiding students to inquire and construct mathematical concepts and to apply mathematical knowledge to solve problems.
- The multimedia materials should be provided suitably and appropriately to facilitate students' construction and understanding of mathematical concepts.
- The e-textbooks should provide suitable interactive tools / multimedia materials (for example, animation and simulation) to illustrate abstract

mathematical concepts and mathematical relationship of different quantities.

- The interactive activities and multimedia materials in the e-textbooks should, whenever appropriate, link to students' daily-life experience. The real-life data quoted should be reasonable.
- The e-textbooks should provide appropriate feedback to facilitate learning and teaching.
- The e-textbooks should provide a dictionary or glossary of mathematical terms.
- The e-textbooks should provide suitable e-tools for learning mathematics, such as a calculator.
- The contents of the reference websites included in the e-textbooks should be relevant to the curriculum and be able to facilitate further understanding of curriculum contents.
- The layout of contents of "Print on Demand" (if available) should be logical and consistent.

### 3.6 Learning Elements/Skills Not Replaceable by Digital Means

- The e-textbooks should include performance tasks that are necessary for establishing and developing the concepts of certain contents. For example, hands-on activities and drawing figures in Primary Mathematics, and hands-on geometric construction and 3D solid construction activities in Secondary Mathematics.
- Activities for the development of students' mathematical language skills (for example, giving oral or written mathematical presentations) should not be solely replaced by learning through digital means.

### 3.7 Technical and Functional Requirements

- Refer to the latest edition of the *Guiding Principles for Quality Textbooks* for the relevant requirements.
- The font size or format of characters and symbols should be consistent, such as using italic fonts for symbols representing variables.
- Graphs or diagrams should be clear and appropriate, precisely labelled and in an appropriate scale. Properties of the shape of the figures, such as perpendicularity and symmetry properties, should be clearly shown.

## 4. Others

- 4.1 When writing e-textbooks, publishers have to ensure that the contents and information provided in the materials should be correct, complete, up-to-date, objective and impartial. The source and date of the information should be provided (For example, indicating the year and source of data quoted from statistical surveys). The information in the illustrations and images should avoid showing brand-names of commercial items unless it is necessary.

- 4.2 Publishers should avoid putting excessive hyperlinks in the e-textbooks so as not to violate the self-containment principles. The contents of the hyperlinks should be placed in the Teacher’s Book or the publisher’s online learning platforms as far as possible for teachers and students’ reference. The hyperlinks should link to the websites with high credibility, such as the official websites and the websites of academic institutions, and avoid linking to commercial or social media platforms.
- 4.3 It is incumbent on the publishers to ensure that all proof-reading work, including the language, information, punctuation, illustration, pagination, etc., is completed and accurate before submitting the e-textbooks for review.
- 4.4 Publishers should clear all copyright issues of the e-textbooks as appropriate.
- 4.5 Publishers should pay attention to the curriculum time allocation suggested in the curriculum documents of this subject to ensure that the learning contents are designed with an appropriate quantity and level.
- 4.6 If publishers submit other versions (such as Chinese version or printed version) of the same textbook title for review at the same time, they should duly check the consistency of the contents among all the versions. If another version will be submitted at a later stage, the suggestions in the review reports for the previous submitted version should be thoroughly followed before submission.

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