PROCESS STANDARDS
FOR THE DEVELOPMENT OF NEXTGEN eCONTENT

MSC MALAYSIA
National ICT Initiative

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Today's learners are born into the ICT age. They are used to mobile technologies and with these technologies becoming more powerful but increasingly affordable, it is timely that their education become more in tune with the technologies they most prefer and are comfortable with. The way they learn today has to change so as to be more appropriate for the 21st century or the knowledge and skills gained during their primary and secondary schooling will become irrelevant and obsolete upon graduation.

Hence, the way schools use media and employ techniques today need to be re-visited. Teachers need to make learning fun and enjoyable. Students need to be attracted to what they need to learn and their interests sustained so that they will explore more on their own, learn deeper and become engaged in the learning activities. The country needs knowledgeable workers who can think, are creative, are techno savvy and will become innovators so as to help the country progress in a globalised economy.

Students need a 21st century learning environment to help them become 21st century workers who will be able to help move the country forward towards a high income economy and become a fully-developed nation by 2020.

Hence, a basic framework of education in Malaysia with the integration of NextGen content was conceptualized (see Figure 1). The following components as determined by the Malaysian Ministry of Education (MoE) have been included in the figure, namely:

- Educational Philosophy
- New Curriculum
- 4M (membaca, menulis, mengira, menaakul)
- Modular curriculum, based on the achievement of standards
- Thematic across curriculum

NextGen Learning Environment

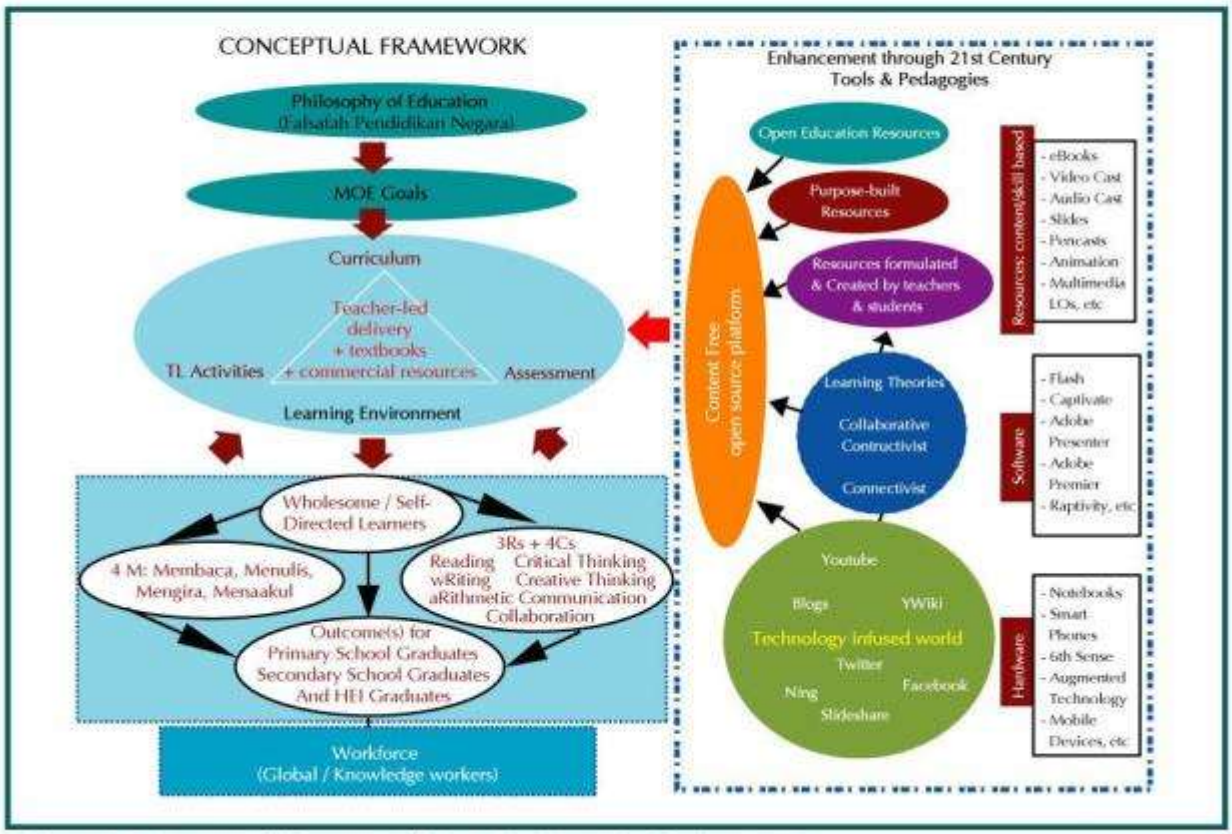


Figure 1. Conceptual Framework NextGen Learning Environment

Figure 1 shows the overall framework adopted for the study. The realization of the MoE goals is through the creation of a learning environment which includes a translation of the curriculum for implementation together with the teaching learning activities and assessment of learning. Central to most, if not all, activities in school are teachers leading the delivery of the lessons together with the use of textbooks and at times, the use of commercially produced resources such as charts, workbooks, multimedia courseware, slides and so on. Of course, based on past knowledge, some teachers will produce handouts, worksheets or develop their own slides or multimedia.

The overall goal of education systems is to produce wholesome or self-directed learners who will be engaged in lifelong learning for his own personal development and thus contributing to nation building. Several key skills have emerged as important and relevant in today's preparation of school leavers for the workforce. The skills include the 4M (Membaca, Menulis, Mengira and Menaakul), the 3Rs (Reading, wRiting and aRithmetic) and the 4 Cs (Critical thinking, Creative thinking, Communication and Collaboration).

In view of current world developments, it is important that Malaysian school graduates become global or knowledge workers with a view to help the nation become a fully-developed nation by 2020. It is imperative that for the latter, the use of ICT in significant ways will be necessary to enable the MoE to produce school leavers who will become global or knowledge workers. Working with current ICT tools in ways that will contribute to the development of the 4M skills or the 3Rs and 4Cs and where relevant is a key approach to achieving the final outcome.

The use of ICT tools should be carefully planned out and effectively implemented based on learning theories that includes and will go beyond behavioristic and cognitivist learning. The other learning theories to be applied include constructivist and connectivist learning; both of which have been widely accepted as appropriate for the millennial generation.

We are now fortunate that the Internet has enabled the wide distribution and sharing of resources among netizens and not only that, its latest contribution is in how it has helped empower the individual to create his own learning opportunities and become his own person depending on how he has shaped his own learning through the consumption and interaction with the Internet community and resources. The assumption here is that the opportunities are available both online and offline.

Resources and ideas abound. From content based resources to content free resources, educators have numerous opportunities to use, re-use and re-purpose resources found online. In addition, some of the currently available Open Education Resures (OERs) can be re-used, re-purposed and shared. A variety of resources exist for any teacher to take advantage of except that they are mostly not in Bahasa Malaysia (Malay Language). Also, we could create new OERs that could support the Malaysian school curriculum. Industry

could assist teachers create and again, share with others and together, work on ideas or contribute resources to benefit the community.

Fortunately, many platforms and tools to develop online communities are available and these can be taken advantaged of to provide an online learning environment that will support learning and teaching. The teaching and learning community may collaborate and communicate using platforms such as blogs, Wikis, Ning, Twitter, Facebook and Second Life.

Purpose-built resources, where appropriate and necessary may be developed with the help of industry in partnership with MoE, Appointed Committee and panel of consultants comprising SMEs and Instructional Designers, among others. Learning ought to be fun and enjoyable. Thus, a wide mix of media and approaches should be made available for the NextGen group of learners.

Both teachers and students can be part of the learning environment that can be kept dynamic, interesting and stimulating with the right tools and know how. The latter can be accomplished through timely in-service training. More imperative is the support of the newly-trained teacher right after the training or when they return to school while their motivation is still high. For example, hardware, software, infrastructure and other necessary resources should be available in the school as these will help the teacher get started with the knowledge, skills and ideas recently gained from the training.

NextGen eContent Characteristics

NextGen eContent Characteristics
Granular and adaptive
Web 2.0 content is dynamic and changeable
Developed by community and able to evolve
Tagged and searchable by entire organisation
Adaptable to multiple contexts
Constructed in multiple, separable layers
Open standards/interoperability

NextGen eContent Indicators

NextGen Content Indicators	Description and Elaboration
Granular	Small
	Reusable in multiple contexts
	Stand alone pieces of information
	Dynamic, just right content
	Single learning objective

NextGen eContent Indicators

NextGen Content Indicators	Description and Elaboration
Adaptive	Personalized educational content tailored to individuals or groups based on user characteristics (e.g. skills, goals, knowledge)
Dynamic and Changeable	Up-to-date content
	On-going process
	Collaboration between teachers and students
	Easily modified
	Sharable
Cost Efficient	Each main object addresses multiple layers; Content developed less costly and effective
Developed by Community	Community of users, students, teachers, parents, school administrators and collaboration with of between any of the users
Ability to Evolve	Able to develop students' competencies with current skills requirements
	Flexible
	Future proof
	Continuously updated
	Can be repurposed in a variety ways
	Can be deployed in an ever-evolving eLearning environment.

NextGen Content Indicators	Description and Elaboration
Tagged and searchable by entire organisation	Indexed organization tagged for efficient search for specific objectives or competencies
	Repurposed across complex, distributed technology infrastructures
Adaptable to multiple contexts	Can be recombined and restructured to address multiple contexts and multiple learning modalities.
Constructed in multiple, separable layers	Separated into distinct layers that include content, structure, presentation, context and pedagogy
Efficient explanation of complex concepts	Types of subjects & topics require explanation best using visual and graphics
Open standards/ interoperability	Enable strict interoperability between content and systems
	Support flexibility in the type of digital content (content can be also applications)
	Sustain distributed content (and applications)
	Standard way to represent digital course materials that is able to run on any compliant virtual learning environment (VLE)
	Enables collections of learning resources of various types and sources (rich content and integrated assessment, with metadata and authorisation for protected content)
	Supports web integration, lessons plans, competency maps, and accessibility support

NextGen Content Indicators	Description and Elaboration
Innovation	Uses a variety of technology tools to appropriately facilitate communication and learning.
	New teaching methods are applied and innovatively enhance student learning, and interactively engage students.
	A variety of multimedia elements and/or learning objects are used and are relevant to accommodate different learning styles throughout the content.
	Optimizes Internet access and effectively engages students in the learning process in a variety of ways throughout the topics.
	Uses a variety of technology tools to appropriately facilitate communication and learning.

NextGen eContent are designed to:

- reinforce concepts and theories
- be activity-based
- be used in any part of the lesson: introduction, learning guidance, closing and assessment
- allow teachers to manipulate the contents
- allow teachers to collaborate with other teachers and students

Type of NextGen eContent : Learning Objects

- can be used as components of a lesson
- deliver a specific outcome
- can be used across several levels and subjects
- are detachble and reusable
- can be accessed on multiple platforms, One Source Multi Use (OSMU)

NextGen Learning Framework

Figure 2 shows how the conceptual framework of NextGen Learning Environment in Figure 1 could be operationalised.

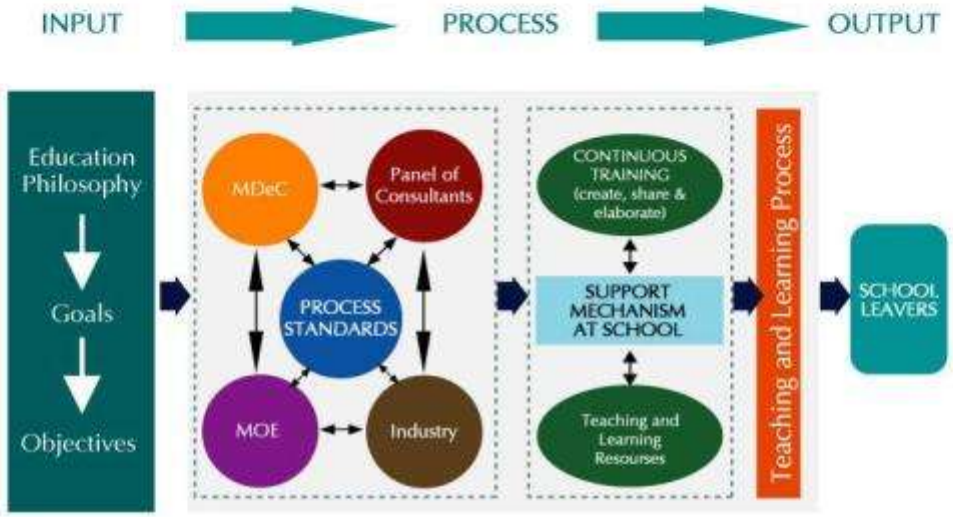


Figure 2. Operational framework for NextGen Learning

Details for the process standards are explained in the next section. It is to be noted that the development for NextGen Learning is in the hands of three major stakeholders, Ministry of Education (MoE), Multimedia Development Corporation (MDeC) and the industry with the contribution of a panel of consultants comprising of SMEs and Instructional Designers or Learning Experts who are experienced in technology use in learning and have done research on learning technologies or in related areas.

The process standards for the development of purpose-built teaching and learning resources are highlighted in the next section.

Process Standards

Rationale

The Process Standards for the Development of NextGen eContent, as well as the idea for the creation of NextGen eContent, is inspired by five (5) rationales:

a) The evolution of content development in Malaysia. From the 70s onwards, educational content has evolved from television and videos to interactive CD-ROMs to courseware in the late 90's. This educational content often rides upon the technology developed for entertainment and communication, and in this age of the Internet, it is natural that education should move onto a mobile or web-based platform, along the lines of current tools such as WebTV, IPTV, and Interactive Whiteboard.

b) The findings of 28 Subject Matter Experts from the Public Institutes of Higher Learning after evaluating courseware from the Ministry of Education. Their evaluation found that teachers were reluctant to use the pre-existing courseware and e-materials as it did not improve the teaching and learning process, and the teachers also found the material too textbook-oriented and exam and curriculum centric, thus did not provide opportunities for students to broaden their scope of knowledge.

c) The shaping of the local content industry's capacity by local major contracts for content. This scenario stifles the individual creativity of smaller content providers as well as does not encourage user-created content from teachers and students.

d) The evolution of technology. ICT moves very quickly, and the education sphere needs to move in time to the ICT developments in order to make the most of the beneficial qualities of new technology that can improve learning outcomes. Many if not all the educational institutions in developed countries have already embraced ICT, using platforms and formats such as podcasts, blogs, and social networking sites.

e) The capacity of the local content industry. The content creation capacity of our local content industry has grown by leaps and bounds, but its energy is mostly focused in the entertainment industry. NextGen eContent aims to tap these skills, with the advice of subject matter and pedagogical experts to create educational content that generates as much excitement as entertainment does.

Definition

The Process Standards for the Development of NextGen eContent are a set of guidelines coupled with detailed instructions that guide the various parties or stakeholders involved in the design and development of NextGen eContent, as well as other types of NextGen teaching and learning resources.

The Process Standards lists the best practices in the design and development of eContent and lists the tasks that need to be fulfilled to achieve the best results. These guidelines provide the stakeholders with end-to-end steps in completing the tasks, and also recommendations on monitoring the tasks using rubrics and checklists for the highest level of standardisation and quality control.

Furthermore, the Process Standards also plays a vital role as the key guidelines for the stakeholders and industries to:

1. Develop the NextGen eContent for education. The set of guidelines is intended to guide stakeholders involved in the design and development of NextGen teaching and learning resources (e.g. e-Content). It will consist of tasks (with end-to-end steps delineated) for the design and development of various types of resources. Thus, encouraging developers to produce quality and One Source Multi Use (OSMU) NextGen eContent for use by teachers and students
2. Enable teachers to procure off-the-shelf content
3. Produce teacher-generated content for teaching and learning, where teachers have the freedom to select their preferred content for use in selected parts of the lesson

Objectives

In addition, the Process Standards for the Development of NextGen eContent aim to achieve four (4) objectives, namely:

i. Identifying a development approach or model for sustainable education content. Information changes very quickly and syllabi are often modified, so NextGen eContent needs to be able to keep up with the times without becoming outdated.

ii. Raising standards for education eContent. Students today are often very sophisticated when using ICT for leisure or entertainment purposes, so NextGen eContent needs to be able to capture their attention and imagination, while at the same time meet the requirements of achieving the learning outcomes.

iii. Developing a set of indicators for the Ministry of Education and content companies to design appropriate process and delivery mechanisms for effective eContent development.

iv. Producing education eContent that meets the demands of users. As a result, the NextGen eContent will be subscriptive based rather than prescriptive based. Often in the past, ICT in education was simply a digitisation of textbooks and did not look into feedback from students and teachers on how they wanted ICT content to complement and support the learning and teacher process.

The Framework of Process Standards for Teaching and Learning Resources

The Process Standards for the Development of NextGen eContent is designed with a three-step flow in order to maximise the quality of the NextGen eContent produced. It starts with Pre-Development, followed by the Development stage, and ends with the Post-Development Stage as shown in Figure 3 and Figure 4.

Figure 3 illustrates the iterative or cyclical flow of the development process.

Figure 4 illustrates the three stages more specifically and the flow of the process standards.

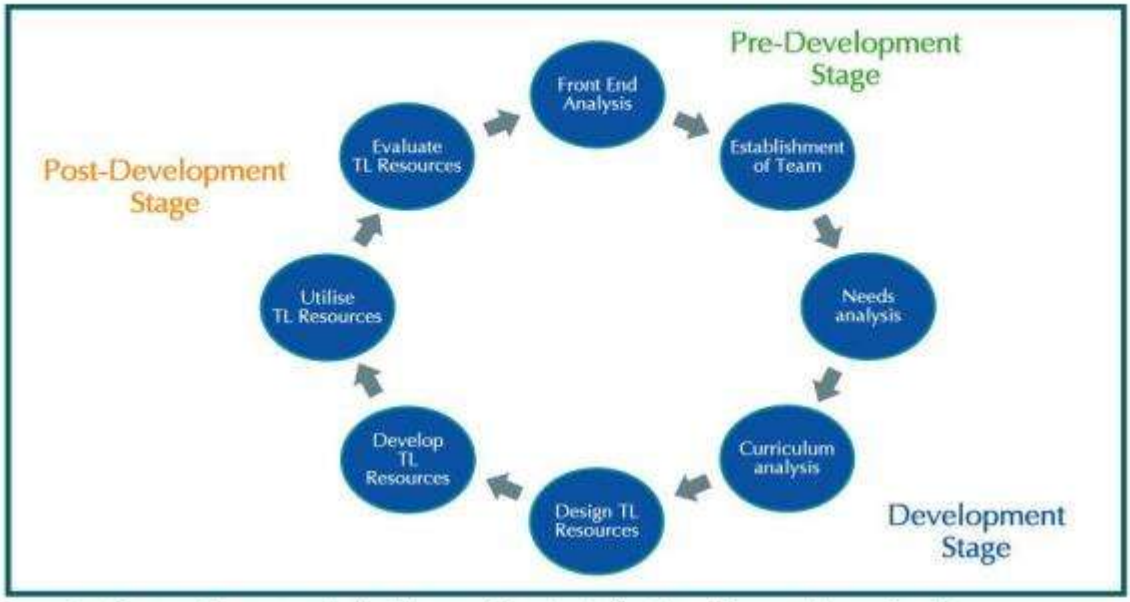


Figure 3. General Framework for Process Standards for Teaching and Learning Resources

As shown in the Conceptual Framework for the NextGen Learning Environment (Figure 1) purpose built teaching and learning resources may be developed to facilitate the teaching of contents and skills to students. They may come in different forms such as:

- E-Books
- Audio-cast
- Pen-casts
- Multimedia
- Video-cast
- Power Point Slides
- Animations
- Learning Objects and others

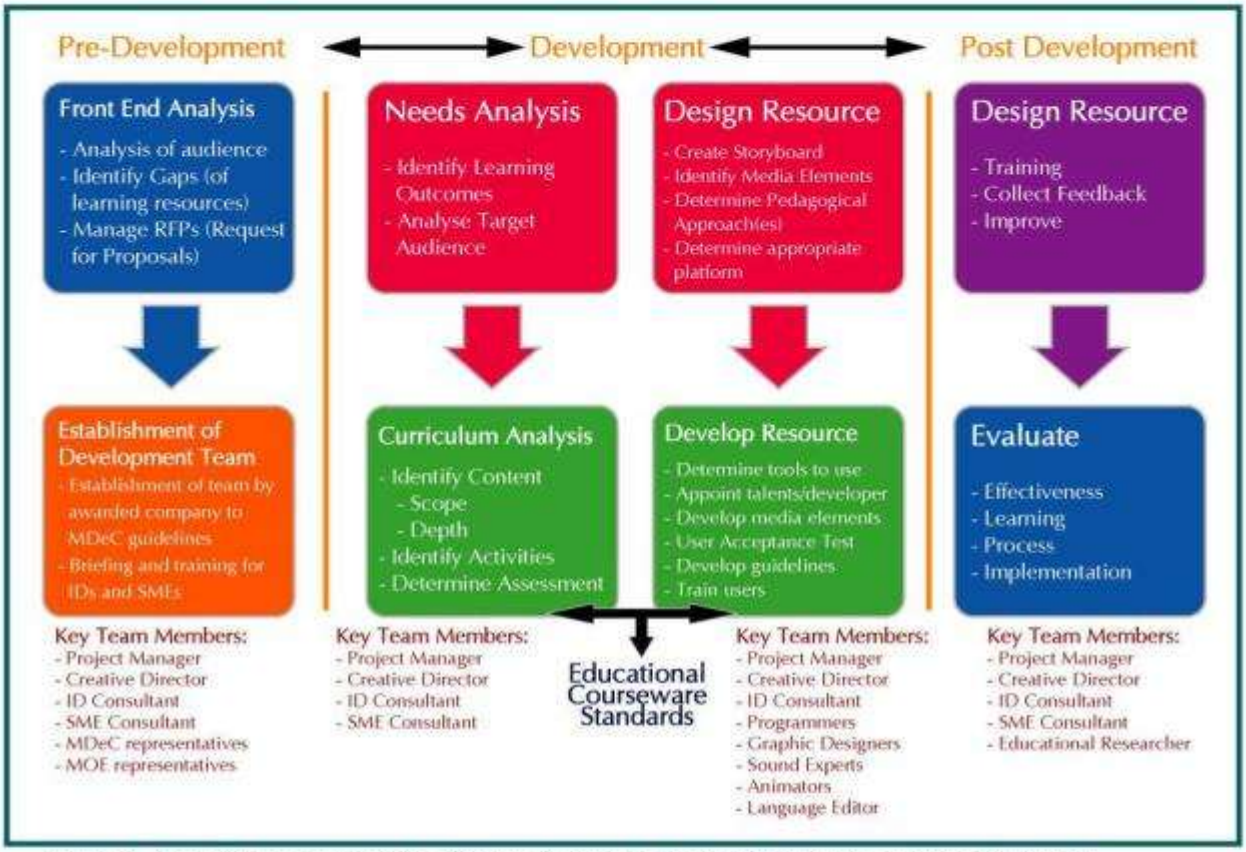
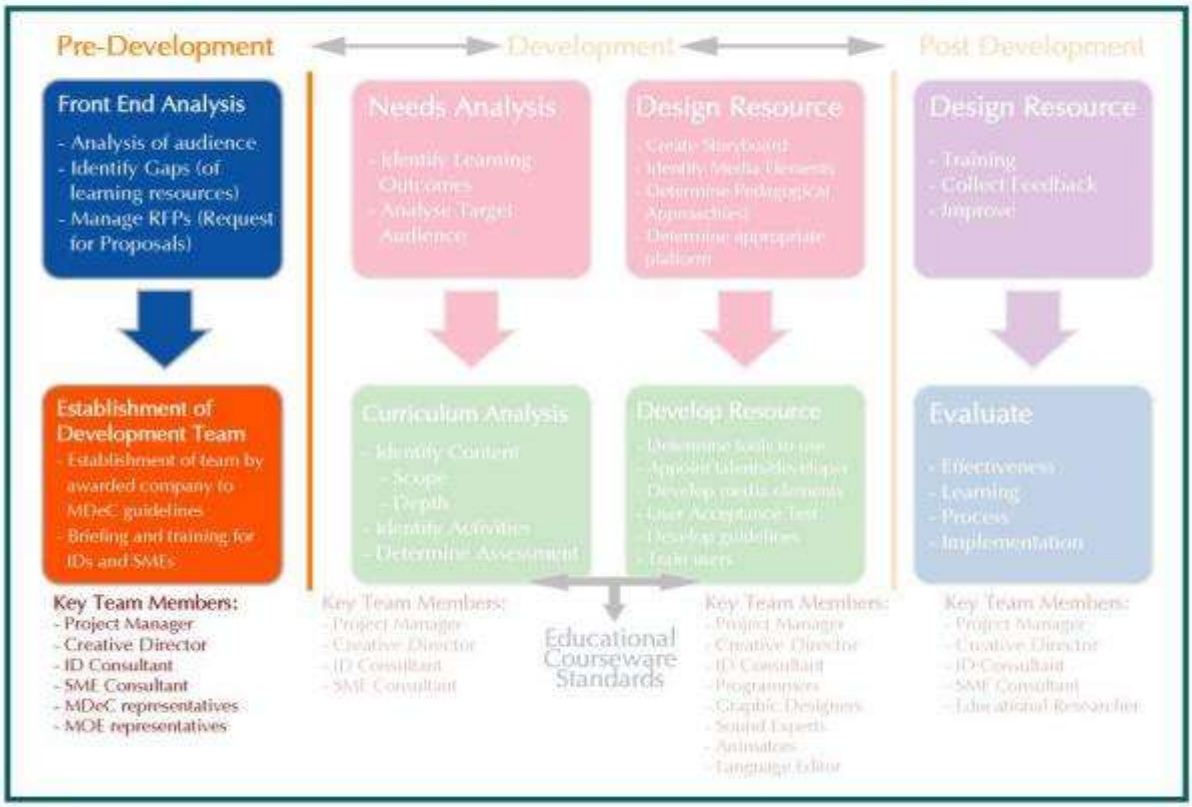


Figure 4. Specific Framework for Process Standards for Teaching and Learning Resources

As the process standards is intended to be a guide for the development of purpose built teaching and learning resources, the steps (in Figure 3 and Figure 4) are limited to the production of such resources. Each of these stages is detailed in the next section.

Pre-Development Stage



In the Pre-Development stage, the process standards starts with Front End Analysis where the audience is analysed, the gaps in learning resources are identified, and Request for Proposals (RFPs) are conducted and managed. Following this, there is Establishment of a Development Team, where the company awarded the contract for educational content creation, establishes a development team according to the Committee guidelines, followed by briefing and training for Instructional Designers and Subject Matter Experts.

Key Members of the Pre-Development Team are the Project Manager, Instructional Design consultant, Creative Director, Subject Matter Expert consultant, and representatives from the Multimedia Development Corporation and the Ministry of Education.

Pre-Development Stage - Processes

Front-End Analysis

The steps may consist of an examination of the problems related to teaching and learning of specific contents and skills for specific subject or discipline. It is important to remember that not all topics in the syllabus need to be addressed in NextGen eContent.

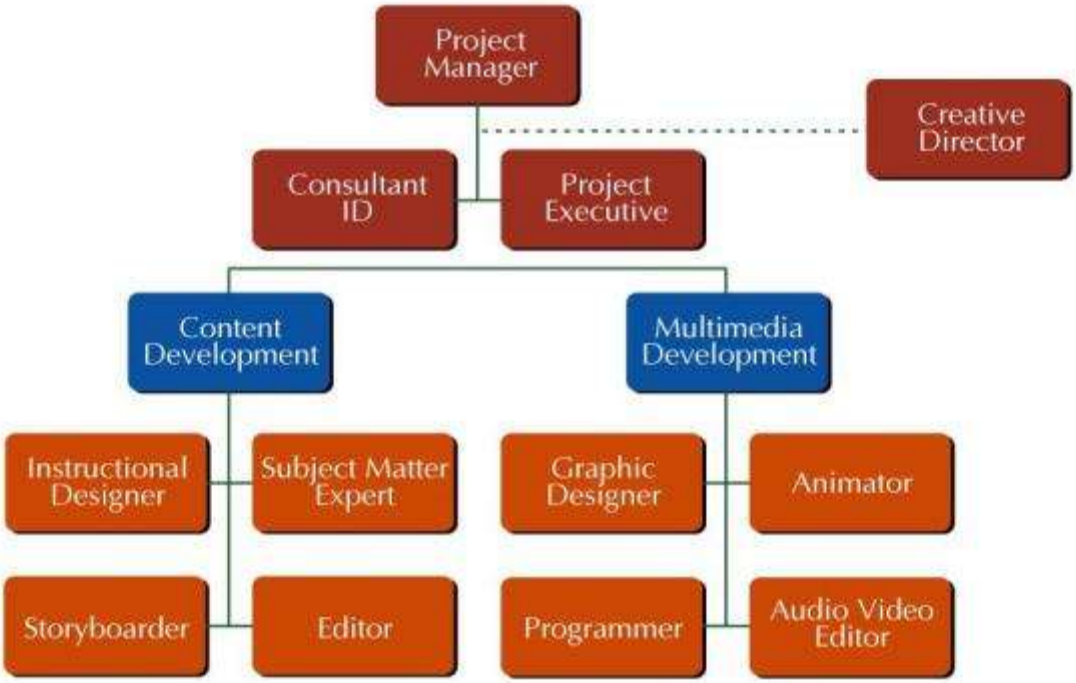
Feedbacks from teachers are vital at this stage to ensure that appropriate contents and skills are selected for NextGen eContent development.

Item	Front-End Analysis
Method	■ Surveys and questionnaires ■ Interviews ■ Document analysis of past examination results ■ Research reports on the teaching of specific subjects
Targeted Participants	■ Teachers ■ SME consultants
Outcomes	■ An identification of the types of tasks, learning activities and assessment to develop ■ An identification of the types of resources to develop: ✔ that will meet specific needs of specific target audience ✔ for use with specific teaching and learning activities and ✔ for assessment of specific learning outcomes of specific subjects. ■ A specification for the teaching and learning resources; and ■ A Request for Proposal (RFP) which will be managed by the project team.

Establishment of Development Team

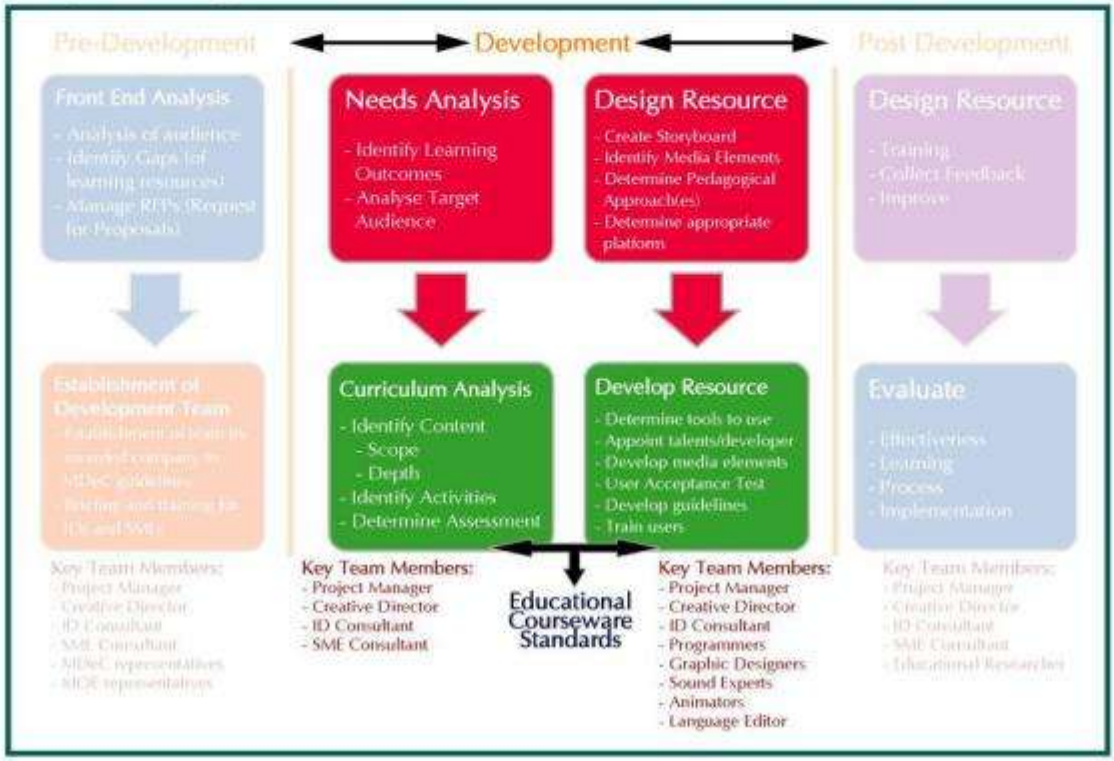
Once the contract is awarded to the chosen vendor or developer, the awarded company will need to put together a team based on the standards set by the Appointed Committee for the next stage of development.

Development Team



A briefing and training on the Process Standards is to be given to the SMEs and IDs from the awarded team. Training should be focused on imparting key knowledge and skills (such as the NextGen learning approach, needs analysis, pedagogical approach and learning activities) required to undertake the development.

Development Stage



During the Development stage, there are two sets of processes done simultaneously. The first is Needs Analysis, where learning outcomes are identified and the target audiences analysed. Needs Analysis is followed by Curriculum Analysis, where the scope and depth of content as well as activities are identified, and assessment determined.

Following Needs Analysis and Curriculum Analysis, the Resource Design is carried out, where the storyboard is created, the media elements identified, and the pedagogical approaches and appropriate platform determined. The Development stage continues with Resource Development once the team is satisfied with the design. At the development stage the tools to be used are determined, developers or talents are appointed, media elements are developed, the User Acceptance Test is conducted, guidelines are developed, and users are trained.

Key Team Members for the Need and Curriculum Analysis processes are the Project Manager, Instructional Designer, Creative Director and the Subject Matter Expert, while the Key Team Members for the Resource Design and Development processes are the Project Manager, Instructional Designer, Creative Director, Programmers, Graphic Designers, Sound Experts, Animators, and Language Editors.

Development Stage - Processes

Needs Analysis

The needs analysis examines the current practices of teaching and learning of the specific content and skills. The result of needs analysis will be an identification of available resources and the needs for new teaching and learning resources to support the learning activities and assessment in order to achieve the learning outcomes. The analysis will also examine the readiness of the target audience and their prior knowledge and skills.

Needs analysis for the NextGen eContent can be conducted via two approaches:

i. Undetermined titles; or
ii. Predetermined titles

Item	Undetermined Titles	Determined Titles
Method	■ Focus group interview* ■ Surveys and questionnaires ■ Interview the experts (MOE officers, educationist, subject teachers) ■ Phone interviews ■ Teaching observation	■ Focus group interview*
Approach	■ Topic best to be converted into Learning Objects ■ Approach best used to deliver a difficult topic. ■ Topics difficult to teach.	■ Approach best used to deliver the learning outcome. ■ Activities best used in the Learning Objects
Targeted Participants	■ Teachers ■ Students	■ Teachers ■ Students

* Focused Group Methodology

It is advisable to begin with generic questions in the interviews. Subsequently, specific or targeted questions should be carried out based on the inputs received.

Note: Questions in the surveys or interviews should be more focused and specific on the learning content if it is already pre-determined.

The decision on which approach to take is usually determined by the Project Owner. The decision is taken based on:

i. Time – timeline given to complete the Project

ii. Resources – manpower to conduct the session

iii. Budget – financial budget allocated for the Project

Curriculum Analysis

The curriculum analysis, content analysis, instructional analysis and task analysis will examine the goals, learning outcomes, activities and assessment appropriate to the content. The result would be the sequencing of the content (content mapping), specific to the discipline depending on the depths and breadths of content.

Design of teaching and learning resources

The curriculum analysis, content analysis, instructional analysis and task analysis will examine the goals, learning outcomes, activities and assessment appropriate to the content. The result would be the sequencing of the content (content mapping), specific to the discipline depending on the depths and breadths of content.

Based on the curriculum goals and the learning outcomes, a blueprint (design specification) for the learning activities and assessments will be designed:

- Appropriate pedagogical approaches are determined taking into consideration the nature of the learning activities and the content. [Reference Documents: Learning Object Guideline and other relevant guidelines from Appointed Committee and MOE].

- The storyboard should be produced indicating the media elements to be developed. The storyboard will be used as a communication tool between the ID and the media developers.
  (Please note the storyboard may communicate enough information for the developers to be able to develop the resources through rapid prototyping method). [Reference Documents: Learning Object Guideline]

- Appropriate tools for development and platforms for delivery are identified. This would include:

  - Content creation tools
  - Communication and collaboration tools
  - Assessment tools and
  - Administration tools

Development of the purpose built teaching and learning resources

The design or the blueprint is then converted into the purpose built teaching and learning resources. At this stage:

- The developer will produce the necessary multimedia elements following the specific standards such as SCORM or other relevant standards when appropriate. [Reference Documents: MOE's National Curriculum Standards].

- When necessary appoint good talents and developers. [Talents and developers as approved by the Appointed Committee].

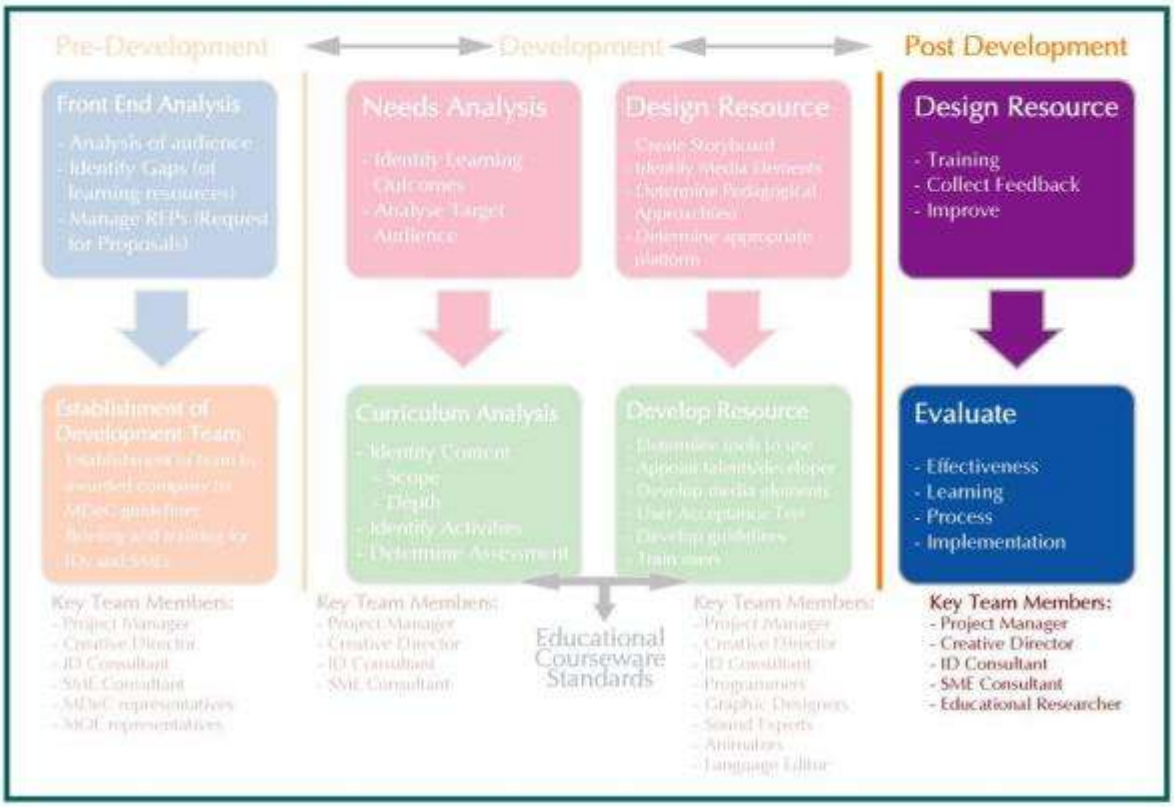
- Write user guideline to guide the teachers and other users in how to use the resources and how to manage the teaching and learning when using the resources.

- Conduct a formative evaluation of the resources and revise as necessary. (Aspects to be evaluated : Content, Learning Activity, Test, Language Aspect, Technical Aspect, Audio Elements, User Friendly Elements, Navigational Aspects)

- Plan for the necessary training and evaluation of the resources in the real teaching and learning environment (teachers and students should be involved in the evaluation process).

The development team must consider the constructivist and connectivist approach to instructional design as indicated in the conceptual framework (Figure 1).

Post Development Stage



In the Post-Development stage, the initial step is Resource Utilisation, where training, the collection of feedback and improvement are done. This is followed by the Evaluation Step, where effectiveness, effect on learning, the processes of the content developed, and the implementation of the contents are evaluated.

Key Team Members for the Post-Development stage are the Project Manager, Creative Director, Instructional Design consultant, and Educational Researcher.

Post Development Stage - Processes

Resource Utilization

At this stage the resources are put to test by the users.

- Users (especially teachers) are to be provided with appropriate training on the integration of the teaching and learning resources. Training will ensure that teachers are able to make the necessary decisions to either adopt the resources as a standalone resource or to be adapted based on specific learning outcomes and learning activities and assessment.
- The resources may be tested in face to face learning environment and/or on virtual learning environment.
- At the utilization stage it is advised that the awardee team also look into the management of the learning and teaching system.

Resource Evaluation

Evaluation of the teaching and learning resource will look into its effectiveness, efficiency and appeal. The summative evaluation steps may be used after the resource has been utilized for a specific time frame, preferably more than one semester:

- Effectiveness will measure the usabilility of the resource in helping the learners achieve the learning outcomes (learnability).
- Efficiency will examine the learning outcomes based on the time spent by the learner divided by the cost in producing the resources.
- Appeal will determine if the resource is well liked by the users.

The result of the utilization and evaluation stage will feedback into the design and development cycle, ensuring the quality of the product produced and the process to produce the purpose-built teaching and learning resources.

Roles and Criteria

The roles of the respective partners and the criteria for selection or appointment are listed below.

Role of Appointed Committee (MDEC)

- Lead implementation (of process standards) to ensure success
- Work in partnership with MoE, Consultants and Industry
- Monitor progress of implementation based on the process standard
- Evaluate for effectiveness of implementation
- Improve aspects of implementation, process standards, etc.
- Set criteria with MoE for selection of Consultants:
  - Instructional Designers
  - Subject Matter Experts
- Provide the necessary support and resources to ensure success

Role of MoE

- Comply with Process Standards
- Ensure that the curriculum prepares the NextGen learners with the 21st century skills
- Ensure that the assessment tools are appropriate
- Identify SMEs from schools and IHLs
- Do research to determine outcomes and suggest improvement
- Provide the necessary support and resources to ensure success

Role of Industry (Vendor)

- Comply with Process Standards
- Do research to inform process
  - Develop tools and delivery platform
  - Develop models of best practices
  - Demonstrate value for money
  - Suggest standards and quality assurance (QA) mechanism
- Design and develop teaching and learning resources
- Stand by their products and provide support
- Provide consultancy
  - Give advice and guidance on
- Curriculum design, development, delivery and monitoring
- Technological, Pedagogical Content Knowledge (TPCK)
- Assessment
- Research methodology
- Provide training for
  - Teachers
  - Administrators
- Provide training on
  - Curriculum
  - Pedagogy
  - Assessment
  - Action research
  - New tools and technologies

Criteria for Selection of Industry Players

- Open to innovative practices
- Past track record of supporting technology in teaching and learning
- Strong R&D in learning technologies
- Recognised by Appointed Committee and MoE

Role of Consultants (ID's and SME's)

- Comply with Process Standards
- Advise on matters pertaining to:
  - Learning design, development and evaluation
  - Technology utilisation
  - Content, and
  - Assessment
- Conduct research for continuous improvement

Criteria for selection of consultants (Instructional Designers)

- Minimum 5 years experience of using technology in teaching
- Has a degree in Instructional Design or related field preferably at the post-graduate level
- Qualification recognised by Appointed Committee and MoE
- Active researcher in effective use of learning technologies

Criteria for Selection of Consultants (Subject Matter Experts)

- Qualified in the subject matter (first degree)
- Expert teacher/Excellent teacher
- Five years experience in using technology in teaching
- Have conducted research on the use of technology in teaching
- Recognised by Appointed Committee and MoE

Note:

- The Project Manager (PM) will oversee the development of the project from start to finish.

- The Creative Director is essential in coming up with the concept and theme. The Creative Director will be responsible to develop the screen layout, color scheme and character design.

- The Subject Matter Experts (SMEs) will be responsible for curriculum analysis, content analysis and instructional analysis, making sure that the concept and content is correct and at the appropriate level. SME may suggest appropriate activities to deliver the content and the tools for measuring or assessing the learning outcomes. The role of the SME is not limited to this stage. SME may be involved in the quality checking of the instructional design output.

- Instructional Designer (ID) will be responsible for carrying out the needs analysis, learner analysis, context analysis, technology analysis and task analysis. The ID will identify the learning outcomes and design the blueprint or specifications for the content to be developed. [ID will identify an appropriate ID model to follow]

Appendix

Educational Learning Object Guidelines

1. Storyboard

1.1 The storyboard shall be based on the Curriculum Specifications of the related subject and shall use the mapping, content script or any other document that may be provided by Ministry of Education (MOE).

1.2 The storyboard shall be based on Sharable Content Object Reference Model (SCORM).

1.3 The storyboard shall conform to the Instructional Design Standards (as in item 2 of this document).

1.4 The language shall be written according to the language of instruction specified.

1.5 Layout

1.5.1 The screen layout shall portray the courseware to be developed

1.5.2 The storyboard shall include (See Appendix I)

(a) Title and version as the header
(b) Page number as the footer
(c) Category of SCO
(d) Graphics / illustrations
(e) Voice over script
(f) Text Script
(g) Navigation buttons
(h) Directions of the navigation
(i) Notes to programmer
(j) Descriptions on the media objects

1.6 Navigation

1.6.1 Storyboard navigation function shall conform to SCORM.

1.6.2 All instructions on navigation shall appear in graphical form / icon.

1.6.3 All instructions on navigation shall represent the actual navigation in product.

1.7 Graphic / Animation / Video

1.7.1 Graphics shall be clearly illustrated or described.

1.7.2 Graphics shall be clearly described whether still or animated.

1.8 Text

1.8.1 Text must conform to the Educational Learning Object Standards as in item 4 and 5 of this document.

1.9 Audio Script

1.9.1 Voice over shall be fully scripted.

1.9.2 Language used should be appropriate to the level of the target group.

1.9.3 Gender and age group for voice over shall be stated.

1.9.4 Sound effects shall be suitable to the requirement of learning.

1.9.5 Sound effects shall adhere to the copyright act.

2. Instructional Design Standards

2.1 Each lesson shall be matched to one or more learning outcomes in the Curriculum Specifications.

2.2 The Introduction section shall give a short overview of the lesson and acts as a set induction to motivate the pupils to the lesson.

2.3 The Content / Concept / Skill Learning section shall be based on learning theories that will enable pupils to master the concept. Explanations shall be kept to the minimum; however should more information be required an option should be made available. Activities that elicit responses from pupils shall be used as much as possible to engage them to learn. In this respect, the approach should always be that the pupil shall be guided to discover or construct the concept or skill.

2.4 The Practice / Activity section shall contain guided exercises. These exercises shall elicit responses from pupil as much as possible and not merely show animated explanation.

2.5 The Test / Evaluation section shall have the following features:

2.5.1 It shall contain a variety of question types, including but not limited to multiple choice, matching, drag & drop or fill in the working/answers.

2.5.2 The questions shall be chosen randomly generated by the system.

2.5.3 Templates for worded questions shall not be reused.

3 Navigation Standards

3.1 All navigations must be designed according to SCORM.

3.2 A user controlled Slider to show an animation Voice Over / Video time frame shall be made available when necessary.

4 Display Standards

4.1 In designing colours for the display, there shall be a contrast between the foreground and the background.

4.2 Text Display

4.2.1 Fonts:

(a) Colours used for text shall be prominently visible against the background of the screen.

(b) Consistent text size shall be maintained throughout.

4.4.3 Presentation:

(a) Text shall be positioned accordingly. The amount of text on screen shall be optimized to avoid clutter.

(b) Blocks of information shall be separated by sufficient space.

(c) Use margins, alignment, and spacing to emphasise important points.

(d) A pop-up screen containing explanations/calculations shall only appear on demand basis to avoid cluttering on screen (example: "Mouse over" the appropriate area shall be used).

(e) Highlighting effects shall be used sparingly/occasionally to maintain emphasis

4.3 Graphics

4.3.1 Graphics shall be logical and not contradictory to real life situations. (Example: showing shadow of an object).

4.3.2 Graphics shall enhance and support learning.

4.3.3 Graphics or animation can be used to highlight key information.

4.3.4 Biases or stereotypes in graphics or animations (gender, ethnicity, religion, etc.) must be avoided.

4.3.5 Lines in diagrams / graphics shall be straight, neat and the choice of thickness should be suitable to the graphic.

4.3.6 Diagrams shall be in proportion to actual size.

4.3.8 Labels:

(a) All diagrams shall be neatly labelled.

(b) Dashed lines, when used, shall begin and end with a dash that intersects with the relevant points.

4.4 Animations

4.4.1 Animations used shall be rendered as smooth as possible.

4.4.2 Blinking texts : Colour of the blinks shall be contrasting.

4.4.3 Animation shall be related to content and must be accurate.

4.4.4 Animation shall be used with purpose to support and enhance learning.

5. Audio Standards

5.1 Voice Over shall be synchronized with text, video, animation or graphic.

5.2 Voice Over used must be appropriate according to gender and age of the character portrayed.

5.3 The voice talent used should be appropriate to the characters appear in the learning object.

5.4 Volume, tone and pitch of audio shall be consistent and clear throughout the learning object. They shall not be peaky, shrill, tinny, bloomy, muddy, thin, distorted, scratchy, coarse, grainy, harsh, hiss, crackle or rustle.

5.5 Pronunciation must be correct and intonation must be clear and with neutral ethnic accent.

5.6 Language used shall be linguistically correct, relevant to the subject and appropriate for the target group.

5.7 Standard British English shall be used.

5.8 Background music used shall adhere to the copy right act.

5.9 Sound effects shall be relevant to the context.

5.10 There shall be no overlapping of audio.

5.11 Where possible and appropriate, short sentences shall be used.

5.12 The voice over shall tell only what is relevant.

5.13 Short and simple audio script shall be used.

6 Technical Standards

6.1 The learning object shall run efficiently in the following minimum environments:

6.1.1 Internet Explorer 5.5, Netscape 7.0, Mozilla 4.0, Firefox 1.5, Safari 1.2 and Opera 6.

6.1.2 Windows 98SE, Macintosh OS X or Linux SUSE 9 /Linux Red Hat 9 operating system.

6.2 Loading time between pages shall be seamless.

6.3 Programming Approach

6.3.1 Programming approach should be flexible

7. Curriculum and Pedagogical Standards

7.1 All content should conform to the MOE's National Curriculum Standards.

7.2 The learning object conforms to the curriculum in terms of its aims, learning outcomes, objectives, skills and values.

7.3 The learning object promotes the acquisition of knowledge: content, problem solving, epistemic and inquiry knowledge.

7.4 The learning object should always depict local life or culture. It can also depict international life or culture as long as it does not contradict local life or culture. Local life or culture depicted in the learning object must observe sensitivity issues of various ethnic groups in the country.

7.5 The learning object permits self-paced, self-accessed and self-directed learning.

7.6 The content shall follow a clear learning strategy to achieve learning.

7.7 The content shall be accurate, valid, up-to-date and without errors.

7.8 The learning object shall stimulate and motivate the learner.

8 Standard References

8.1 The standard reference for English language shall be the Oxford Advanced Learner's Dictionary.

8.2 The standard reference for Bahasa Malaysia shall be the `Kamus Keluaran Dewan Bahasa dan Pustaka' and 'Tatabahasa Dewan'.

8.3 For jawi spelling 'Daftar Kata Jawi DBP' shall be used.

8.4 The standard reference for Islam is based on 'Mazhab As-Syafie'and for Al-Quran text ' Mushaf Rasm Uthmani' shall be used.

8.5 The standard reference for sign language is 'Kod Tangan Bahasa Melayu' (KTBM) in Malay and 'American Sign Language' (ASL) for English.