Writing for Multi Media : A Practical Guide

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I. Introduction

For many of us, the lure of computers is as powerful as the fear of failure. The lure comes from our exposure to this very exciting and colourful medium. Fear of failure comes from our not being computer literate. In the last ten years, the scenario both in education and information and communication technologies (ICTs) has been transformed beyond recognition. Teachers, earlier considered to be the source of knowledge, have seen their position eroded and in order to survive in a fast changing world, have become learners. The present paper is a guide designed for teachers as learners. The paper attempts to introduce concepts in the design and preparation of multi media packages. The author made an effort to design the paper for beginners who can then begin to explore the world of multi media on their own without any fear. It is designed, keeping in mind, that all of us have been using computers for some time for word processing; and have not been exploiting the full capacity of built in hardware and software. We are going to restrict ourselves to the process of writting for multimedia for the simple reason that most of us, as academics, are engaged in this aspect of the design of multimedia. It is also an area largely untouched by the many books and other materials dealing with multimedia courseware design available in the market.

"Multimedia" is a term frequently heard and discussed among educational technologists today. And unless clearly defined, the use of the term can alternately mean "a judicious mix of various mass media such as print, audio and video" or it can mean the development of computer based hardware and software packages which enable mass production yet individualized use and learning". In essence, multimedia is an integration of multiple levels of learning into an educational tool that allows for diversity in curricula presentation.

Today's multimedia is a woven combination of text, graphic art, sound, animation and video elements. When you allow an end user, i.e. the viewer of a multimedia project, to control what and when and how the elements are delivered and presented, it is interactive multimedia. When you provide a structure of linked elements through which the user can navigate,interactive multimedia has an added dimension of hypermedia in it.

In the 1980s and 1990s changed all this, as the capabilities of satellites, computers, audio and video converged to create new media with enormous potential. Combined

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with hardware and software advances, these technologies were able to potentially provide enhanced learning and with attention to the specific needs of individual users. Specific uses include :

a) *drill and practice to master basic skills,*

b) *the development of writing skills,*

c) *problem solving,*

d) *understanding abstract mathematics and science concepts,*

e) *simulation in science and mathematics,*

f) *manipulation of data,*

g) *acquisition of computer skills for general purposes, and for business and vocational training,*

h) *access and communication to understand populations and students,*

i) *access for teachers and students in remote locations,*

j) *individualized and cooperative learning; and*

k) *management and administration of classroom activities.*

A primary application of the interactive videodisc for instruction is in an instructional situation where the learner is given control so that he/she may review the material at his or her own pace and in keeping with his/her own individual interests, needs and cognitive processes. The basic objective of interactive video material is not so much to replace the teacher as to change the teacher's role entirely. As such, it must be extremely well designed and sophisticated so that it mimics the best teacher, combining in the design various elements of the cognitive processes and the best quality of the technology. With today's multimedia courseware, once a programme has been designed, and built in with the appropriate responses, it is also flexible, permitting change and alteration.

II. At the Beginning of the Process

One cannot begin the process of writing for multi media without formative research. Formative research is the collection and analysis of all the information that is needed in order to understand the target audience, i.e, the learners for whom the multimedia is targetted. Also called needs assessment, formative research enables us to understand various characteristics of our learners even before we determine the aims and objectives of a given multi media courseware.

The factors we need to have information about and need to understand are :

- *Demographic characteristics, such as number of learners, their ages, sex, family,*

economic, linguistic backgrounds, previous education, employment status, and access to the media which we will be using.

- *Motivational factors, such as why they are learning, what do they want from a given programmes, what are their hopes and fears, how will the courseware relate to their life and work.*

- *Learning factors, such as their beliefs about learning, their learning styles, learning skills, experience with this form of learning.*

- *Subject background, such as what do they already know about the subject, what are their knowledge and skill levels, personal interests and habits, misconceptions and inappropriate habits.*

- *Resource factors such as when, where and how will they be learning; who will be paying their fees, how much time do they have for study; what access do they have to facilities and equipment, what support will they have from other learners.*

- *How can we make the multimedia interactive—what kind of graphics, audio and video are available; what kind of activities should be included; what kind of questions and answers are students likely to have; what kind of problems can we include.*

Formative research also includes the search for useful materials in relation to the chosen topic. These may be books or other materials, whether text, photos, film clips, sound bytes, that may be available. A word of caution, materials so chosen should either be free of copyright. In case of copyrighted materials, one has to obtain permission prior to use so as to avoid any violation of existing laws.

In an ideal situation, it is only when all of this information is available that one can make a beginning. However, most academics are quite familiar with their learners and much of the information can be obtained by discussion; for other information such as access to facilities, a short and quick survey can be undertaken.

We must also look at the criteria for determining effective instruction apply irrespective of the way in which we are delivering content. These would include questions such as :

- *Are you and your learners clear about where this multi media lesson fits into the overall course?*

- *Are you and your learners clear about what they are expected to have learned about what they are expected to be able to do once they have completed this multi media lesson?*

- *Have you identified the conditions under which learners will be expected to perform their task?*

- *Have you identified the level at which they will be expected to perform the task.*

This means that decisions about target learners, content and learning style are not necessarily multi media programming decisions. These are decisions that one must take at the very beginning even before proceeding to choose a topic/theme on which the multi media courseware is to be designed.

III. How to Choose the Content Area

There are no hard and fast rules or guidelines which can help in the selection of the content to be chosen for the design of a multimedia lesson. However, we can look at the content in relation to the capabilities and limitations of using multimedia before proceeding to choose specific content.

We cannot take an entire course (one which would take 28 weeks of classroom lectures) and convert it into one single lesson. This would create information overload. On the other hand, if we simply take the text and transfer it on to multi media, we would not be using the interactive capabilities of the medium. So the obvious question is : How much then? Given that we will integrate text, still and motion graphics, audio and video, about one or two unit out of the syllabus of an entire course.

Another aspect that we could consider in choosing a specific content area would be the medium characteristics. For instance, a subject area which benefits from showing a process, as opposed to a still chart, or where we could enhance the content by showing a video clip; or where sound could be added, may be an area which could be chosen for multimedia treatment.

Other factors which could guide us in the choice of the content would be the learning capabilities of the users, access of users to the required hardware and software to benefit from the multimedia courseware. For instance, what is the point of putting in extensive video, if the computer at the user's end does not have the capability of displaying video. Other factors also determine content. These are availability of materials, costs, funding availability, time, copyright and other legal issues, and in house competencies.

IV. Purpose of the Lesson

In writing the purpose of the lesson, one can address the overall aim or specific objectives. An overall aim is a broad statement of what the learner might learn from a piece of instruction. Each piece of instruction needs to have aims and objectives. The example below enable us to know the aims and objectives come from a course on "Diet and Nutrition". Aim of this course :

- *Students will learn about healthy eating habits or*

- *The couse will introduce learners to healthy eating habits.*

The objectives of the course :

Upon completing this course, learners should be able to :

a) *List the principal components of a balanced diet;*

b) *Describe the function of each component in the body;*

c) *Calculate the composition of a given diet given food composition tables; and*

d) *Suggest ways to improve their diet.*

V. The Writing Process

Courseware writers are, generally, unlikely to be familiar with the detailed technicalities of multimedia programming. This, itself, is a blessing. Writers may have a rudimentary or vague idea about what "writing courseware" means. At the beginning of the writing process, it should be made clear that scriptwriting is NOT programming or even "authoring" in a software engineering sense. There is no technical effort involved, other than word processing. The only point to remember is that we have to write to a structure and with some guidelines in mind so that it becomes earlier.

There are three important planning documents : (i) the flowcharts, (ii) storyboards, (iii) scripts.

A *flowchart* is a visual blueprint of how the interactive programme works. The flowcharts are used by the interactive designer and the programmer to determine how and when each media element will appear to the person using the application.

Storyboards are rough visual drawings of how the screen will appear and are used by all the team members.

Scripts are the details of the printed text, the narration and the background sound on the visual that will appear on screen. Each of these documents is an important tool to establish that all team members are working toward the same goals and to identify any difficulties in programming, graphic design, audio and video before they become embedded in the programme.

In our first effort, let us write an academic script, the way we might write our lesson if we were to read it out on radio. However, let us try to give some structure to it so that first drafts become easier.

V.I Structuring the First Draft

In our first effort, let us write an academic script, the way we might write our lesson if we were to read it out on radio. However, let us try to give some structure to it so that later drafts become easier. Examine the lesson outline given here :

<center>**A Sample**</center>

Lesson Outline

- A. Introduction
  1. *Statement of objective.*
  2. *Review previous learning.*
  3. *Provide motivation, making this brief, to the point, stimulating.*
- B. Main Body of Lesson
  1. *Provide information.*
  2. *Use small steps.*
  3. *Break frequently for questions, comments, answers.*
  4. *Use teaching aids (audio, video, graphics, etc.) to :*
     - ---*illustrate*
     - ---*simplify*
     - ---*provide variation*
     - ---*provide opportunities for practice and feedback :*
     - ---*to summarize*
     - ---*to provide opportunities for future reference*
  5. *Make contingency plans for :*
     - ---*what to do with extra time and space.*
     - ---*which terms need to be elaborated.*
- C. Provide for :
  1. *subject headings.*
  2. *indexes.*
  3. *key words.*
- D. Determine what are important concepts which need hyperlinks and with what.
- E. Detemine what important keywords need hyperlinks.
- F. Think and suggest what kind of menu options you would like, e.g. search, browse, tour, keyword, etc.

V.2 Writing the First Draft

Audio and video programmes are organized into storyboards. The storyboard is really the programme broken up into its visual, sound effects and narration. Each

visual in the programme is composed of shots and scenes. A shot is what is visible at a moment on the screen. A set of shots comprises a scene. And there are linkages given from one shot to another, from one scene to another. The totality of all is packaged into what we call the programme—and is essentially a linear process going from the beginning to the end in a sequence at a pace determined by the producer.

In multimedia, we add a dimension to this process by enabling the learner to move between various text, audio and video elements in a non linear, non sequential manner, at random perhaps but more likely in the way and at the pace the learner wishes to proceed. The learner may go forward or backward or move laterally between audio, video and text. This essentially is the interactivity that drives multimedia to its success as an educational tool. Writing the text for multimedia is somewhat similar to writing for video or audio. At a rudimentary level, we must write our text in order to organize our information into a format that will be easier to use than, say, printed material. The ability to organize material into a usable is not a specialized art, it is a skill we can acquire through practice. In general :

- *Keep your sentences simple, crisp, direct and to the point.*
- *Use conversational language.*
- *Use the active voice in writing your sentences.*
- *Do not cram in too many facts, figures, names and ideas into a few sentences.*
- *Ideally, use one idea per paragraph.*
- *When shifting from one area to another, use some kind of a transition. This may be a summary, a question to test what students have learned or some other link.*
- *Work within limits of space and time, especially in relation to each idea or concept.*

V.3 Analyzing the Content

It is necessary now to study the content of what has been written both in terms of instructional design, keeping the learner as the central focus of our efforts and to examine the content in terms of finer details, such as concepts which need further clarification; concepts that need to be interlinked; concepts that are going to need extensive audio visual and graphic support etc. To do this, mark the draft highlighting the areas, topics and even words that will have to be linked to each other. These will constitute the hyperlinks which we willl give. For each highlighted area, topic or key word, we will have to write explanations, elaboration, etc. in script form.

Identify what multi media elements do we use to use and where in the script. At what point do we want to supplement our text with a visual or with a soundbyte? What areas need links—graphics (stills and motion), audio, visual etc.

Another way of working with the content is through the classification of information by categorizing, grouping and differentiating information.

Once you have identified the focal point of your courseware relate it to the user and start putting down all your contents. While you pen down the content start categorization of the information as per logical sequence.

For example if the course is going to teach Newton's third law of motion "every action has an equal and opposite reaction" we could first group the information as :

   ---The Law

   ---Sir Isaac Newton

   ---Gravity and Science Education

   ---Gravity

The information could be further categorized :

Σ The Actual Law

Σ The other Laws

Σ Application of the Law

Σ Products and Process already in use

Σ Physics and Gravity

Σ Math and Gravity

Σ Nature and Gravity

Σ Solar System and Gravity

Σ Sir Isaac Newton - History

Σ Observations of Sir Isaac Newton

Σ Scientists who have already worked on this

Σ Scientists who are presently working on Gravity

Σ Papers and Journals on Gravity

Σ Research Institutes on Gravity.

The grouping and categorization would help in designing the navigational pattern and interactive style. This part of the exercise has to be done by the subject expert and cannot be done either by the instructional designer, producer of the audio/video, or computer programmer.

VI. Developing the Alpha Version

VI.1 The Story Board, Flow Charts, Sequential Arrangement of Content, Text, Sound, Video

Once you have written the draft, it is time to think visually. Although the art of thinking visually is individualistic and highly creative, a few suggestions may set us on the way. Take a look at the computer screen. You will see that there are several elements to it. For instance, there is a visual element, which may consist of both text and pictures. There is also text given in a box. There probably is a sound byte attached to this picture (hidden). There are options and routes which the learner can follow. And there are the computer's control commands. At this stage, we do not need all the elements of the screen to prepare the next stage of the draft. We therefore, could prepare the content as one would a story board for a television script. The story board breaks up the script into its various elements. There is space for the visual, for the narration, as well as for the sound effects.

In preparing our storyboard, we are really informing our producer and our programmer, what ideas are linked together in a sequence. A sample storyboard is shown below :

Video	Text	Sound Track
Draw what you would like to show here on the screen (the visual)	Write what you would like to say as the text; (the written text)	Write what you would like to say as the audio track/or sound effects.
Show rough visual	Write the text here	Write the narration and sound effects you want here

Remember to prepare a story board for every key concept and term you have highlighted.

The detailed storyboard, showing the structuring, sequencing and linking of the content becomes the master plan from which the instructional designer, the producer and the programmer work. It is, therefore, essential that the detailed storyboard be as clear and comprehensive as possible.

A simple way that I have used to prepare the storyboard is to use cards, i.e. 3"×5" or 5"×7", the sort used by researchers and librarians to record and keep reference data. Use four cards for each frame. Give a common label for each card and a clarrification if it is text, audio, video, or navigation. For instance, for a programme on nutrition, you could label each card as

F=Frame

Title=Nutrition

T=Text

A=Audio

V=Video

N=Navigational tool

Frame1/Nutrition/Text/Audio/Video/Navigation

Each card then has a link with the others and is not likely to get lost or misplaced. Using cards also allows us the flexibility of shifting their positions in the courseware; while enabling all members of the team to understand the common names we are using.

VI.2 Production of Audio, Video, Graphics, Animation, Inserts, etc.

Once the preliminary script and content preparation is over, the producers take the lead. Audio and video has to be accessed recorded; still and animation undertaken. Through all of this, the content specialist has a critical say in the factual accuracy of content, while design and technical quality are the purview of the producers.

There is a considerable amount of usable material available in digital form in the public domain which the courseware developer can profitably use or adapt. Such material includes :

- *Texts, including some literary classics*
- *Clip art*
- *Photographs, such as stock libraries on CDROM*
- *Audio clips, both on tape and on CDROM*

Video Clips on Tape and on CDROM

It is, however, erroneous to assume that because material is in the public domain that it is necessarily copyright-free. If any documentation is present with the material, whether electronic or hard copy, it should be scrutinized carefully for conditions of use. Similarly, copyright laws cover material available on the Internet, although there is an understanding amongst Internet users that material placed in the public domain, not accompanied by details of use restrictions, can be used freely for personal and non-commerical purposes as long as it is attributed.

VI.3 How Much Will One CD Hold?

This is probably the question you are asking yourself. How much can I include in one CD. Here are some guidelines :

- Text   650,000

- Audio   5 Hrs FM Stereo
                                                        or 22 Hrs Near A.M. Quality Mono
                                                        or 44 hrs near A.M.

- Video Stills

  5,000 Very high Resolution or
  10000 High Resolution or
  40,000 Medium Resolution

- Motion Video

  72 Minutes of Full Screen,
  Full Motion resolution at
  30 frames per second

- Mix and Match Example

  20 Minutes of Full Motion Video
  with 5000 High Resolution Stills
  with 6 Hours of Audio over stills
  with 15,000 Pages of text...

All In One CD ROM

With all this information in mind, we are ready to write out first script. All I can suggest is that there is no learning like exploratory or experiential learning. So let us sit down to write and to share what we learn from this experience.

VII. Conclusion

It has been my attempt to introduce in a modest way, in this paper, those elements of writing that are not dealt with by other authors and that are not readily available in textbooks.

There are other aspects in the development of courseware that we have not yet attempted to discuss. There are issues of copyright and intellectual property; methods of educational testing; individual strengths and weaknesses of each of the media. There are other issues that will form the basis for future.

It is our effort to provide both the novice and the expert an idea of the complexity of writing for multimedia courseware. We hope you will get back to us with your comments and suggestions. The views expressed in this paper are those of the author and do not necessarily reflect the views of the organization to which the she belongs.