Assurance of Quality of Digital Learning Resources
National E-Learning Resource Centre, University of Kelaniya

1. **Policy Title:** Assurance of Quality of digital Learning Resources, University of Kelaniya

2. **Policy Number**: CQA/A/P/02

3. **Policy Functional Area; Academic/ Administration/ Finance:** Academic

4. **Effective Date of the policy:** 15th July 2020

5. **Approved by:** The Council and The Senate**,** University of Kelaniya

6. **Responsible Office/Department/Unit**: National E-Learning Resource Centre Faculties and Departments

7. **Policy Contact information**: Librarian, Deans of Faculties and Heads of Departments

8. **Description and Purpose of the policy:**

8.1 What is Quality Assurance of Digital Learning Resources (DLR)?

Quality is an integral element that must follow in all productions either physical or intangible objects. Testing and reviewing of any product allow errors to be corrected. Thus, quality is "the degree to which a set of characteristics inherent to a product, process or system meets the requirements initially stipulated for them" (ISO 9000(2000)).
DLR is educational materials that can be used for teaching and learning purposes to support learners' achievement of the described learning goals. These materials consist of a wide variety of digitally formatted resources including:

- graphics images or photos
- audio and video
- Simulations-This resource aids teacher's explanation, and allows learners to test out their ideas and experiment.
- Animations
- Prepared or programmed learning modules.

The quality of DLR is the compliance with functional and performance requirements. Thus, the DLR is evaluated by the experts to ensure that it is met for intended requirements and doesn't behave in a different way than it is specified.

8.2 Why it is required?

This quality assurance framework describe the development and evaluation process of the digital content developed for the teaching and learning purpose. Most of the time, the digital content only refers to the technical capabilities such as graphic designing, audio and video editing etc. However, when it comes to educational domain, it is more concentered with the specifics of the content being presented. Therefore, it can be seen that digital learning resources developed as yet are over-emphasized technical proficiency at the expense of

sound pedagogy or have used relevant digital media which suits for educational purpose. Therefore, it is an extremely important to follow the
quality checking procedure in the stages of digital learning resource designing, development and delivery to assure that the quality is embedded in the application of technology to achieve educational goals.

8.3 E-learning Model

The eLearning model shown in Figure 1 has been adopted. This model gives all the benefits of Blended learning and Micro teaching to teaching/learning community. It starts with carefully selected subject contents for blended learning and divides them into meaningful micro contents to be digitized. Therefore, Instructional Design plays a major role here. The success of the learning process depends on the efforts and time spent on Instructional Design than creating images, audios, videos, graphics, and preparing texts.

8.3.1 Blended Learning

Blended learning is, integration of computer mediated learning with conventional face to face teaching (Curtis & Graham, 2005). In blended learning environment a component of a subject/course will be delivered in electronic form and other component will be delivered with physical presence. Blended learning method is highly practicing in secondary and tertiary
educational sector with the rapid development of the technology. Blended learning method would be more effective when it uses micro-learning (Hesse, et al., 2019; Jonathan, Mazzone, Ma, Davich, & Erickson, 2019).

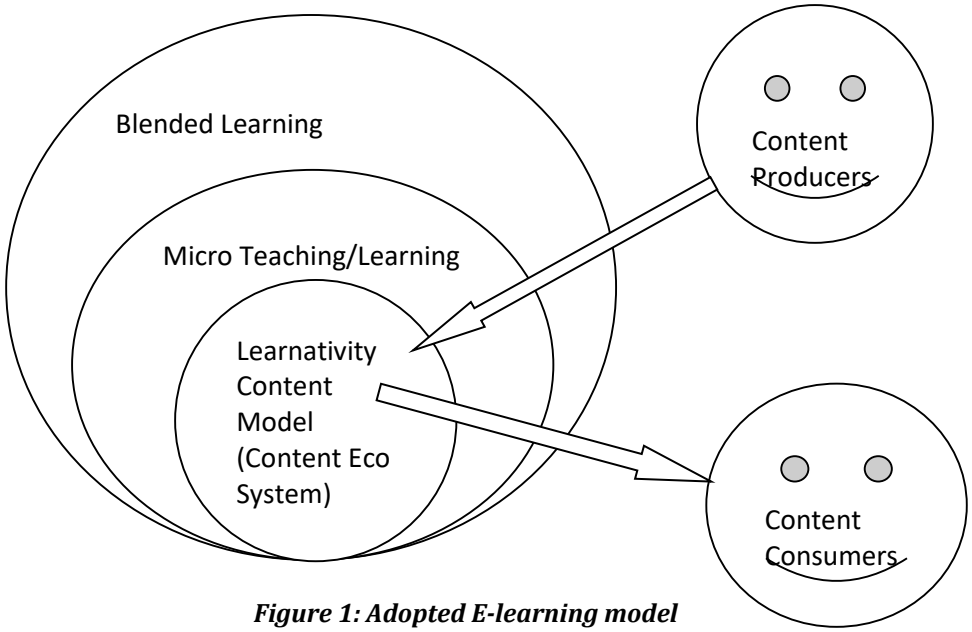

Figure 1: Adopted E-learning model

8.3.2 Micro Teaching

Micro Teaching/Leaning can provide the necessary flexibility for the students to learn from anywhere / anytime.

A study conducted by Giurgui (2017) shows that smallest contents help students to retain information. It further says that "micro-learning offers students the opportunity to more easily absorb and retain the information provided by the course lessons and activities that are more manageable and digestible".
Singh (Singh, 2014) stated the following basics of micro learning in his article "17 Awesome Resources on Micro-Learning" publish in the web site of eLearning Industry:

- Micro learning suits the constraints of the human brain with respect to its attention span. This approach aligns with research that proves we learn better when engaged in short, focused sessions, than hour-long sessions that cause information overload. In this approach, the learning content is offered in short durations of 3 to 7 minutes at the most to match the human attention span.
- Micro learning is not a newly invented approach but rather a realization of how the human brain is wired to learn. It is considered to be one of the best instructional approaches for new age learners.

8.3.3 Content Eco System

The Learnativity Content Model proposed by Wagner (2002) has been adopted as the Content Eco System.
Wagner defines

a. Learning Environment
b. Learning Component
c. Learning Object
d. Information Object
e. Content Asset

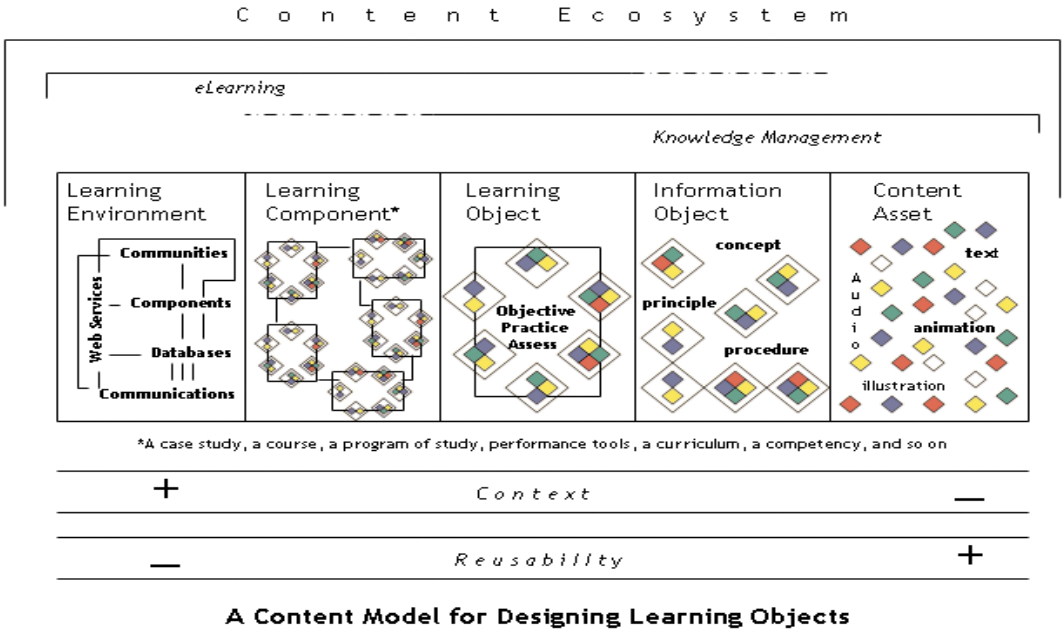

Figure 2: Learnativity content model

Content Assets

Raw media

- photographs,
- illustrations,
- diagrams,
- audio and video files, animations,
- applets…….etc.

These are the files generated by educators and can be in the form of image, graphic, audio, video, and text. Contents are basically mapped onto one or more of the above "Raw Media" and represented in a digital format. However, it is recommended to follow a content development process as shown in Figure 3.

Information Objects

Wagner defines Information objects as

- a concept
- a fact
- a process
- a principle
- a command reference
- an exercise
- a procedure

Quality of these "Raw Media" should be assured since these "Raw Media" are the end products having content used by students for learning. Therefore, assuring quality of these "Raw Media: is under the scope of the Assurance of quality of digital contents. Two or more "Raw Media" can be combines together to form an "Information Object". However, it is still possible to use a "Raw Media" as an "Information Object". This is where the Micro Teaching/Learning (sometimes referred as "bit-sized" learning) comes into play. It is highly recommended to adopt Micro Teaching/Learning for eLearning as the students learn according to their own learning styles.

It is evident that the concept of "Information Object" can be implemented by using "Micro Learning".

Quality of an Information Object affects the learning of a single concept by students. Therefore, quality of digital information objects is also under the scope of the Quality Assurance of Digital Contents

Learning Objects

A learning object is a collection of relevant reusable Information Objects to form to teach a common job or a single learning objective (Wagner, 2002). In short, a Learning Object is a result of integration of several information objects. The quality of the integrated product called Leaning Object equally affects the students' learning as that of content assets, information objects. For example, the assessment integrated into the learning object should be compliance with the contents in the same learning object.

Therefore, the quality of digital learning objects is also covers under the scope of quality assurance of digital contents.

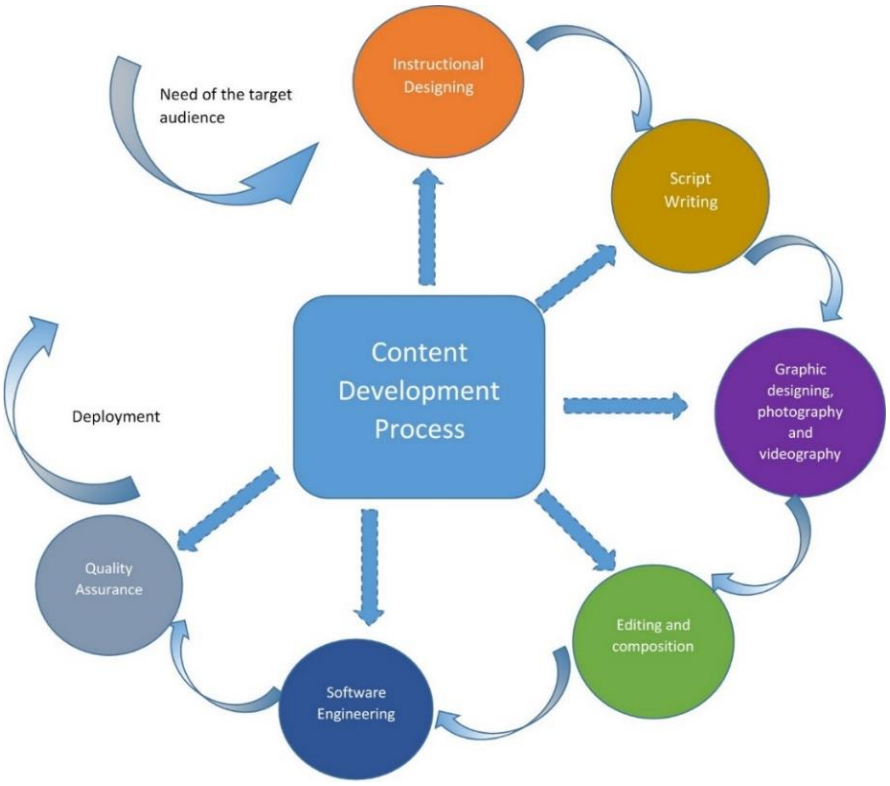

Figure 3: Content Development Process

8.4 Learning Component and Learning Environment

Learning Components (Lessons or courses) and Learning Environment (LMS) are not under the scope of the quality assurance of digital contents. They should be considered in quality assurance of e-learning of an organization.

The Learnativity Content Model can be represented by a Layered Architectural Model as shown in Figure 4.

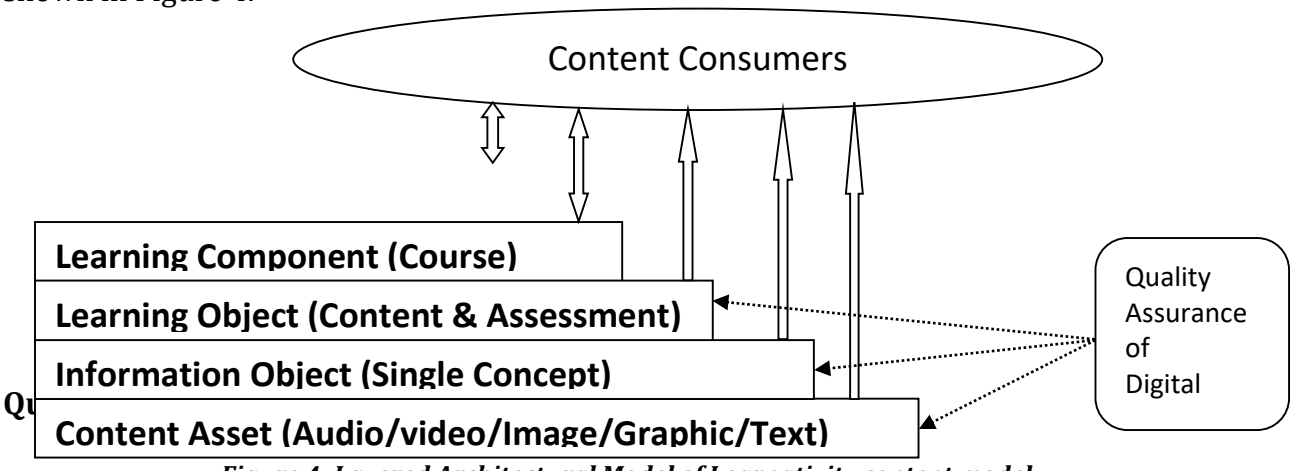

Figure 4: Layered Architectural Model of Learnativity content model

9. Quality Assurance Measurements

1. Accuracy

a) Subject matters should be correct and up-to-date (contemporary).
b) The Learning objective is clearly stated and measurable.
c) Digital contents are designed to meet the learning objective.
d) Digital contents should cover all the subject matters stated in a topic or sub-topic of the curriculum (comprehensiveness) and be consistent with the curriculum.
e) Examples used in the digital contents are well designed and selected so that a student can easily understand the complex subject matters.
f) The slide/image showing to the students matches with the audio explanation and the text displayed (synchronization of slide/image, audio and text).
g) Correct spelling, punctuation and grammar should be used.
h) When using contents from other authors, due credit should be given, reference to original material should be included, copyright and patents should be honored.

2. Creativity

a) Digital contents should be presented to a student in a unique way to the educator. (This is to ensure that availability of multiple digital contents on same subject matter with different explanations and styles).
b) Retention of students' attention throughout the lesson should be maximized.
c) Students with different knowledge levels can follow the contents without an additional support.
d) Contents should be structured logically to support easy learning.
e) At the end of the lesson, students should demonstrate self-confidence in the subject matter and be enthusiastic to learn and explore the subject matter further.

3. Maintainability

a) A logical classification method and structure should be used when storing digital contents in an LMS or in some other storage.
b) A logical and easy to remember file naming convention should be used to name the digital contents.
c) Digital materials may be modified and refined much more easily.
d) Adjustments to address local needs are possible.
e) Replacing an old digital content with a new digital content should be possible with minimum efforts

4. Availability

a) Digital contents should be available to students 24x7 to enable students to have a flexible learning time.

5. Accessibility

a) Digital contents must be support for online as well as offline learning.
b) These should be accessible via Internet connections with low bandwidth and slow download speeds.
c) Digital contents should be accessible from anywhere at anytime. This will bridge the digital divide.
d) Values for metadata adopted should be specified

6. **Usability**
    a. The students will be able to select digital contents suitable for his/her learning style (in their choice).
    b. Audio explanations should be simple, audible, clear and precise.
    c. Language used in digital contents should be simple so that a student with poor language skills will also be able to understand them.
    d. Font size should large enough for students to read the contents easily.
    e. Font color and the background color should be selected according to the color theory (using color wheel).
    f. It is recommended to maintain the duration between 8 to 15 min. (This is to encourage Micro Teaching.)
    g. Flow of contents should be logical from one screen to the other (easy to follow).
    h. It is preferred to visible the content to students without scrolling.
7. **Interoperability**
    a. Digital contents should be run on all available platforms, devices and operating systems
    b. Metadata should be defined using IEEE Standard for Learning Object Metadata (IEEE The Institute of Electrical and Electronics Engineers) and values for those metadata should be specified in order for users (even for other LMS users) to search required contents.
    c. Images are preferred to be in JPEG (loss based compression), PNG (lossless compression) or GIF (lossless compression and limited animation capability) formats.
    d. Audio and video are preferred to be in MP3 (lossless compression) and MP4 formats respectively.
8. **Flexibility**
    a. Digital contents should be acceptable to students from different cultural, linguistics, gender and religious backgrounds.
9. **Affordability**
    a. Digital contents should be available to students free of charge or with a minimum bearable cost. If not, it will widen the digital divide and the United Nation's goal to provide "quality education for all" will not be achieved.

9.1 Check List

1. Accuracy		**Weight-2**
No.	**Criteria**	**Marks** **Excellent - 5** **Good -4** **Average -3** **Poor -2** **Bad -1**
a.	Are subject matters correct and up-to-date (contemporary)?	
b.	Is learning objective is clearly stated and measurable.	
c.	Are digital contents designed to meet the learning objective?	
d.	Are digital contents covered all the subject matters stated in a topic or sub-topic of the curriculum (comprehensiveness) and be consistent with the curriculum.	
e.	Are examples used in the digital contents are well designed and selected so that a student can easily understand the complex subject matters.	
f.	Is the slide/image showing to the students matches with the audio explanation and the text displayed (synchronization of slide/image, audio and text).	
g.	Does correct spelling, punctuation and grammar are used.	
h.	Does due credit has given when using contents from other authors and references are made to original material and copyright and patents are been honored.	
Score		
Weighted score (W1) = Score X weight		

2. Creativity		**Weight 2**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**
a.	Does digital contents are presented to a student in a unique way to the educator. (This is to ensure that availability of multiple digital contents on same subject matter with different explanations and styles)	
b.	Is lesson prepared in a way that maximize the retention of students' attention throughout the lesson	
c.	Shall students with different knowledge levels follow the contents without an additional support?	
d.	Are contents structured logically to support easy learning?	

e.	Would students demonstrate self-confidence in the subject matter and be enthusiastic to learn and explore the subject matter further at end of the lesson,	
Score		
Weighted score (W2) = Score X weight		

3. Maintainability		**Weight 1**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**
a.	Is a logical classification method and structure has used when storing digital contents in an LMS or in some other storage.	
b.	Is a logical and easy to remember file naming convention used to name the digital contents?	
c.	Would digital materials may be modified and refined much more easily.	
d.	Is it possible to make adjustments to address local needs	
e.	Is it possible to replace an old digital content with a new digital content with minimum efforts	
Score		
Weighted score (W3) = Score X weight		

4. Availability		**Weight 1**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**
a.	Does digital contents are available to students 24x7 to enable students to have a flexible learning time.	
Score		
Weighted score (W4) = Score X weight		

5. Accessibility		**Weight 1**
	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**

a.	Does digital contents available for online as well as offline learning.	
b.	Shall digital contents accessible via Internet connections with low bandwidth and slow download speeds.	
c.	Shall digital contents accessible from anywhere at anytime. (This will bridge the digital divide)	
d.	Values for metadata adopted should be specified	
Score		
Weighted score (W5) = Score X weight		

6. Usability		**Weight 2**
No.	Criteria	**Marks** **Excellent - 5** **Good -4** **Average -3** **Poor -2** **Bad-110> errors (Reject)** **-1 mark**
a.	Would students able to select digital contents suitable for his/her learning style (in their choice).	
b.	Are audio explanations simple, audible, clear and precise?	
c.	Does the language used in digital contents simple so that a student with poor language skills will also be able to understand them.	
d.	Does the font size large enough for students to read the contents easily.	
e.	Does the font color and the background color selected according to the color theory (using color wheel).	
f.	Does the digital content maintain the duration between 8 to 15 min. (This is to encourage Micro Teaching.)	
g.	Flow of contents should be logical from one screen to the other (easy to follow).	
h.	It is preferred to visible the content to students without scrolling	
Score		
Weighted score (W6) = Score X weight		

7. Interoperability		**Weight 1**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2**

		Bad -1
a.	Would digital contents run on all available platforms, devices and operating systems	
b.	Metadata should be defined using IEEE Standard for Learning Object Metadata (IEEE The Institute of Electrical and Electronics Engineers) and values for those metadata should be specified in order for users (even for other LMS users) to search required contents	
c.	Images are preferred to be in JPEG (loss based compression), PNG (lossless compression) or GIF (lossless compression and limited animation capability) formats.	
d.	Audio and video are preferred to be in MP3 (lossless compression) and MP4 formats respectively.	
Score		
Weighted score (W7) = Score X weight		

8. Flexibility		**Weight 1**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**
a.	Does digital contents acceptable to students from different cultural, linguistics, gender and religious backgrounds.	
Score		
Weighted score (W8) = Score X weight		

9.Affordability		**Weight 1**
No.	Criteria	**Marks** **Excellent - 5** **Good - 4** **Average -3** **Poor -2** **Bad -1**
a.	Does Digital contents available to students free of charge or with a minimum bearable cost. (If not, it will widen the digital divide and the United Nation's goal to provide "quality education for all" will not be achieved.)	
Score		
Weighted score (W9) = Score X weight		

10. Policy Implementation; Strategy, Responsibility, Monitoring & Evaluation:
QA Process

1. An educator should apply and submit the digital learning recourses developed for quality assurance review.
2. Independent review committee should be appointed comprising with following personnel by the University Curriculum, Teaching and Evaluation Committee (CULTEC)
    - A subject matter expert
    - A nominee from the respective faculty or department
    - A nominee from the National E-Learning Resource Centre
3. In order to pass from the quality assurance process, a DLR should be in the categorization of "Good" or "Excellent".
4. Calculation of final score;

$$\frac{(W1+W2+W3+W4+W5+W6+W7+W8+W9)}{\text{Total of the weighted score}} \quad X\ 100$$

$$\boldsymbol{Final\ Score = \frac{\sum_{i=1}^{9} Wi}{Total\ of\ the\ weigthed\ score}\ x\ 100}$$

$$\boldsymbol{Final\ Score = \frac{\sum_{i=1}^{9} Wi}{290}\ x\ 10}$$

5. Categorization of DLR based on the final score

Final Score (X)	**Category**
X <= 50	Poor
50 > X <= 65	Average
65 > X <= 75	Good
X > 75	Excellent

6. Committee should submit the evaluation report to the CULTEC Within one month.
7. A certificate should be issued to the applicant stating the Category

References

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