

# **e-Textbook Writing Guidelines for Science Education Key Learning Area**

## **1. Introduction**

- 1.1 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 the Science Education KLA in a bid to ensure that the e-textbooks are written in accordance with the specific requirements of the curriculum and “The Seven Learning Goals of Secondary Education” ([www.edb.gov.hk/en/curriculum-development/7-learning-goals/secondary/index.html](http://www.edb.gov.hk/en/curriculum-development/7-learning-goals/secondary/index.html)). (For details, please refer to *Secondary Education Curriculum Guide* (2017) and its Supplementary Notes (2021).)
- 1.2 *Values Education Curriculum Framework (Pilot Version)* has been released in 2021. Upon the addition of “Law-abidingness” and “Empathy” in 2020, the Education Bureau (EDB) has listed “Diligence” as the tenth priority value and attitude. Publishers are suggested to reinforce the learning elements for values education in the e-textbooks where appropriate, especially for the above-mentioned three newly added priority values and attitudes. (For details, please refer to *Values Education Curriculum Framework (Pilot Version)* (2021)(Chinese version only)([www.edb.gov.hk/tc/curriculum-development/4-key-tasks/moral-civic/ve\\_curriculum\\_framework2021.html](http://www.edb.gov.hk/tc/curriculum-development/4-key-tasks/moral-civic/ve_curriculum_framework2021.html)).)
- 1.3 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 the EDB’s Textbook Information website ([www.edb.gov.hk/textbook](http://www.edb.gov.hk/textbook)).

## **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 to 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 hyperlinks<sup>1</sup> 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

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<sup>1</sup> Please note the requirements listed in paragraph 4.2.

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 with 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.
- 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 objectives outlined in the Curriculum and Assessment Guides.
- Suitable exercises should be included to help students assess their 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 experience 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 investigation.
- STEM activities could be introduced to provide opportunities for students to integrate and apply STEM-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 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. 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-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 to 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, 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

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- 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 brand-names of commercial items unless it is 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 must link to the publisher's website for the publisher's easy management. For the third party resources, the URLs or 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. 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 liabilities.
- 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 in their website. Publishers may also provide their website's URL in Teacher's Book for teachers' reference in preparing lessons or designing learning and teaching activities. Publishers should be accountable for the learning and teaching resources they provide.
- 4.4 It is incumbent on the publishers to ensure that all proof-reading work, including the e-features, language, information, punctuation, illustration, pagination, etc., is complete and accurate before submitting the e-textbooks for review.
- 4.5 Publishers should review the e-textbook contents from time to time. When necessary, publishers can make amendments to the e-textbook contents with the EDB's prior consent. The EDB may also require publishers to make amendments if deemed necessary.
- 4.6 Publishers should clear all copyright issues of the e-textbooks as appropriate.
- 4.7 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.
- 4.8 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 e-Textbook Review Reports for the previous submitted version should be thoroughly followed before submission.
- 4.9 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 to 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 so that accidents might be avoided. Hazards of chemicals / substances involved in practical activities should be clearly stated. For the information of 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)*.

- 4.10 Publishers are required to provide relevant information to show the feasibility of the practical activities, including the detailed design, implementation details for facilitating student learning as well as necessary measures for enhancing safety, in the form of guidelines, teachers' handbook/guide, sample results, etc. wherever appropriate, for the EDB's reference in reviewing the e-textbooks.

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February 2022