

e-Textbook Writing Guidelines for Science Education Key Learning Area (Secondary Level)

1. Introduction

- 1.1 The purpose of this set of guidelines is to familiarise interested e-textbook publishers with the curriculum aims and objectives and related principles for writing e-textbooks of curricula of the Science Education KLA at the secondary level, etc. in a bid to ensure that the e-textbooks are written in accordance with the specific requirements of the curriculum and the updated “The Seven Learning Goals of Secondary Education” (www.edb.gov.hk/en/curriculum-development/7-learning-goals/secondary/index.html)/. For details, please refer to the *Secondary Education Curriculum Guide* (2017) and its Supplementary Notes (2021) (www.edb.gov.hk/en/curriculum-development/major-level-of-edu/secondary/CG_documents.html).
- 1.2 The *Values Education Curriculum Framework (Pilot Version)* was released in 2021 and ten priority values and attitudes (PVA) were introduced. The PVA have been optimised since 2023 with the PVA “Care for Others” extended to “benevolence” and two PVA (i.e. “Filial Piety” and “Unity”) added. Publishers should incorporate the learning elements of values education in the e-textbooks where appropriate. For details, please refer to the *Values Education Curriculum Framework (Pilot Version)*(2021) (Chinese version only) (www.edb.gov.hk/en/curriculum-development/4-key-tasks/moral-civic/ve_curriculum_framework2021.html) and the EDBCM No.183/2023 on *Enriching the Values Education Curriculum Framework (Pilot Version) – Optimisation of “Priority Values and Attitudes”* (applications.edb.gov.hk/circular/upload/EDBCM/EDBCM23183E.pdf).
- 1.3 The *Curriculum Framework of National Security Education in Hong Kong* was released in 2021. Publishers should incorporate the learning elements of national security education in the e-textbooks where appropriate. They may also refer to the government website “National Security Education Day” for information such as major fields of national security. For details, please refer to the *Curriculum Framework of National Security Education in Hong Kong* (www.edb.gov.hk/en/curriculum-development/kla/pshe/national-security-education/index.html) and the government website “National Security Education Day” (www.nsed.gov.hk/index.php?l=en).
- 1.4 For the general principles and requirements for writing e-textbooks and the requirements for submission of e-textbooks for review, publishers should refer to the latest edition of the *Guiding Principles for Quality Textbooks* and *Guidelines on Submission of e-Textbooks for Review* available on EDB’s Textbook Information website (www.edb.gov.hk/textbook).

- 1.5 The e-textbooks should be written in line with the following CDC curriculum documents:

Curricula	CDC curriculum documents
Science (S1-3)	<ul style="list-style-type: none">• Science Education Key Learning Area Curriculum Guide (Primary 1 - Secondary 6) (2017); and• Supplement to the Science Education Key Learning Area Curriculum Guide: Science (S1-3) (2017)
Biology (S4-6)	<ul style="list-style-type: none">• Science Education Key Learning Area Curriculum Guide (Primary 1 - Secondary 6) (2017); and• Biology Curriculum and Assessment Guide (Secondary 4 - 6) (2007, with updates in November 2015)
Chemistry (S4-6)	<ul style="list-style-type: none">• Science Education Key Learning Area Curriculum Guide (Primary 1 - Secondary 6) (2017); and• Chemistry Curriculum and Assessment Guide (Secondary 4 - 6) (2007, with updates in June 2018)
Physics (S4-6)	<ul style="list-style-type: none">• Science Education Key Learning Area Curriculum Guide (Primary 1 - Secondary 6) (2017); and• Physics Curriculum and Assessment Guide (Secondary 4 - 6) (2007, with updates in November 2015)

2. Curriculum Aims and Objectives

Publishers should refer to the latest Science Education KLA Curriculum Guide, as well as the Curriculum and Assessment Guide, curriculum documents and supplementary documents of the respective subjects.

Remarks: Publishers should submit at least three Elective topics, in addition to the Compulsory Part, of Physics (S4 – 6) for review.

3. Guiding Principles

3.1 Content

- Publishers should refer to the latest Science Education KLA Curriculum Guide, as well as the Curriculum and Assessment Guide, curriculum documents and supplementary documents of the respective subjects.
- Both the Compulsory and Elective Parts or the Core and Extension Parts of each subject should be covered by the e-textbooks.

3.2 Learning and Teaching

- Curriculum, pedagogy and assessment form a trio. e-Textbooks prepared for the Science curricula should reflect this trio and support student-centred learning, help our students construct knowledge and promote understanding of important scientific models and theories.
- e-Textbooks should be designed to be comprehensible and self-contained, and should:
 - provide a sense of purpose and direction for learning;
 - address students' prior knowledge;
 - provide students with a variety of phenomena and help them understand how the phenomena are related to scientific ideas;
 - provide resource materials such as hyperlinks¹ to websites / videos / online news articles, extracts from articles (with sources provided), flow-charts, photos, diagrams, statistical tables or graphs, etc. for students' reference;
 - guide students' interpretation and reasoning;
 - provide practice in applying scientific ideas;
 - provide assessment tasks to facilitate assessment for learning and assessment as learning; and
 - encourage students to explore science beyond the classroom.
- Practical work, activities and exercises
 - Practical work, either integrated with the main text or compiled as a separate section, should be included in e-textbooks to facilitate the development of scientific concepts and understanding, as well as science process skills. Involving students in the planning of investigations would enable them to better understand how variables are controlled, what data have to be collected, how frequent measurements have to be taken, etc.. The use of data loggers (or suitable devices such as single-board computers or smartphone devices) and suitable sensors for experiments should be included, as alternatives or in parallel, wherever appropriate.
 - The instruction, diagrams or photos, etc. in relation to practical / field work should meet the necessary safety requirements.
 - Advice on potential hazards, risk assessment and appropriate control measures for open-ended investigative study, scientific investigations or practical-based projects, etc. should also be provided.

¹ Please note the requirements listed in paragraph 4.2.

- In the study of science, practical work is important, but it is not the only type of learning and teaching activity. A range of activities, such as discussion, information search, “reading to learn”, writing learning journals, role-play, debate, design and make, project learning, etc. should also be included for the attainment of the learning objectives outlined in the Curriculum and Assessment Guides.
- Suitable exercises should be included to help students assess their level of attainments of learning objectives of different parts of the curriculum and check their own learning progress.
- Learning tasks of different types and demands could be included to embrace learner diversity. Student-centred and interactive approaches are recommended, as they are useful in providing suitable learning experiences for stimulating and developing higher-order thinking.
- Application of IT tools could be introduced to enhance the effectiveness and efficiency of doing practical work, and facilitate students to conduct scientific investigations.
- STEM / STEAM activities could be introduced to provide opportunities for students to integrate and apply STEM / STEAM-related knowledge and skills to solve daily life problems.

3.3 Structure and Organisation

- Publishers should refer to the latest Science Education KLA Curriculum Guide and Curriculum and Assessment Guides of the respective subjects.

3.4 Language

- The language used in e-textbooks should be appropriate to students’ language ability. For the Chinese translation of English terms commonly used in the teaching of science, publishers should refer to the [*English-Chinese Glossaries of Terms Commonly Used in the teaching of Science Subjects in Secondary Schools*](#) compiled by the Education Bureau.
- The International System of Units (SI) should be used in e-textbooks. For detailed guidance on units and symbols, please refer to:
 - ✧ *Signs, Symbols & Systematics: The ASE Companion To 5-16 Science* published by the Association for Science Education (1995), UK: ASE;
 - ✧ 《高等學校教學參考書——物理量與單位》。杜荷聰、王啟堯、袁楠(1986)著。中國計量出版社出版; or
 - ✧ the latest information announced by the General Conference on Weights and Measures (CGPM).

3.5 Pedagogical Use of e-Features

- The e-textbooks should meet the technical and functional requirements with appropriate pedagogical use of e-features for learning and teaching activities and assessments.
- The e-features of Science e-textbooks should include:
 - appropriate multimedia such as video clips and animation of experiments / practical activities that could not be demonstrated in school laboratories;
 - interactive simulation tools and animations for appropriate topics that can help arouse students' interest and consolidate learning; and
 - simulations of experiments that are too fast, too slow, too hazardous or too expensive to be performed in schools.
- Where appropriate, the e-textbooks of Science subjects could include:
 - problem-solving and inquiry e-tasks to facilitate the development of mathematical skills essential for the understanding of science concepts and solving problems in the digital environment; and
 - interactive assessment items, such as moving and rotating objects to solve problems, data handling, and showing students work with typed text, equations, and drawings, to facilitate assessment for learning.

3.6 Learning Elements / Skills Not Replaceable by Digital Means

- The use of simulated experiments should not deprive students of the opportunities of engaging themselves in hands-on activities for the acquisition of science process skills.

3.7 Technical and Functional Requirements

- Refer to the latest edition of the *Guiding Principles for Quality Textbooks* for the relevant requirements.

4. Others

- 4.1 When writing e-textbooks, publishers have to ensure that the content and information provided in the materials should be correct, complete, up-to-date, objective and impartial. The source and the date of the information should be provided as appropriate. The information in the illustrations and images should avoid showing the brand names of commercial items unless they are necessary.

- 4.2 All URLs and hyperlinks (including the publisher's self-developed learning materials and the learning and teaching resources developed by the third party) in the e-textbooks should be linked to the publisher's website for the publisher's easy management. For the third party resources, the URLs or hyperlinks should be linked 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. In case problems arise from the hyperlinked content (including the third party resources), the publisher should take immediate follow-up actions and bear the relevant liability.
- 4.3 Publishers should avoid putting excessive hyperlinks that provide additional references in the e-textbooks so as not to violate the self-containment principles. Publishers may place the hyperlinks of their self-developed supplementary learning materials or the learning and teaching resources developed by the third party on their website. Publishers may also provide their website's URL in the Teacher's Book for teachers' reference to facilitate lesson preparation or design of learning and teaching activities. Publishers should be accountable for the learning and teaching resources they provide.
- 4.4 The maps included in the e-textbooks should be accurate and only contain essential information suitable for student learning. Reference should be made to the requirements and standard maps of the Ministry of Natural Resources of the People's Republic of China for all maps of China included in the textbooks, and wherever appropriate, the respective map review numbers and dates of reference should be quoted. Textbook publishers should also follow strictly the instructions in “公開地圖內容表示規範” issued by the Ministry of Natural Resources. (https://www.gov.cn/zhengce/zhengceku/2023-02/17/content_5741977.htm)
- 4.5 When using images of the national flag, national emblem, regional flag and regional emblem, the following points should be noted:
- **avoid drawing** the national flag, national emblem, regional flag and regional emblem on your own;
 - use real photos to show the national flag, national emblem, regional flag, regional emblem, etc.;
 - use the files of the national flag, national emblem, regional flag and regional emblem downloaded from the Protocol Division Government Secretariat and follow the relevant requirements stipulated by the Protocol Division Government Secretariat on the use of these images.
- 4.6 It is mandatory for the publishers to ensure that all proof-reading work, including that for e-features, language, punctuation, information, illustration, pagination, etc., is completed and the e-textbooks are error-free before submitting them for review.

- 4.7 Publishers should review the e-textbook content from time to time. When necessary, publishers can make amendments to the e-textbook content with EDB's prior consent. EDB may also require publishers to make amendments when needs arise.
- 4.8 Publishers should clear all copyright issues of the e-textbooks as appropriate.
- 4.9 The suggested time allocation set out in the curriculum documents should be taken into consideration to ensure that the learning content is designed with an appropriate quantity and level.
- 4.10 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 content among all the versions. If another version is to be submitted at a later stage, the suggestions in the e-Textbook Review Report for the previously submitted version should be duly followed before submission.
- 4.11 Safety precautions for laboratory work and outdoor activities should be concise and precise and should be included wherever appropriate. In particular, helping teachers and students exercise care and good judgement in safeguarding against laboratory accidents is of paramount importance. Students should always be alerted of potential hazards in laboratory work and activities, and be reminded of the corresponding safety precautions so that accidents might be avoided. Hazards of chemicals / substances involved in practical activities should be clearly stated. If a practical activity involves chemical that school laboratories are in general not equipped with suitable facilities for proper handling and / or storage, or chemical which is prone to accidents / posing risks that are difficult to control during transport, this practical activity should not be included. Publishers should consider replacing it with an alternative practical activity that is more suitable to be carried out in schools. For information on chemical hazards, publishers should refer to the Materials Safety Data Sheets (MSDS) / Safety Data Sheets (SDS) provided by the Education Bureau, professional organisations (such as CLEAPSS) or chemical manufacturers. More information on laboratory safety can be found in *Safety in Science Laboratories (EDB, 2013)*, and in *Safety Guidelines on Microbiology and Biotechnology Experiments in School Laboratories (EDB, 2021)*.
- 4.12 Publishers are required to ensure the practical activities are workable in school laboratories, and provide relevant information to show the feasibility of the practical activities, including the detailed design, sample results, implementation details for facilitating student learning as well as necessary measures for enhancing safety, etc., in the form of supplementary notes for EDB's reference in reviewing the e-textbooks.

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