

Quality Assurance Framework for Multi-media Learning Materials: A Field-testing Report

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Field-testing of the Quality Assurance Framework for Multi-media Learning Materials: A Report by YCMOU

1. Introduction and Rationale

The Information, Communication and Technological Revolution has transformed every sphere of life; education being no exception. Various e-learning modules are already part of the teaching-learning processes the world over. Quality is, by and large, assumed to exist in these modules. Unfortunately, while the technology standard is fairly well-defined, little attention appears to be paid to pedagogic considerations in many of these modules. Unlike the ISO standards that operate in business processes, there is a marked absence of standardised procedures for developing these materials and assuring their Quality.

Any industry to function in an efficient manner & promote healthy competition amongst its players, calls for a set of guidelines & statutory provisions that set the rules of the game or the broad framework within which to perform. For instance, the Companies Act of 1956 for companies, the IRDA Act of 1999 for regulating the Insurance sector, etc. There has been no such effort in the field of Multi-media Learning Material (MLM) development despite its growing popularity & acceptance in the learning domain. The Information Technology Act of 2000, which made noteworthy contributions in regularising e-commerce too fails to make even a mention of E-learning & MLM. The lack of concrete guidelines for various stakeholders namely, developers, distributors, instructors, learners, etc creates room for ambiguity and ad-hoc practices that can more often than not, result in sub-standard productions.

Considering this scenario, the Commonwealth of Learning (COL) through its Commonwealth Education Media Centre for Asia (CEMCA), in collaboration with the Ministry of Higher Education (Malaysia), has pioneered a bold step to develop a Quality Assurance framework for Multimedia Learning Materials (MLM). Thanks to their efforts involving a highly democratic process of deliberations and discussions with professionals, academics and other stakeholders involved either in the development or utilisation of the multi-media learning materials (MLM), we now have a pre-final Quality Assurance Framework for the same.

Having prepared this Framework in its present form, another commendable exercise undertaken by CEMCA has been to get its field-testing done by a number of institutions so as to assess its efficacy, overall applicability and identify the gaps that may exist so as to come up with an improved, final version. The present report is an outcome of this Field-testing activity undertaken by the Yashwantrao Chavan Maharashtra Open University through the services of an identified Research Assistant. It is in this context of getting a kind of third-party assessment of the Framework that the present report assumes importance and seeks to positively contribute.

2. Nature and Importance of MLM

What is meant by MLM? What constitutes MLM? Although the meaning of the term has not been explicitly stated in the Framework, in order to arrive at a common understanding of the term, MLM very simply means a combination of 'multi' or many 'media' (i.e. methods of communication transfer) like text, graphics art, sound, animation & video elements delivered to the user by a computer or any other electronic means with the primary purpose of enhancing learning.

Compared to the traditional 'Stand & Deliver' teaching method, training imparted through animated, interactive, instructional multimedia applications has proven to be much more useful in a wide variety of settings. Apart from making the subject matter more interesting, multi-media applications have been found to increase information retention as well as learning capacity of the users. Research shows that people retain only 20% of what they see and 30% of what they hear. But they remember 50% of what they see and hear and as much as 80% of what they see, hear and do simultaneously. MLMs have brought about a paradigm shift in the role of educators from teaching to facilitation and mentoring and in turning students from passive learners to active participants.

3. Objectives

The QAMLM framework has considered five stages of activities, namely, **Analysis, Design, Development, Implementation** and **Evaluation**, popularly known as the **ADDIE** model. The Framework document explains briefly what is implied at each stage.

The Field-testing activity for the prepared Framework, therefore, considered the following objectives:

1. To assess the suitability of the Activities, Processes and Outcomes outlined in the Framework as part of the ADDIE model.
2. To verify the adequacy and applicability of the Quality Indicators proposed in the Framework.
3. To assess the usefulness of the Assessment Scale given for each Quality Indicator in the Framework.
4. To identify the limitations of the Framework, if any e.g. neglect of important areas, redundancy of information, improper emphasis, etc. for improvements in future.
5. To highlight pertinent issues in the development of Multi-media Learning Material so as to guide future policy-making in the area.

4. Methodology

4.1 Broad Approach

The approach adopted for undertaking the Field-testing activity involved the following:

- (i) Independent analysis of the given Framework by the researcher as well as some experts in the field.
- (ii) Collection of some existing multimedia learning resources and study of the applicability of the Framework to them using two sources of data:
 - (a) The Research worker's own observations and inferences, and
 - (b) Feedback from the developers of these multimedia learning resources.

4.2 Specific steps

In keeping with the broad approach outlined above, the following steps were taken:

- (i) Considering that the Principal Researcher herself was involved in the development of this Framework as a Core Team member, in order to obtain a dispassionate analysis of observations and responses, the services of a Research Assistant were availed in this activity. The Research Assistant was given a free hand at the data collection phase.

- (ii) The various inputs and/or processes and outcomes under each activity along with the Quality Indicators were looked at critically by the Research Assistant as well as two experts in order to verify their practical utility and comprehensiveness.
- (iii) Five available MLMs were carefully selected so as to cover a broad range of 'content' and also achieve a combination of MLM developers – those developed purely by an educational institute (viz. a university) and those developed for educational purposes by commercial firms.
- (iv) The responses given to each Activity and sub-activity in the Framework by some of the developers of the selected multimedia learning materials were obtained so as to ascertain whether all the sub-processes are actually used as well as to obtain first-hand feedback regarding important missing areas as well as points that were repetitive or redundant.

5. Description of the MLMs selected

As stated earlier, care was taken to collect samples from different content areas in order to understand content-based peculiarities as well as identify the unique features, if any, of various multimedia learning material development agencies.

The following MLMs were, therefore, taken for study:


Name of the MLM	Content Area	Type of Developer
MS Office	Computer Science	Educational Institute
Engineering Drawing	Engineering	IT Firm
Aarogya Mitra	Health Science	Educational Institute
Learn English	Humanities	IT Firm
Rose Plantation	Agricultural Science	Educational Institute

6. Observations and Analysis

The opinions expressed by experts, MLM developers as well as the observations made by the researcher threw light on the efficacy of the ADDIE model used through the Activities, Processes and Outcomes listed in the Framework and the appropriateness of the Quality Indicators stated for each sub-activity. The analysis based on all of these is summarised in what follows, some of the details being presented in tabular form and the balance in terms of descriptive statements.

6.1 Expert responses to the overall applicability and usefulness of the QAMLM Framework: Some excerpts

- The work is commendable. The draft framework for "Quality of Multimedia Learning Materials" will definitely serve as guidelines for both, the agency involved in quality assurance as well as the agency involved in development of multimedia contents. Overall, the document is good.
- Quality parameters for "Fonts" are incorporated in the draft document. However, the quality of multimedia study material also depends on the aspects related to intonation of voice-over, grammar, simplicity of sentences, colour harmony etc. Hence, these aspects may also be considered.
- The quality (of MLM) also depends on the sampling rate of audio, frame rate of animation and the resolution of graphics (This aspect should also be covered in the Framework).
- According to the theories related to multimedia learning, the effectiveness of multimedia instructional material is affected by the following and the Framework should ascertain inclusion of these.

Split attention effect: Multimedia instructional materials which contain both textual and graphical sources of instruction, should integrate the text into the graphic so that students do not have to split their attention in integrating information received by reading text and graphics separately. 

Spatial Contiguity Principle : Words and pictures should be coordinated in multimedia presentations. This principle states that the narration should be simultaneous with the animation. Also, words and associative pictures should be near each other.

Temporal Contiguity Principle : Students learn better when corresponding words and pictures are presented at the same time, rather than in succession. In other words, the narration and animation should be presented in close coordination, so that when the narration describes a particular process or action, the animation shows it at the same time.

Coherence Principle : Students learn better from multimedia presentations in which extraneous words, sounds, and video are excluded.

Modality Principle : Students learn more deeply from animation and narration than from animation and on-screen text.

6.2 Analysis of selected MLMs

While each activity/sub-activity wise analysis with respect to each of the five Multi-media Learning Materials from the point of view of the Research worker as well as from the Developer's perspective are included in the **Appendix**, the broader observations and inferences with respect to all the five MLMs taken together are given herein.

- Most MLMs studied are Learner-centric, not Teacher (instructor) or Industry-centric
- Generally MLMs are developed to cater to a specific age group or educational background, thereby ignoring skill sets, which is a very important component of e-learning with the aid of MLMs.
- Instructional strategy or/and structural map for content is missing in most cases.
- Socio-economic & cultural aspects are not probed into before preparing the MLM in order to make them relevant & effective.
- The MLMs are not strong on a content flowchart & non-linear navigation tools, so as to enable the user to quickly access the desired topic.
- In-built Help system/On-line assistance is almost negligible.
- Updating facility is missing.
- No attention is given to matters like Virus protection.
- There is a general lack of attention to an appropriate evaluation mechanism.
- Two important factors appear to influence the process of developing an MLM. These factors are: i) Type of Business and ii) Subject matter or the type of content for which the MLM is being prepared. For instance, educational institutes appear to prioritise content over all other factors, while commercial developers (IT firms) pay a lot of attention to presentation & packaging as it impacts their sales. Similarly professional courses, lay emphasis on content & technical aspects while MLM for non-professional courses like language training like to be as user-friendly and appealing as possible.

6.3 Applicability of Quality Indicators

The following Table captures the opinions of experts and MLM developers with respect to the usefulness of the Quality Indicators (QI) stated in the Framework. Each QI is categorised in terms of whether it is Completely Applicable (CA), Partially Applicable (PA) or Not Applicable (NA) based on prevalent practices. Occasionally, additional comments are stated in parentheses if a certain QI was found to have a repetitive component and also to indicate why a certain QI was viewed as 'Not Applicable'.

CA- Completely Applicable	PA-Partially Applicable	NA-Not Applicable
ANALYSIS		
Needs are clearly stated & comprehensive		PA
Needs are appropriately prioritized		CA
Context is clearly & fully mapped		PA
Learner profiles are adequately captured		CA
Primary purpose of MLM is clearly stated		CA
Usage aspects of MLM are clearly specified		PA
Content outline is indicative of the scope of MLM		PA
Raw content has been validated for appropriateness & accuracy		PA
Content is accurately classified for design treatment as per learning domain		CA
DESIGN		
Objectives are clearly defined, achievable, relevant & measureable		PA
Content is pedagogically structured, logically sequenced & consonant with learner profile		CA
Instructional strategy is clearly stated, appropriate, achievable & compliant with 'Analysis' requirements		CA (Repetitive)
Media mix is appropriate, engaging & consonant with objectives		PA (Repetitive)
Learner Evaluation Scheme includes a variety of assessment techniques & is consonant with the learning objectives		PA
The GUI design is intuitive, visually appealing & consistent		CA (Repetitive)
Fonts are legible & visually appealing		CA
Layouts are clearly defined & reflect information hierarchy		CA
Content, visuals & instructional strategy are contextually relevant, gender & racially sensitive		PA (Repetitive)
Technical design is consonant with 'analysis', 'instructional strategy' & 'visual design' requirements		CA
The technical design reflects the latest developments in technology		NA (Interoperability is more important than advance nature)
Technical design is compatible with on-line delivery requirements		PA
Prototype testing shows the effectiveness of 'Instructional Design Strategy', 'Visual Design' & 'Technical Design'		PA
DEVELOPMENT		
Storyboard follows a Structured Map, Objectives & defined Instructional Strategies		CA (Repetitive)
Storyboard uses simple, correct & clear language		CA

Instructions provided in the storyboard to the developers are unambiguous & detailed	PA
MLM is validated by subject experts	CA
MLM is compliant with specified standards	NA (Specified Standards are not specified)
Process documents facilitates easy & quick development of MLM	NA (Developers hardly ever specify process documents)
MLM testing in a stimulated environment satisfies overall performance requirements	PA
IMPLEMENTATION	
Implementation strategy provides clear roadmap for execution	CA
Instructional manuals are self-explanatory, applicable & usable	PA
Timelines for implementation are appropriate & realistic	CA
Appropriate structure & resources are in place for implementation	CA
Facilitators are empowered for implementation	PA (Copyright issues may need to be handled)
Learners are adequately oriented	CA
EVALUATION	
Evaluation strategy is clearly outlined	PA
Evaluation process is rigorous & as per standard procedures	PA (Standard Procedures need to be clarified)
Institutional mechanisms required for evaluation are specified	CA
Evaluation tools are objective, valid & reliable	CA
Provision for feedback & improvement is made	PA

6.4 Usefulness of the Assessment Scale

Based on discussions with experts and developers as well as independent analysis done by the research worker, the assessment scale that is essentially an exercise at arriving at an overarching measure of quality of the MLM appears feasible, functional and in consonance with all the stakeholders' needs. Its utility, therefore, is of paramount importance. Barring a few ambiguities like lack of clarity in specifying the multimedia and programming standards, it is an exhaustive exercise that is strong on application. It comes across as a thoughtfully devised measuring device that captures the finer aspects of the quality parameters and enables gradation on the basis of a nuanced understanding of these parameters. The scale extending from Poor to Excellent with Average, Good & Very Good in between will certainly pave the way for greater accuracy in grading (assessing) the quality of the MLM. There are a few repetitions in the parametric considerations but this appears unavoidable as one process often feeds into another with some commonalities.

6.5 Limitations of the Framework

The proposed framework has some structural limitations, which if not looked into and plugged, can dilute the efficacy of the entire framework. An important limitation is the silence of the Framework on pertinent impacting aspects like budgetary allocation and the time frame for preparing the MLM as well as issues of technological compatibility and interoperability. The framework also appears to have overlooked the critical issue of Security. There are also some minor omissions within certain quality indicators like while discussing content, no mention has been made about uniformity of concept density in the content. External limitations like government policies & legislations are also not considered.

6.6 Pertinent Issues and Guidelines for Policy-making

Though MLMs are being extensively produced, circulated and used, they are mired by serious quantitative and qualitative limitations. Mentioned below is a list of some of the prominent problems that are commonly experienced by MLM developers in general as assessed through interviews and discussions with them. Many of these have a direct bearing on future policy-making at the governmental levels. Legislators and policy-makers must, sooner or later, address these pertinent issues.

- The biggest problem cited by MLM developers is the rampant copyright infringements that plague the industry. Added to it, is the issue of piracy.
- Lack of a censoring body to check the factual correctness of the content and the manner of presentation in case of sensitive issues/topics. E.g. MLM on mythology or religious texts, is another lacuna.
- Another grey area is the non-existence of a grievance redressal mechanism to check malpractices within the industry and protect the rights of the customers (end user).
- There are no concrete rules of the business, with regard to regular updation & withdrawal of old (obsolete) material from the market.
- There are structural problems like the spread (penetration) and availability of technological support (access to computer & internet).

- The biggest and most critical problem encountered is that of SECURITY. All the effort that goes into making an MLM is wasted when the critical issue of security is overlooked. This is one area that needs to be fool proof. Quality can be ensured only in a tamper-proof environment. If the MLM is vulnerable to mischief by hackers or other vested interests, it will be unfair to expect quality & accountability from the developer.

In view of the above, there is an urgent need for standard setting & benchmarking in the MLM industry on the lines of ISI for electronic products, ISO for Organizations. Likewise, there is also a need to specify the accountability of the developer for all aspects of the MLM (conception to commissioning). Transparency & accountability issues will circumvent many malpractices that take place today. In cases where the MLM is sponsored by a third party, then the role or the motive of the sponsor, should be taken into account.

7. Conclusions

The Field-testing of the Quality Assurance Framework for Multi-media Material Development involved an intensive exercise that elicited the participation of experts as well as MLM developers. Although five already developed MLMs were considered for detailed study, the focus of the exercise was not to evaluate these for their Quality and effectiveness, but rather to use them as a medium for ascertaining the usefulness and comprehensiveness of the Framework developed. The end users of the MLMs viz. potential learners were not directly considered in this study though their expectations and feedback were voiced by the developers and experts.

The study has revealed the following:

1. By and large, the ADDIE model used in the Framework and the Activities, Processes and Outcomes specified in it is useful and comprehensively developed. A few aspects on which the Framework appears silent as stated earlier, like for example, Govt. policies, security issues, financial considerations, etc. even though probably implied, need to be spelt out more explicitly for refining the Framework.
2. The Quality Indicators and the Assessment Scale developed for each of these are mostly adequate and appropriate and permit finer discriminations with respect to Quality. A few of them probably involve some repetitive aspects

possibly because one process leads to another, but no redundant elements have been noticed.

3. The Framework, it has been pointed out, needs to explicitly define what constitutes 'Multi-media Learning Material'. Adding this feature will help to build a common understanding of the term among all stakeholders.
4. While admittedly there are a few limitations in the Framework – mostly in the form of areas not explicitly considered, these are certainly of the kind that can be addressed easily so as to provide a more refined version for the future.
5. An important by-product of this Field testing report has been the identification of areas of concern experienced and voiced by the MLM developers. This should provide a useful guide for policy-making in this field.

8. Acknowledgements

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APPENDIX: Analysis of five MLMs

Case Study 1

Name of the MLM: MS Office

Area of Study: Computer Science

Name of the Developer: Prof..Ramchandra S. Tiwari

Name of the Organisation: Yashwantrao Chavan Maharashtra Open University, Nashik.

Target Group: Students taking up diploma and degree courses in Computer Science

Brief Background: The MLM was prepared with the intention of simplifying the content of the courses meant for Diploma & Degree level studies in Computer Science

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
1.	Analysis		
1.1	Need	<ul style="list-style-type: none"> • Learner's needs are focused • Simplification of the complex subject 	Developed MLM as complementary material for learners to ease the complexity of subject, based on inputs from experts belonging to the School Council of the university.
1.2	Context	Context is established to serve the needs of individual/groups of all ages	Established from a study of the available literature and material on internet, on CD ROM. Consideration given to multiple intelligence theory.
1.3	Learner	Rather than specifying the skills, minimum educational qualification is the prerequisite.	Educational background of target group considered.
1.4	Task	Primary purpose is clearly identified as education with integrated usage aspects.	Education, integrated usage aspects.
1.5	Content	Accuracy and completeness is validated with the help of existing study material and experts' review.	Accuracy and Completeness given importance

Criterionwise Analysis:

As most of the MLMs are developed for educational purpose they tend to be learner centric and neglect teacher's or industrial needs. Simplification of the complex subject is not addressed in the ADDIE model. Learner's educational background, and not skills, forms the basis of developing a MLM.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
2. Design			
2.1	Instructional Design Strategy	Instructional design strategy is simple based on principles, concepts and processes.	Computer generated Self-marked assessment, pre-test and post-test assessment
2.2	Visual Design	Visual design is simple and user friendly. Fonts and layouts are defined and reflected in hierarchical manner.	Based on type of information to be represented (fact, process, principles, concepts, algorithms)
2.3	Technical Design	Technical designs used are in consonance with instructional and visual strategy. Designs are standardized & made compatible to the technological availability of learners.	The following points were considered: <ul style="list-style-type: none"> • Computing power of machines • Resolution of computer displays • User Friendly Graphical User Interface
2.4	Prototype Testing	Target audience is widely taken into consideration for prototype testing.	Suggestions from experts, teachers and students are collected. Modifications are made with the following priorities: <ul style="list-style-type: none"> • Text • Graphics • Animation • Sound • Video • Simulation • Color and Layout

Criterionwise Analysis

Most of the time design strategy is outsourced and availability and identification of multimedia developer is the main step in developing designs. The needs are to be explained to the outsourced agency. Other important constraints that are not considered in the proposed framework is budgetary allocation & technological compatibility.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
3. Development			
3.1	Story Boards	Storyboard is simple but not very effectively used. It shows only main contents without giving the structural map (flowchart of contents).	The content is analyzed and categorized in terms of concepts, entities, procedures, algorithms, laws, principles. Visuals are decided accordingly.
3.2	Multimedia Elements and Programming	Integrated media package that has followed standards and validated by subject experts, is used.	<ul style="list-style-type: none"> • Best book on the subject is selected • Experts are asked to

			<p>refer to the book and prepare a Draft structure.</p> <ul style="list-style-type: none"> • A meeting of experts is called, brain storming sessions are organised and the content structure finalized with respect to: <ul style="list-style-type: none"> a. Audio b. Text c. Graphics
3.3	Process Documentation	Process documentation is specified and very well prioritized.	<p>The following priorities were used in the Process</p> <ul style="list-style-type: none"> • Text • Graphics • Animation • Sound • Video • Simulation • Color and Layout
3.4	Testing	Product has incorporated suggestions from the concerned experts.	<p>Suggestions from experts, teachers and students are collected and modifications are made with the following priorities.</p> <ul style="list-style-type: none"> • Text • Graphics • Animation • Sound • Video • Simulation • Color and Layout

Criterionwise Analysis

The development of the MLM is based on content, mainly its concepts, process, principles. Besides, the MLM focuses on other aspects such as identification of authors for the script, finalisation of Syllabus, date of launch.etc, which are crucial in the process of developing an MLM.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
4. Implementation			
4.1	Strategy	Implementation strategy is conceived but not documented.	<p>The following stages are followed:</p> <ul style="list-style-type: none"> • Packaging • Deployment • User orientation • Implementation • Feedback
4.2	Structure and Mechanism	Implementation structure is worked out, but not formally stated	Walkthrough and Review of multimedia content is carried out with the help of experts

			during the following development stages <ul style="list-style-type: none"> • Script writing • Recording of Voice over • Preparation of graphics and animation • Video shooting • Media integration • Packaging
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Criterionwise Analysis

Though there is a defined implementation strategy, there are no formal structures or mechanisms developed for that.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
5.	Evaluation		
5.1	Evaluation Framework	Evaluation process is clearly outlined and standardized method is used.	Semi Final copies of multimedia content are given to subject experts in colleges and industries, staff at study centres, and learners for getting their feedback.
5.2	Evaluation Mechanism	Though institutional mechanism is not mentioned, proper feedback from various agencies has been endorsed.	The above approach becomes part of the Evaluation mechanism
5.3	Improvement Mechanism	Improvement mechanism is clearly outlined and scope to incorporate important feedback is provided.	Priority of modifications suggested in the feedback is decided. Modifications in multimedia content are done for major and important feedback. Very minor modifications suggested are postponed for incorporation into the next version.

Criterionwise Analysis

The MLM has a pre-planned and clearly outlined evaluation strategy with prioritization of modifications after obtaining feedback from the stakeholders.

Special features

Besides the parameters developed in the framework for Quality Assurance of MLM, the following points were observed about the MLM:

- To ensure uniform concept density in the content a simple rule of introducing one concept/idea per paragraph, is put into practice.
- The MLM has maintained the basic principle of keeping sentences short, with reading speed of about 100 words per minute. The difficult paragraphs containing graphics and animation maintain a reading speed of about 40 words per minute.
- Abstract concepts are simplified by using analogies or metaphors, specific concrete examples of everyday life are used to display visualizations in terms of graphics and animations.
- Simulations in the form of “mouse, keyboard and screen capture” are used to show how various menus and activities are performed while solving software related problems.

CASE STUDY 2

Name of the MLM: Engineering Drawing Comes Alive! Vol I

Area of Study: Engineering

Name of the Developer: Ms. Meghna Tiwari

Name of the Organisation: Cognifront, Nashik

Target Group: Instructors & Students

Background: Cognifront is a start-up IT firm dealing exclusively in the development of MLM. The product under scrutiny was a result of 2 years of research to arrive at a Common Minimum Syllabus(CMS) on the subject.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
1.	Analysis		
1.1	Need	<ul style="list-style-type: none"> • Failure rates of Engineering graphics and non-availability of good teaching tools in the market are the focal points for developing the MLM. Teachers are identified as the prominent target group. 	Figured out failure rates of Engineering Graphics and lack of good tools for teaching the subject. Hence the organization made a foray with this product, which is their first product.

1.2	Context	Most of the MLM is developed for the teachers so as to facilitate the formal learning environment.	Two primary groups – students and teachers are addressed with different needs and entirely separate set of materials are developed for the two target groups.
1.3	Learner	Educational background and level of English proficiency are considered as the only parameters to assess the academic level of learners.	Educational background, English language proficiency of target group considered.
1.4	Task	Primary purpose is clearly stated as education, awareness and skill development with specific usage aspects.	Purpose: Education, awareness and skill development Usage Aspect: Standalone, supplementary and integrated.
1.5	Content	Accuracy, completeness and inclusiveness are validated with the help of existing study material and expert review.	Accuracy, completeness and inclusiveness are given importance.

Criterionwise Analysis:

The MLM is developed for educational purpose. It is teacher centric. The focus is on the non-availability of quality teaching tools in the market. Difficulty level of subject, (failure rate of students, availability of subject matter expert) and timeframe at hand are the parameters to assess the needs and establish the context of the MLM.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
2.	Design		
2.1	Instructional Design Strategy	Instructional design is based on concepts and processes. Marketability, rather than pedagogical issues, is considered as an important parameter while developing the design. In media mixing, interactivity is considered as an important strategy statement.	After analyzing the syllabus from various universities and organizing meetings with different experts from colleges, the scope of the content is defined. Accordingly, structure and sequence of the content is prepared. Audio, Video, graphics, animations and interactivity are considered.
2.2	Visual Design	Visual design is complex. Fonts and layouts defined and reflected in hierarchical manner.	<ul style="list-style-type: none"> • Relevance of the visuals with respect to concept • Timeline available for delivery considered. Type of learner given importance.

2.3	Technical Design	More emphasis on inter-operability and direct playback. Hence, designed using FLASH but there is less control of the user on the design.	<ul style="list-style-type: none"> • Interoperability • Zero-installation – direct playback • Display resolution Packaging in single CD (media).
2.4	Prototype Testing	Process of testing is not specified. Time consuming, minor suggestions are not incorporated in the final version.	Conduct prototype testing. However, a small percentage of less important recommendations may not make it to the final product if they are time consuming.

Criterionwise Analysis

Prediction of ratio in design strategy is not believed to be feasible at the time of design due to variability in nature of subject. The MLM has about 34% animations, about 26% still pictures, about 13% interactivity and 5% videos of experts and remaining content in the form of presentations (PPTs) and interactive classroom problems, mentioned as “visualization boosters”. The MLM does not have any learner specific evaluation strategy.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
3. Development			
3.1	Story Boards	Storyboard is simple but not very effectively used. It shows only main contents without giving the structural map.	Storyboard must necessarily include technical symbols Dimensioning, Labeling, Synchronization of Text/Graphics with Audio, etc.
3.2	Multimedia Elements and Programming	Simplified, integrated media packaging	
3.3	Process Documentation	Process documentation not specified.	
3.4	Testing	Product has incorporated suggestions from the experts concerned only if they are major.	Suggestions from experts and teachers taken into account.

Criterionwise Analysis

The MLM has used multimedia with interoperability. The process documentation and product testing strategy is not elaborated.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
4. Implementation			
4.1	Strategy		

4.2	Structure and Mechanism	There is a well defined implementation strategy with formal structures and mechanisms.	<ul style="list-style-type: none"> • Master copy preparation. • Multi-copying from leading vendors. • Packaging. • Training sales team. • Orientation/Training of teachers. • Delivery.
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Criterionwise Analysis

Well planned and professional implementation strategy has been developed.

Sr No	Quality Parameter	Observation Analysis	Developers Approach
5. Evaluation			
5.1	Evaluation Framework	Considering the technical tools used for the MLM there is very little scope for incorporating the feedback.	There is a feedback form that is shipped with all copies of the product. Feedback that the business development team receives from experts from various colleges they visit is also incorporated.
5.2	Evaluation Mechanism		
5.3	Improvement Mechanism		

Criterionwise Analysis

Business oriented feedback mechanism is there but clear strategy to incorporate feedback is not mentioned.

CASE STUDY 3

Name of the MLM: Arogya Mitra

Area of Study: Health Science

Name of the Developer: Ms. Manjiri Joshi

Name of the Organisation: Yashwantrao Chavan Maharashtra Open University, Nashik.

Target Group: Medical attendants in rural areas

Brief Background: The MLM is a Power Point representation of the text that forms the syllabus. It is simple & user-friendly, meant as a prelude to the practicals that follow.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
1.	Analysis		

1.1	Need	<p>Primary purpose is clearly stated as education, training and awareness with supplementary usage aspect.</p> <p>Government policies have important impact on MLM development.</p> <p>Easy and interactive learning to overcome the limitations of printed books.</p>	<ul style="list-style-type: none"> • Easy and effective learning • Availability of appropriate content • Readiness & ease of line drawing
1.2	Context		<ul style="list-style-type: none"> • Group oriented
1.3	Learner		<ul style="list-style-type: none"> • Education • Age • Field Experience • Local language • Socio-Cultural Differences
1.4	Task		<ul style="list-style-type: none"> • Education • Training • Awareness
1.5	Content		<ul style="list-style-type: none"> • Accuracy • Completeness • Relevance to existing Government Policies

Criterionwise Analysis

The MLM is developed for educational purpose with a focus on public health. Spreading awareness about health related schemes among common people is the prime motto of the MLM. Hence, government programmes and policies are considered as important quality parameters for establishing the context of the content.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
2. Design			
2.1	Instructional Design Strategy	Instructional design strategy is simple based on principles, concepts and processes.	<ul style="list-style-type: none"> • Pedagogically and logically structured and according to learner's profile. Besides, distance learning methodology – instructional systems design – is adopted in the content structure. • MLM is a combination of text and graphics as it is mainly in the form of power point presentations. • Evaluation strategy consists of practice in actual field/workstation, tutor-marked assessment, games and quizzes and pre-test and post-test assessment is incorporated.
2.2	Visual Design	Visual design is simple and user friendly. Fonts and	<ul style="list-style-type: none"> • Appropriateness • Cultural background of the

		layouts defined and reflected in hierarchical manner.	target group <ul style="list-style-type: none"> Visualizing one idea at a time
2.3	Technical Design	Technical designs used are in consonance with instructional and visual strategy. Designs are standardized, yet compatible to the technological availability of learners.	Availability of infrastructure and technical knowledge of the tutor and end user are considered as the basic criteria for decisions on technical design.
2.4	Prototype Testing	As prototype testing is not conducted, feedback from stakeholders is not possible.	Prototype testing is not conducted.

Criterionwise Analysis

Most part of the content is in the form of presentations (PPTs) with equal importance to graphics and text. The MLM does not have any learner evaluation scheme.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
3. Development			
3.1	Story Boards	Storyboard is simple, giving the structural map.	Simplification of text, more use of pictures are important elements of storyboard.
3.2	Multimedia Elements and Programming	Simplified media packaging but limited to text and graphics, without use of audio mix.	Text and graphics
3.3	Process Documentation	Process documentation not specified.	Not mentioned
3.4	Testing	Product has not incorporated suggestions from the experts concerned before introducing the product.	Product testing is not undertaken.

Criterionwise Analysis

The MLM has used multimedia with interoperability. It is only in a book format. In a way, it is useful and simple but does not serve the purpose of MLM. The process documentation and product testing strategy is not elaborated.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
4. Implementation			
4.1	Strategy	There is no well defined strategy for implementation of the MLM.	<ul style="list-style-type: none"> Training Master trainers Need based training
4.2	Structure and Mechanism		

Criterionwise Analysis: Strategy and mechanism is too teacher or instructor centric.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
5. Evaluation			
5.1	Evaluation Framework	As technical tools used in the MLM are very simple, trainers and teachers review is easy to incorporate.	<ul style="list-style-type: none"> • Trainer's review • Student's review Incorporation through verification and addition.
5.2	Evaluation Mechanism		
5.3	Improvement Mechanism		

Criterionwise Analysis

No business module or professional strategy but easy and conventional evaluation mechanism.

CASE STUDY 4

Name of the MLM: Learn Grammar

Area of Study: Language

Name of the Developer: Not available

Name of the Organisation: Vision Interactive Systems, Bangalore

Target Group: Anyone interested in learning English Language

Brief Background: The MLM is of a generic nature that can be used by anyone interested in learning the English language. It uses animation to make it interesting & interactive.

Sr No	Quality Parameter	Observations of Researcher
1.	Analysis	
1.1	Need	Primary purpose is clearly stated as education and skill development, especially teaching grammar through animated conversation. Though learner's profile is not specified the content is focused on students' needs. Anyone who wishes to learn grammar can use it. Series and self-learning. Informal in nature. Content outline clearly indicates the scope of the MLM.
1.2	Context	
1.3	Learner	
1.4	Task	
1.5	Content	

Criterionwise Analysis

The MLM is developed for educational purpose and the focus is the general public. It does not capture the learner's profile adequately because of the nature of the content.

Sr No	Quality Parameter	Observations of Researcher
2.	Design	
2.1	Instructional Design Strategy	Instructional design strategy is simple based on principles and concepts, pedagogically structured and logically sequenced. Media mix is well animated and properly used.
2.2	Visual Design	Visual design is simple and user friendly. Fonts and layouts defined and reflected in hierarchical manner.
2.3	Technical Design	Technical designs used are in consonance with instructional and visual strategy. Designs are standardized and supported by latest technological advancement.
2.4	Prototype Testing	Information Not Available

Criterionwise Analysis

Layouts, fonts and visuals are in consonance with the target group and content. Very effective navigation strategy is used to make it user friendly.

Sr No	Quality Parameter	Observations of Researcher
3.	Development	
3.1	Story Boards	Storyboard follows a structured map and clearly defines instructional strategy.
3.2	Multimedia Elements and Programming	Compliant with specified standards and cohesive multimedia packaging.
3.3	Process Documentation	Process documentation not available.
3.4	Testing	Information about product testing not available

Criterionwise Analysis

The MLM has used multimedia with interoperability with effective multimedia mix.

Sr No	Quality Parameter	Observations of Researcher
4.	Implementation	
4.1	Strategy	Implementation strategy provides clear roadmap and manuals are self-explanatory and easy to use.
4.2	Structure and Mechanism	

Criterionwise Analysis

As the developer's response could not be sought for the MLM, the implementation strategy, its structures and mechanisms could not be assessed.

Sr No	Quality Parameter	Observations of Researcher
5.	Evaluation	
5.1	Evaluation Framework	Feedback mechanism is not mentioned or available. Considering the technical tools used

5.2	Evaluation Mechanism	in the making of the MLM, there is very little scope for incorporating the feedback.
5.3	Improvement Mechanism	

Criterionwise Analysis: No feedback mechanism.

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CASE STUDY 5

Name of the MLM: Rose Plantation in a Polyhouse

Area of Study: Agricultural Science

Name of the Developer: Dr. Madhuri Sonawane

Name of the Organisation: Yashwantrao Chavan Maharashtra Open University, Nashik.

Target Group: Farmers

Brief Background: Having farmers as the end users, the MLM is kept as simple & to-the-point as possible. It consists of 95% of video clippings & 5% of text for ease of understanding the subject, which is of a practical nature.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
1.	Analysis		
1.1	Need	Primary purpose is clearly stated as education, enrichment and awareness with supplementary usage aspect. Acquaintance & orientation are considered as other important tasks as they are initial steps in adoption of particular technology.	<ul style="list-style-type: none"> Need of teacher counselor (subject expert) if he is not able to teach a particular aspect only with text & feels that certain MLM would help students to understand particular aspects better. Sometimes the target group might put forth the demand.
1.2	Context		<ul style="list-style-type: none"> Self-explanatory. Suitable for self-learning
1.3	Learner		<ul style="list-style-type: none"> Educational Level
1.4	Task		<ul style="list-style-type: none"> Education Enrichment Awareness
1.5	Content		<ul style="list-style-type: none"> Content outline is designed as per the needs of the target group, i.e, farmers.

Criterionwise Analysis:

The MLM is developed for an educational purpose with focus on a particular profession, viz. farming. Spreading healthy practices in agriculture, with specific reference to rose plantation, with the help of actual demonstrations of farming, is the basic objective of the MLM. Accuracy, completeness and inclusiveness are the important parameters followed to validate the raw content.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
2. Design			
2.1	Instructional Design Strategy	Instructional design strategy is simple, based on concepts, facts and processes. Emphasis is on the practical demonstration of the processes.	<ul style="list-style-type: none">• Orient the learner• Seeing is believing• Logical Sequence
2.2	Visual Design	Audio and video is appropriately mixed to make the visuals effective.	Exact technique is depicted in visual. If visuals are related to insects/pests, then size of visuals is suitably adjusted (close-up).
2.3	Technical Design	Technical designs used are in consonance with instructional and visual strategy.	Availability of infrastructure and technical knowledge of the end user are considered as the basic criteria for decisions on technical design. <ul style="list-style-type: none">• Configuration• File size• Learner's context
2.4	Prototype Testing	Prototype testing is conducted and feedback is incorporated in the final version.	Prototype testing is conducted.

Criterionwise Analysis: Pedagogy is in consonance with the needs of the learners. Orientation of the learner and the principle of 'seeing is believing' are used as important parameters. Visuals and their appropriate shots are used to make the MLM more effective. Pre-test and post-test assessment is effectively used as per the level of the target group.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
3. Development			
3.1	Story Boards	As emphasis is on practical demonstrations, story board does not provide a structural map.	Story board is used.
3.2	Multimedia Elements and Programming	Effective media packaging with effective use of audio and visuals.	Audio and Video

3.3	Process Documentation	Process documentation not specified.	Not mentioned
3.4	Testing	Product has incorporated suggestions from the experts concerned before introducing the product.	Product testing is undertaken.

Criterionwise Analysis

The MLM has used multimedia with interoperability. It is only in an audio-visual format with very little use of text.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
4.	Implementation		
4.1	Strategy	There is no well defined strategy for implementation of the MLM.	<ul style="list-style-type: none"> • Training
4.2	Structure and Mechanism		

Criterionwise Analysis

Strategy and mechanism is too teacher or instructor centric. There is no business module developed.

Sr No	Quality Parameter	Observations of Researcher	Developer's Approach
5.	Evaluation		
5.1	Evaluation Framework	Very effective evaluation strategy is developed and mechanism is implemented accordingly.	<ul style="list-style-type: none"> • Face-to-face observations • Filling up of questionnaire • Question-answer session at the end of the viewing of MLM.
5.2	Evaluation Mechanism		
5.3	Improvement Mechanism		

Criterionwise Analysis

Professional strategy for effective evaluation is developed and improvement mechanism is effectively elaborated.