

DESIGNING, DEVELOPING, PRODUCING AND ASSURING THE QUALITY OF MULTI-MEDIA LEARNING MATERIALS FOR DISTANCE LEARNERS: LESSONS LEARNT FROM INDONESIA'S UNIVERSITAS TERBUKA

**Dewi MUTIARA
Aminudin ZUHAIRI
Sri KURNIATI
Universitas Terbuka
INDONESIA**

ABSTRACT

Learning materials serve as major learning resources for distance learners, and quality learning materials help students learn effectively at a distance. This paper addresses comprehensive aspects of design, development, production, and quality assurance of multi-media learning materials, based on the experience of Indonesia's Universitas Terbuka (UT). A course team approach is used to design and develop UT learning materials, involving content experts from partner universities, UT's own academic staff, instructional designers and media specialists. Preparation for production of printed learning materials are done internally, while the large-scale reproduction is outsourced externally, and for the non-printed materials all production and reproduction processes are done internally. The learning materials go through a systematic quality assurance mechanism in each stage of design, development and production, in order to ensure that distance students have high quality learning materials for use in their autonomous and independent as well as structured and guided learning activities throughout the course of their learning endeavour at a distance.

Keywords: Learning materials; instructional designers and media specialists. printed learning materials; aspects of design

INTRODUCTION

Universitas Terbuka (UT) is an open university, established in 1984 as the 45th state university to widen opportunity and access to university education, for in-service teachers, working adults and recent high school graduates. UT was founded as a part of the government's national strategies to improve access and participation in higher education. In 2006, UT enrolls more than 320,000 students, residing in different parts of the country, with over 95% of whom are working adults. UT has major roles to play in developing high-calibre human resources needed for the nation's competitiveness and sustainable development. Since its foundation, UT has enrolled over 1.2 million students and has produced over 600,000 alumni, working in various fields of the profession.

UT students learn from the course materials delivered by the institution and from other learning resources accessible from other institutions. UT has developed multi-media learning materials for its students, with the printed materials as the major media supplemented with audio-cassettes, video programs, television programs, audiographic programs, computer-assisted instruction, web-based materials and online tutorials. Learner support is provided to facilitate student learning, such as tutorials, counselling, study groups as well as administrative services. Students' needs for tutorials are provided and facilitated by regional offices.

A number of tutorial methods have been implemented, namely face-to-face, correspondence, broadcast, and online tutorials. Currently UT has 4 Faculties (Teacher Training and Educational Science; Mathematics and Natural Sciences; Economics; Social and Political Sciences), with 35 Programs of Studies. Additionally, it has a Graduate School offering 3 Masters programs in Public Administration, Management, and Fishery Management. Graduate programs in the field of education are currently under construction. UT media resources for learning includes 150 courses with correspondence tutorials, 117 courses with radio tutorials, 377 courses with online tutorials, and 800 televised tutorial programs.

In distance education the course materials serve as the major learning resources for students. The availability of high quality learning materials are crucial to facilitate the students' learning process at a distance. Distance education systems have been established to expand access to learning, using a variety of technology. The philosophy of distance education is based on the value that it removes barriers to learning, and it allows for flexibility for students to learn what they want, when they want, and where they want (COL, 2005). A variety of technology has been used to deliver knowledge for students to learn.

The technology used can be in printed and non-printed formats. The printed learning materials are usually in the form of modularised workbook, and the non-printed learning materials can be in the audio, video and computer formats. The audio formats may include audiocassettes and radio programs. The video formats can be in videocassettes, television programs and CD-ROMs. The computer formats can be synchronous (such as interactive computer-based learning materials) and asynchronous (such as web-based materials, internet-based learning support system).

DESIGNING, DEVELOPING AND PRODUCING PRINTED LEARNING MATERIALS

Effective design of instruction is essential, as in distance education it is the institution rather than the teacher teaches. The learning materials should thus be designed to be user-friendly for the learners' self-study and independent learning activities. Designing effective instructional systems for distance learning involves activities which include identifying needs and goals, analysing instruction, developing materials and planning delivery system, piloting the materials, and revising the materials. Figure 1 indicates the process of systematic instructional design and development.

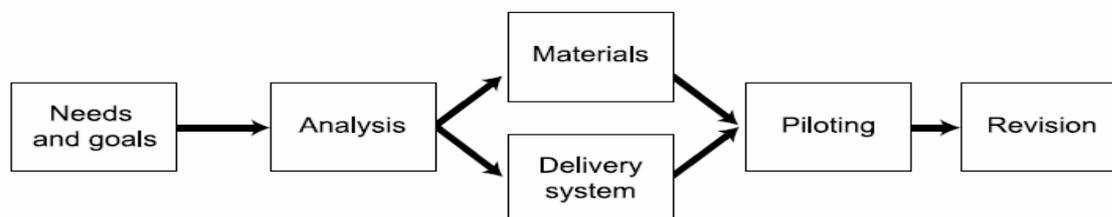


Figure: 1
The instructional design process
 Source: Romiszowsky, 1981 (in COL, 2005, p. 3).

Learning materials serve as the major learning resource materials for distance students, in which the students learn from the printed materials and have the options to choose from a variety of media that suit their learning needs and circumstances.

These variety of media include printed materials, audio cassettes, video cassettes, television programs, CD-ROM software, web-based supplement, Computer Assisted

Instructional (CAI), and audio graphic programs. Learning materials development in UT involves a course team approach, comprising course authors, course reviewers, instructional designers, media specialists, and course managers. The course authors are responsible for writing the original manuscript of the course materials, and they are responsible for the content of the course. Course authors write courses referring to the basic course outline, while the course reviewers are responsible for reviewing of the course materials, and ensuring the quality standards of the content based on the basic course outline.

Instructional designers are responsible for ensuring that every printed material consists of several modules, depending on the number of semester credit unit of the course. Each module consists of the following components: general and specific instructional objectives, introductory section, the content of the course comprising topics and subtopics, exercises, summary, formative tests, feedback, list of references, and glossary of terms. Instructional designers are also responsible to ensure that the modules are designed to be self-instructional to facilitate students to learn the materials independently with minimum assistance from the tutors (UT, 2005). The UT media specialists are responsible for identifying appropriate non-printed media for use to support student learning at a distance. Non-printed media enrich the learning materials to facilitate the students' understanding of the concepts and topics discussed in the printed materials.

The variety of non-printed materials provide students with greater flexibility to acquire knowledge. The course managers are responsible for ensuring the development process of the course materials in accordance with the requirement and schedule set by the institution. This course development process begins with the course writing, course review, editing, and finalising the course manuscript ready for printing. The UT learning materials are systematically designed to be self-instructional, interactive and communicative in accordance with instructional design principles. They are self-instructional in a sense that they encourage students to learn the content actively and independently. They are interactive and communicative in that they include dialogues between author(s) and the students, they use communicative language, so that students have a feel that they have direct interaction with their own teachers.

Distance students have to familiarise and internalise themselves with independent learning style, and therefore the printed learning materials should include sections where students have to engage themselves in active learning, instead of passive reading. For example, students can be actively involved in working on a project, conducting small-scale research, solving cases, pronouncing words and sentences in foreign language courses, doing exercises, and taking self-assessment questions.

The course materials allow for students to have feedback from their tutors for their work and learning activities. They are also designed to enable students to do self-assessment on the exercises and formative tests on their own or in collaboration with their peer groups. In this way, distance students will be able to overcome the lonely feelings of the independent and autonomous learning processes (Suparman & Zuhairi, 2004). In other words, UT printed materials are designed to consider not only the systematic presentation of the content but also other aspects relating to the precise communication process, delivery process, and pedagogical matters. The UT printed materials are designed in such a way to represent teaching and learning in the face-to-face mode of instruction, and it is designed to motivate the students in self-directed learning.

Hence, the content of the materials must focus on encouraging learners to study independently (Yunus & Pannen, 2004). The learning materials are structured in ways that they stimulate students' independent learning activities, guide students' learning of the content, and direct students to be able to understand the concepts

through a variety of exercises and self-assessment. UT utilises academic resources from other institutions of higher education, and it prefers to outsource the development of course materials involving external course authors and material reviewers in writing and reviewing the materials. The course authors and material reviewers consist of senior academics and experts from well-reputed state and privates higher education institutions, such as University of Indonesia (UI), Bandung Institute of Technology (ITB), Gadjah Mada University (UGM), Diponegoro University (UNDIP), Padjadjaran University (UNPAD), Bogor Agricultural Institute (IPB), Education University of Indonesia (UPI), and Hasanuddin University (UNHAS). Table 1 below indicates the number of authors of printed course materials in UT by faculty.

Table: 1
Number of authors and course materials by faculty at UT

No.	Faculty	Number of Authors	Number of Course Materials
1.	Economics	111	73
2.	Social and Political Science	369	218
3.	Teacher Training and Educational Science	506	457
4.	Mathematics and Natural Science	283	228
Total		1269	976

The process of printed learning materials development, which include the writing and reviewing of the materials, is directly coordinated by each Faculty. Working with the some regional state universities as partner institutions, the UT has established "course writing centres" with a purpose of achieving greater effectiveness and efficiency in writing the course materials. These "course writing centres" are intended to facilitate the management of the course writing process in the designated areas. This process includes the recruitment of course authors and reviewers, the management of the writing process, and progress check of the writing activities of authors. Supported by respective UT Regional Offices, these designated "course writing centres" are attached to the local state universities, among others in Palembang, Jakarta, Bandung, Yogyakarta and Malang. The duration for the writing of the course materials are about eight months up to one year. However, some of the course writing process takes more than one year to accomplish.

The delay of completion of the writing process is generally attributed to the fact that many course authors are well-reputed senior academic staff from established universities, and they have a number of responsibilities and professional commitments.

Course materials development and production is an assembly line process, in which deadlines are important to meet to ensure that students get the materials on time. UT has to guarantee the process of printed materials development can be accomplished in accordance with specified deadlines so that the materials can be distributed to students on time. It is essential that the writing process of the printed materials are completed as scheduled so that it would not disturb the production and distribution process of the materials. When deadlines cannot be met, the faculty will have to make the necessary preparation to find new course authors who are available and have the capability to finish the course materials over a short period time. However, these course authors have to meet particular criteria set by the faculty, which among others include competence in the respective fields of study as well as formal qualifications. UT has the obligation to make sure that the students get the learning materials on time, so that they have sufficient time to learn the materials and prepare themselves for the semester examinations.

When the original manuscripts are completed by the authors, they are sent to the respective faculties for reviews of content by experts in the field appointed by the faculty. The review process is essential to ensure that the course materials meet specified criteria set in the basic course outline. The course materials must meet the stated criteria in terms of relevance, accuracy, updated content, readability, comprehensiveness, and freedom from gender, race and class biases. The content has to be critically reviewed to meet the presentation format and the systematic instructional design principles for independent learning. This process is done by instructional designers, who are UT academic staff responsible for ensuring that the printed materials draft meet the specified instructional design standards.

Instructional designers have to address questions relating to whether the materials is in accordance with the UT format, whether it meets the criteria for the number of credit, and whether the course materials is designed to be self-instructional. Learning materials failing to meet the specified instructional design criteria are returned to the authors for improvement. The Table: 2 indicates the review criteria of printed learning materials, as stated in the work agreement between UT and course authors.

Table: 2
Quality control criteria for printed learning material

Category	No	Criteria	Weight	Score*
Course overview				
Brief description		Provide comprehensive description of the content of the course (including general and specific instructional objectives, and consistency to the basic course outline)	1	
		Describe the relationship between printed and non-printed learning materials	-	
		Describe contribution of the printed learning materials to the achievement of instructional objectives stated in the basic course outline	1	
		Explain student learning activities	1	
		Describe the benefit of the application of the course in daily life	1	
		Indicate Instructional Analysis Diagram along with description about relationship among competencies	1	
Presentation of the Modular Learning Materials (including Content and Format)				
Introduction		Describe the content of the module	2	
		Indicate general and specific instructional objectives as stated in the basic course outline	2	
		General and specific instructional objectives use operational words	1	
Substance		Consistency of the materials to the basic course outline (title and sub-titles reflect topics and sub-topics stated in the basic course outline)	10	
Detailed		Systematic presentation of the	10	

Category	No	Criteria	Weight	Score*
description		content		
		Interactive and communicative styles of presentation	5	
		Use of examples and enrichment of concepts	10	
		Comprehensiveness and clarity of the component and description of the concept (including pictures, charts, diagrams, graphics, etc.)	7	
		Minimum number of pages (at least 10 pages per learning activity, 40 pages per module for social sciences; or 30 pages per module for exact sciences)	10	
Exercise		Essay-type exercises	1	
		Assess competencies relevant to specific instructional objectives	3	
		Include answer keys to exercises (including key words or systematic steps to solving problems)	1	
Summary		Summarise the content	3	
Formative test		Assess competencies consistent to specific instructional objectives	3	
		Consistent to types of Semester Final Examination	2	
		Minimum number of 5 items	2	
		Include answer keys to formative tests along with explanation	3	
Feedback and follow up		Include feedback to formative test answers	-	
Closing parts				
References		Relevant to the content	2	
		Refer to work instructions for course writing	1	
Glossary		Include glossary of terms	2	
Appendix		Include appendices (if necessary)	-	
Compliance to deadlines		Penalty of 5 points for every 1 month of delay	15	
TOTAL			100	

*) To be filled out by course manager.

When the manuscript has been revised, it is sent to the Printed Learning Materials Production Centre for lay-out according to UT formats and standards. The efficient development and production of the printed learning materials involve the cooperation and support of a number of relevant operational units, including the Faculties, Printed Learning Materials Production Centre, Non-Printed Learning Materials Production Centre, and Learning Materials Distribution Centre.

Figure: 2 shows a flow chart of processing printed learning materials in Printed Learning Materials Production Centre (PPBAC) as a unit is responsible for preparing master copy of the printed materials.

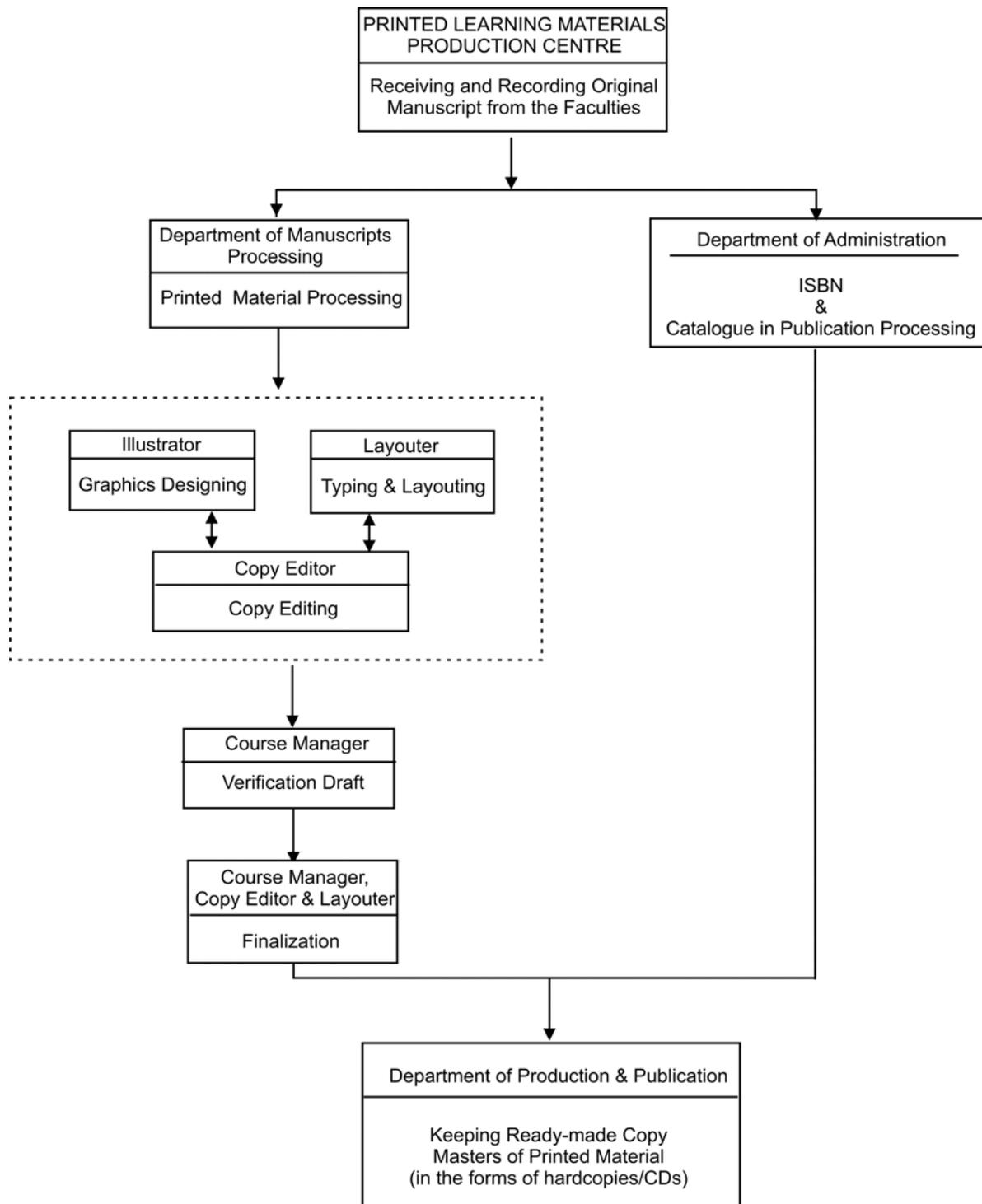


Figure: 2
Flow chart in printed materials process
transforming original manuscripts
into specified printed learning material format.

When the original manuscripts from the authors have been reviewed in terms of content, language and instructional design, the Faculty send the manuscripts to the Printed Learning Materials Production Centre for further process. The Centre will then record this manuscript in the administration logbook and key-in to the learning materials production database. After that, the manuscript is sent to the Division of Manuscripts Processing of the Centre

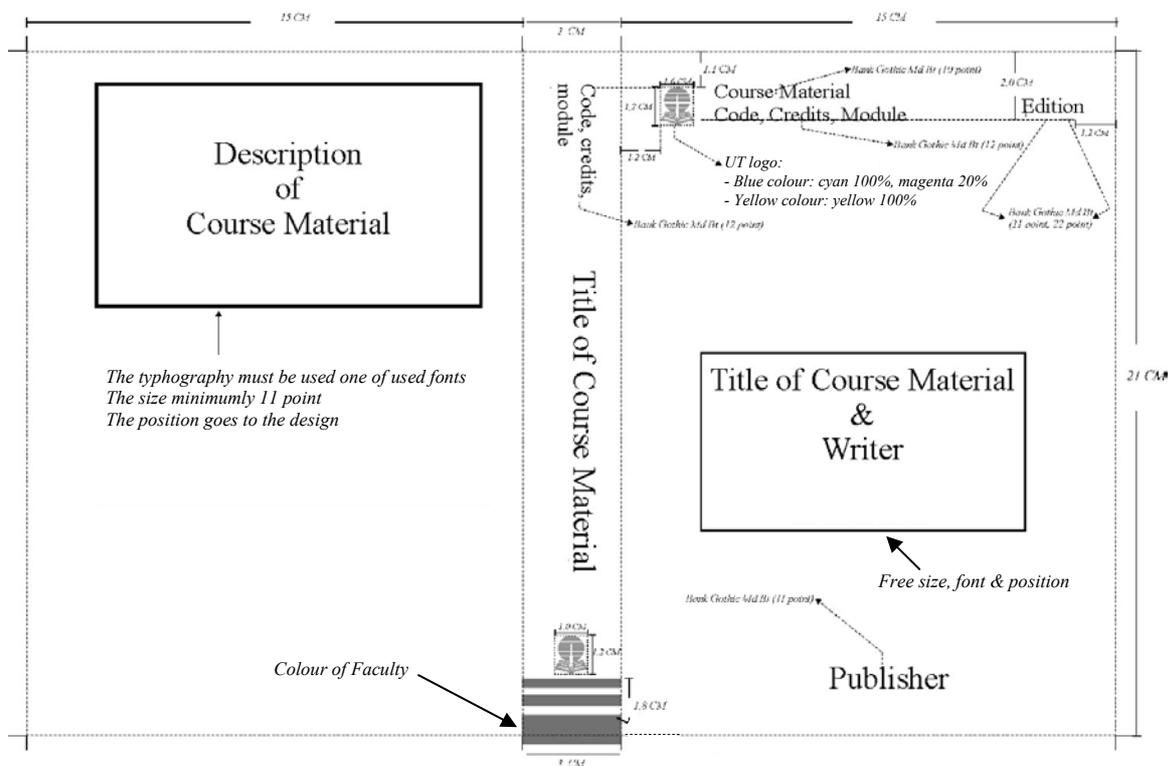


Figure 3:
The format template of the UT cover of printed learning material.

Template of printed learning material cover to ensure that the learning materials are finalised to suit the UT printed learning material template, based on the UT guidelines and criteria.

The cover of the printed learning material template is designed to include among others the lay out of the course code and title of the learning material, the UT logo, the name(s) of the course author(s), and the name of the publisher. The cover should facilitate the users to identify that the course materials are published by UT. To provide readers with fast information about the Faculty producing the course material, different colours are used for each of the Faculties, namely blue for the Faculty of Mathematics and Natural Science, orange for the Faculty of Social and Political Science, grey for the Faculty of Economics, and purple for the Faculty of Teacher Training and Educational Science.

Furthermore, in order to have effective ways in delivering information to readers and students about the content of module, the description of the course is provided at the back cover of the printed learning material.

To enhance the quality of the physical design of the learning materials, attractive multicolour images and illustrations relevant to the content are used on the front and back covers of the printed learning materials. To ensure the quality of the cover appearance, the cover is evaluated by a team consisting of representatives from the faculty and a specialist in graphic design, prior to large-scale printing of the learning materials for further distribution to students. This team evaluates the cover of the printed learning materials using particular criteria in terms of lay out, font size, colour, character composition, colour combination, relevance between illustrations and the content of the printed learning materials, proportion of illustrations, and so forth. The lay out of the module is designed by the Printed Learning Materials Production Centre in terms of readability (font size, kinds of font, legibility, space), lay out design (location of the title and sub-titles, numbering and kind of icons). To facilitate students in reading and learning the materials easily and conveniently, UT

uses HVS 60 gram paper for the printed materials. Beside that, A5 paper is used to make the modular learning materials smaller and easier to carry by students when they need to study the materials.

Preparation, Typing, Editing and Illustrating

In order to process one particular learning material, the Printed Learning Materials Production Centre sets up a small processing team. This team consists of one lay-outer who is responsible for typing and lay-outing; one copy editor who is responsible for editing especially in terms format, template, typographical errors, spelling, consistency with the original manuscript; and one illustrator who is responsible for graphic designing of the course material, including graphic illustrations for the cover and the content of the course. This team is responsible from the receiving of the original manuscripts from the faculties until the production of the final master copy ready for printing by commercial printers outside the UT.

Review and Finalisation

The Printed Learning Materials Production Centre sends the draft of the master copy to the respective faculty for verification and validation in terms of content as well as physical and design formats. Then the result of the final review from the faculty is returned back to the Centre for final revision. The finalisation process of the materials involves both the team and course manager and it is conducted in the Printed Learning Materials Production Centre. In conducting the finalisation process, the course manager reviews the general description of the course, the overview of the course, and overall review of the final version of the master copy to ensure that all components of the learning materials are well presented, such as, cover, objectives, content, glossary, and brief curriculum vitae of the course authors. When all components of the master copy are completed, the course managers are required to fill in and sign the written form provided by the Printed Learning Materials Production Centre. The form contains the course code, title of the course, number of credit, edition, the authors' and reviewers' name(s), and the agreement statement indicating that the master copy has met specified criteria and is ready for printing. Besides the course manager, the head of the study program or academic department also signs the form to endorse the agreement statement. The master of the printed learning materials is then duplicated to produce a dummy and a master copy. The master copy is sent to the faculty, while the dummy and the master are stored as archive in the Printed Learning Materials Production Centre.

Production and Multiplication

Once the decision has been made to print a particular course materials, it has to be equipped with ISBN (International Standard Book Number) from the National Library and KDT (Catalogue in Publication or *Katalog Dalam Terbitan*) or Publication Catalogue Number from the UT Library. The ISBN process as administrative attempt needs to be done, in order to record it in national database of publication so that the information about the materials can be accessed nationally. *KDT* is the information about published edition of UT library, which can be used as guideline in searching the edition. UT collaborates with commercial companies for printing the master copy of the materials, because UT does not have its own printing facilities. The printing company is selected through an auction process according to government regulations. The titles and numbers of the materials for printing are decided in a review meeting coordinated by the Institute of the Learning Materials Development, Examination and Information System and is attended by related units, i.e., the Faculty, Learning Materials Service Centre, the Printed Learning Materials Production Centre, the Non-Printed Learning Materials Centre, and the Bureau of General Administration and Finance.

The prediction of volumes of the course materials for printing is based on the available stock in the Head Office and Regional Offices, the number of registering

students in the past semester, and the minimum stock requirements in Head Office and Regional Offices.

Based on the Review Meeting, the Head of the Institute of the Learning Materials Development, Examination and Information System writes a request letter of printing to the Vice Rector for Administration and Finance. Furthermore, the Bureau for General Administration and Finance conducts the auction process to select the most competitive and efficient printing companies and then issues the Letter of Printing Order to the selected companies.

The printing companies then produce of the materials in accordance to the specified agreement in terms of schedule, volumes, physical quality of the printed materials. When the printing process is completed, the printed materials have to be checked by a team under set up by the Printed Materials Production Centre for quality control. This quality control process is done using a sampling method, considering the large numbers and volumes of the course materials to ensure that the printed materials meet the specified UT requirements. Then the Printed Learning Materials Production issues a Letter of Approval stating that the printed materials meet the criteria for further distribution to Regional Offices through the Learning Materials Service Centre. Some of the printed materials are rejected because they fail to meet the requirements, such as failed collating, blurred fonts, and loose binding. These failed products then will be sent back to the printing companies for replacement that satisfy the expected quality. To enhance the printing qualities, the course materials use HVS 60 gram letter A5 with multi-colour cover, front side and back side. Since 2005, some of the course materials have used multi-colour illustrations and texts, so that the appearance becomes more attractive. Learning materials are revised at least every seven years. The development and revision of the learning materials must follow standardised systems and procedures as stated in the Quality Assurance Guidelines for Development and Management of Learning Materials.

DESIGNING, DEVELOPING AND PRODUCING NON-PRINTED LEARNING MATERIALS

Characteristics of Non-Printed Learning Materials

Technological advances have enabled the use of a variety of media for learning at a distance. UT employs a variety of media, print as well as non-print, to facilitate student learning, such as modularised instruction, web-based supplementary materials, audio-visual materials, computer-assisted instructional programs. The use of a variety of media should enable students to have various learning experiences in order to assist their understanding of the printed course materials, which serve as the main medium of instruction.

The use of various media is also intended to address the diverse learning needs and styles of a very large number of students. These large number of students surely have different styles of learning to suit the characteristics of one of these media. UT still uses printed materials as the main media of instruction to deliver knowledge to distance students, and non-printed materials to supplement and enrich the printed materials which can be easily accessed by students. As much like the printed learning material, the development of non-printed material involves a team approach, comprising manuscript authors who write the content, content reviewers, media reviewers, media production specialists.

Involvement of Non-Printed Learning Materials Development Team

The development of non-printed learning materials involves a number of stages, including manuscript writing, manuscript review, production, and program preview. The team approach in non-printed media development includes two different groups of specialists. The first group of specialists prepare the script, or the script team, and the other group of specialists produce the program, or the production team.

The script team consists of script writer, content reviewer, and media reviewer. Unlike the printed materials, which are mostly authored by academic staff from face-to-face universities, the non-printed material development teams are mostly UT's own academic staff.

The script writing of the non-printed materials are done by UT's own academic staff, and the production of audio/video programs have been done internally by the Non-Printed Learning Materials Centre. The Centre is adequately equipped with audio/video production and computer facilities to produce non-printed learning materials, which include the audio/video programs as well as computer-based programs needed by Faculties for their distance students.

Process of Developing Non-Printed Learning Materials

The process of developing non-printed material programs involves four phases: script development, production, evaluation and distribution. Further explanation is presented in the following.

Script development process

The development process of non-printed materials starts when course planning, that is the media program outline, has been made. This stage involves the identification of materials for development into the non-printed format and the kind of non-printed format used. This identification can be done when the writing of the printed learning materials has been completed. Academic staff maintaining the course determine that some materials need further development into non-printed version. Then, the Faculty determines the topic to be presented in non-printed format, the kind of media, the script writer, and the content reviewer to write the script for the non-printed materials. The script writer will work through some stages, from the writing of Media Program Outline, the content review of the outline, the media review of the outline, the revision of the outline. When those stages are completed, the next step to do is writing the script based on the approved media program outline, reviewing the content and media of the script, revising the script in order to produce the final script.

When the final script has been made, the final version of the script goes into the production team. The Non-Printed Learning Materials Centre facilitates the development of UT's non-printed material program through the media review process. The scriptwriters are faculty members whose expertise are related to the subject matter that will be developed. In the process of writing the script, the writers are assisted by media specialists from the Non-Printed Learning Materials Centre. Media specialists and subject matter experts should approve the final script. The media specialists concern with the format and visualization aspects, while the subject matters concern with the validity aspects of the content.

Production process

When the script is approved for production, it is handed over to the Non-Printed Learning Materials Centre as a unit under the Institute of the Development of Learning Materials, Examination, and Information System. The main responsibility of the Centre is to produce the masters of the non-printed learning materials. Staff of this Centre have special expertise in the area of the production of non-printed learning materials, such as media reviewers, directors, audio operators, audio editors, cameramen, lighting staff, sound men, graphical designers, video editors, technicians, computer programmers, and many other specialties related to that are linked to non-printed media production.

Media reviewers need to give the inputs to the script writers about the coherence of media type with the chosen topics, layout format for every media programs, use of communicative language to deliver the content. Media reviewers also provide inputs related to the technical ability of non-printed media production.

The Non-Printed Learning Materials Centre assigns a director, that is a person who leads the production process of a particular non-printed learning media program, and produce the master of non-printed materials, based on the script earlier developed by the script development team. A director is responsible for the whole aspects of the production processes, including the process of shooting and taking of pictures by cameraman, recording of sounds by sound man or the audio operator, management of lighting by the lighting man, and so forth. The director starts the work with reading and analysing the script, and then breaking down the script with production crews, especially in video/TV programs, to develop production planning, which includes determining the list of actors/actresses, location for picture taking, sounds, and graphic. Based on the production planning, the director and the production crews produce the program. The location of shooting can be done in studio, in in-door as well as out-door locations. The next stage of the process is post-production, which involves editing and mixing.

Evaluation of non-printed learning materials

The evaluation phase is a very important step to maintain the quality of the educational program. Thus, the evaluation of video or television programs should be done right after the rough edit program is ready. The evaluation involves producer, director, scriptwriter, subject matter reviewer and media specialist. The evaluation results are used as input for program revision, which should be accommodated by the director to revise the program. There might be several times of revision before a program is considered final as a non-printed program master by the evaluator. Program revision is intended to produce the final master for non-printed learning materials, ready for broadcast or duplication.

Distribution of non-printed learning materials

The distribution of the final non-printed media program can be distinguished into three different modes. The first mode is through the postal service as a part of multi-media learning packages sent to students. The second mode is through television/radio broadcasting, nationally as well locally. The third mode is distributed online via the internet. If the program is designed as a multi media-learning package, the final master of the program will be duplicated according to the number of students taking the course. In addition, if the program is designed as a television program, the copy master will be sent to the TV station broadcasting the UT programs. The online program requires the process of digitising and then uploading into the internet.

Types of Non-Printed Learning Materials for Distance Learners

The kinds of non-printed learning materials developed by UT initially include the television program, the audio-cassette program, and the radio program. Alongside with the changing needs of the students, the availability new technologies for learning, the kinds of non-printed materials developed are more varied. The new technology-based programs include such things as the audio-graphic programs, computer-assisted instruction, video interactive programs, and web supplements. The delivering media also develops alongside with the availability of new technologies, which currently involve not only the use of radio and television broadcast, but also the use of the Internet.

Television Program

With the strength of TV media as the mass media, the TV programs can be effective media for learning and teaching a large number of the public. The significant potential of this type of media has also utilised by UT to deliver knowledge to a very large number of students residing in various locations throughout the country. The television media has been historically the first learning media introduced to the public in the delivery of distance education, because of the UT's opening ceremony by the President of the Republic of Indonesia, continued with a stadium general on

economics by a well-known expert, Professor Soemitro Djojohadikoesoemo. To develop the TV program during the first years of the establishment, UT had support from the Communication Technology Centre. UT has developed more than 800 television programs with duration of 30 minutes in various formats, some of those are *features, talk shows, single presentations, and interviews*, and the number of programs keep growing.

Video Program

Video programs have different characteristics from the television program. Television programs have a typical characteristic of broadcast program, namely a one-time opportunity for viewing, and viewers do not have the chance to review the program when they miss the television programs. The video programs have flexibility for viewing by students as they can be replayed several times to suit their needs. The development of the video and television programs must take into account these different characteristics. The video programs have more flexibility than television programs in terms of eye-catching techniques, duration for viewing, and types of programs. The development of video programs has just fairly recently started in 2001, when UT attempts to enhance the quality of learning materials through the use of have multi-media components, which include video programs. The video programs can be integrated into the learning materials package or serve as enrichment materials for the existing printed materials. The video program is based on the VCD format, which is common to many of UT students. In the not-so-distant future, there is a possibility that the DVD format, which has better quality, is going to replace the VCD format, when the DVD format is more widely used by students. Until now, about 70 video programs have been produced by the Centre, with the 30-minute duration in feature, single presentation, and talk show presentation formats.

Radio Program

Apart from the television program, UT uses radio programs significantly to reach its remote students and enhance the students' learning process. The radio programs have been developed since the beginning of UT operations in 1984 as supplementary and enrichment materials. The development and production of these programs have been done alongside with the development of the printed learning materials. However, not all courses are equipped with the radio programs, depending upon the content characteristics of the course. For example, courses in mathematics and statistics cannot be appropriately supplemented with radio programs. On the other hand, courses in economics and social sciences can be supported with radio programs to enhance students' learning. UT has adequate equipment and staff for radio program production, and produce the radio programs using its own resources since 1992. Up until 2006, UT has produced more than 3000 radio programs, in magazine and interview formats. The broadcasting of these radio programs is done through by *Radio Republik Indonesia (RRI)*, the state-owned national radio network, every day for 20 minutes, and by local community and private radio network in partnership with Regional Offices.

Audio Cassette Program

Audio-cassette programs have also been developed since the beginning of UT operations. Historically, UT courses were designed to include both radio and audio-cassette programs, as part of an integrated multi-media learning package. However, considering various aspects that relate to cost, usability, and practicality, this particular policy has changed. Then, the development of audio-cassette programs have only been limited for the courses that need integrated audio-cassette programs, particularly language courses and in-service primary teacher training courses.

Since 2001, UT has implemented new policies, enabling the use of multi-media learning package, which includes both printed and non-printed learning materials. Then, audio-cassette programs has started more extensive development again under the name Audio Basic Course Book.

The Audio Book has been designed to clarify and provide further in-depth explanation about particular topics discussed in the printed learning materials. Until now, the UT has produced more than 100 courses that have Audio Basic Course Book, consisting of 1 until 6 pieces of audio-cassette programs in 60 or 90 minute duration.

Audio-graphic Program

The audio-graphic program is the audio program which is integrated with graphics, including texts and images. The development of audiographic programs at UT began in 1990, with a concept that an audio program should be able to describe texts and images on the printed materials. One course may consist of 4-6 audio-cassettes for audio-graphic programs, each of which consisting of 60 or 90 minutes duration and printed graphics. The audio-graphic programs were offered to students who had to pay for such media.

However, because of the low interest of students in this type of media, audio-graphic programs were used very little to supplement the existing printed materials. Some audio-graphic programs have still been for use to enhance further explanation of difficult concepts presented in the printed materials. For example, there are some economics, mathematics and science courses using audio-graphic programs to explain difficult topics, such as mathematical derivation, economic curves, calculations, images, and diagrams. Additional texts and images are needed to explain and analyse the difficult concepts in the printed materials. In addition to that, audio-cassettes are also used to narrate and describe the graphics in order to explain the concepts. Some of the texts and images are placed in the backside of the cassette album or the course book. There are only a few audio-graphic programs developed by UT, representing only 15 courses supplemented with audio-graphic programs.

Computer Assisted Instruction (CAI)

Recent advances in the use of new technology has also encouraged UT to develop innovation in the use of computer-assisted instruction (CAI) to assist students in learning at a distance. UT has started to develop computer-based materials since 1998. CAI programs are developed to contain interactive texts and images. It can be used to provide more detailed analysis and explanation of the concepts presented in the printed materials, and to provide interactive exercises to be done by students with instant feedback generated by the computer. The CAI program is designed to encourage students to enhance active learning and encourage students to interact with the learning materials. Until 2006, there are about 80 CAI programs produced by UT.

Video Interactive program

UT uses the video-interactive programs to refer to the computer-assisted instruction enriched with the video program. With the use of this audio-visually enriched CAI program enables the media to display richer examples, provide more precise explanation of the concept, and offer more attractive programs. This video-interactive program began to develop in 2003 when UT was opening the post-graduate programs. More than a half of the offered courses in the post-graduate programs have been supplemented with video-interactive programs. So far, more than 20 video-interactive programs have been developed for use on post-graduate courses.

Web Supplements

Web supplements are used to enrich the printed materials, and are accessible by students through the UT website. This type of learning material is used to update the existing printed materials. Some courses in social sciences, such as tax administration, public policy and public finance courses, need to be revised for a short period of time because of the changing needs of the users and changing policies of the government. However, because of the long process of course revision, web supplements can be more readily used to keep the course materials up to date.

The web-based learning materials can also be linked with other articles, websites, or mailing lists discussing related topics for use in interactive online discussions. The development of the web supplement materials has begun since 2002, and until now the UT has more than 120 courses enriched with web supplements.

Integrating the Multi-Media Learning Materials and Assurance of Quality

As a part of the effort to enhance the quality of learning materials, UT has intensified the use of multimedia learning packages since 2001. The multimedia learning package for a course consists of an integrated package of the printed and non-printed material, for use by distance students in their independent learning activities. The printed materials are the modularised self-instructional course materials in printed format. The non-printed materials can be in the forms of audio programs, audio-graphic programs, video programs, CAI, or video-interactive programs. These non-printed materials are mostly developed as the enrichment for the materials printed materials.

For some courses in languages and music, the development of non-printed learning materials is integrated with the printed learning materials. Until 2006, the UT has developed more than 240 courses the multi-media package format. The course team approach to learning materials development requires systematic quality assurance mechanism to ensure that those materials are of high quality that meets the expectations of users. UT learning materials have to be revised after being used for seven years, and the process of course revision should begin after the course has been used for five years.

The UT has implemented a comprehensive quality assurance system which covers almost all aspects of distance education operations. For the development of learning materials, a number of quality manuals have been developed in areas, such as development and management of course materials. The purpose of the quality manual is to ensure that all systems, procedures, work instructions and formats are well-defined and used consistently by staff and management to perform the defined areas of activities. As the UT has attempted to improve its quality management system through the implementation of ISO 9001:2000, the documentation of systems, procedures, work instructions and formats is designed to meet the criteria for ISO 9001:2000.

Distance education operations are based on the proposition that the roles of institutional planning and management as a whole is crucial. As students are separated by distance, time and space, the use of media is indispensable, and two-way communications are necessary to initiate and maintain dialogue with students. Despite the significant role of the institution in planning distance education methods, there must be teachers, students, courses or curricula and a contract acknowledging the teaching learning roles.

Distance education materials are presented to students systematically to facilitate learning at a distance. Any distance education institution needs to consider these propositions. To ensure successful operations of distance education, the design and development of courses in distance education need to take into account a number of factors relating to learner autonomy or control, interaction, access, and costs (Shearer, 2003). In terms of quality assurance there are a number of aspects that need specific attention to ensure the quality of the design, development and production of course materials.

The UT implements quality assurance system called *Sistem Jaminan Kualitas (Simintas)* through adopting and modifying the *Asian Association of Open Universities (AAOU) Quality Assurance Framework*. The following is the quality assurance principles relating to the design, development and production of multi-media learning materials, as stated in the UT quality assurance system (UT, 2002).

Course design, objective, content, and test or assignment

The faculty, academic department and study program should design the course through proper planning. The statement of course objectives should be clear and informative to the learners. A clear and informative statement of objectives will help learners to organise their learning activities systematically and adapt their expectations to the course. The objective of the course should be relevant to the goal of the program. Course development should be relevant to the goal of the program, and should be based on the needs of the students, involving careful needs analysis of the students. The course development process should be systematically scheduled and carefully monitored to ensure on-time completion, production and reproduction of the course materials. The design and development of the course contents should be relevant to the goal of the program, and there should be consistency between course content and test or assignment.

Use of a variety of media, learning material components, and student learning support

The course should use a variety of media appropriate to the objectives and characteristics of the course to ensure that students have access to a variety of media that facilitate their learning process and accommodate different learning styles of individual students. The learning material should consist of the following components (objective, scope, description of materials, examples, cases, exercises, summary, formative test, feedback, answer key) to encourage and facilitate distance students to learn. The course design and development should be sufficiently integrated with the student learning support services in order to produce learning materials that are congruent with the students' needs for learning support.

Course team approach

There should be standard competencies and qualifications of the members of the course team to ensure the quality of the course material meet specified criteria set by the institution. The course materials should be developed involving the use of a course team approach. The design and development of course materials involve a course team approach to ensure quality of content, design and delivery suitable for distance learning. The course materials should be reviewed involving the use of a course team approach. The review of the course materials involves a course team approach to ensure the validity of the content, design and delivery system. There should be system and procedures for course team selection and recruitment. There should be proper system and procedures which are consistently implemented and monitored for course team selection and recruitment.

Training of course team

A systematic training plan for the course team should be developed, implemented and continuously evaluated to ensure that the institution has qualified course designers and developers to meet the institution's needs. There should be a training program on distance education for the course team members prior to development of the courses to ensure sufficient insights about distance education. There should be adequate training on course design and development for the course team prior to the development of courses. Prior training on course design and development is required for the course team members to ensure the acquisition of knowledge, skills and competencies in course design and development in distance education.

Course evaluation

There should be systematic and continuous evaluation for improvement of course materials. Course materials for distance education should be systematically and continuously evaluated for revision and further improvement.

Assuring quality for learning media

The use of technology offers the promise to improve the effectiveness of both classroom instruction and distance education. The use of information and communication technology provides increased interactivity, more control for the learner, and even global learning network, in a highly cost-effective manner. The myth is that new technologies require significant investment in the infrastructure of telecommunications network and equipment provision. Developing nations generally cannot afford the use of high technologies, such as interactive communication and computer technologies.

Research and development, value added, and students' skills in the use of new technology

The institution should undertake systematic research and development in the use of new technology integrated into the academic and administrative services to ensure the provision of the best services available to students. The institution should use media that have sufficient added value for student learning with respect to the cost-benefit aspects. The institution should consider sufficient skills of the students in the use of media. The institution should develop appropriate learning materials, considering sufficient skills of the students in the use of the media.

CONCLUSIONS

Learning materials serve as a major learning resource for distance learners. The design, development and production of learning materials should carefully take into account the systematic and scientific principles of instructional design. Quality learning materials are very dependent upon consistent implementation of quality assurance principles. Distance education institutions must pay serious attention and put sufficient resources to ensure that quality multi-media learning materials can be provided and easily accessible by distance learners. Quality assurance should be implemented consistently in the design, development and production process of learning materials in order to ensure high quality product.

BIODATA and CONTACT ADDRESSES of AUTHORS

Dewi MUTARA is Head of Printed Learning Materials Production Centre and Lecturer in civil law in the Department of Communication, Faculty of Social and Political Science, Indonesia's Universitas Terbuka (UT). She holds a *Bachelor of Law* from *Universitas Katholik Atma Jaya, Jakarta* and a *Master of Technology* in development studies from *Institut Teknologi Bandung, Indonesia*. Previously she was Head of the Department of Communication, and Head of the Test Item Banking Division at the Faculty of Social and Political Science. Contact detail: Universitas Terbuka, Printed Learning Materials Production Centre, Jalan Cabe Raya, Ciputat, Tangerang 15418, Indonesia.

E-mail: dewim@mail.ut.ac.id

Fax. + 62 21 7490941, extension 1702

Tel. + 62 21 7490941, extension 1700

Aminudin ZUHAIRI, PhD is Head of Quality Assurance Centre and Senior Lecturer in distance education and educational management in Indonesia's Universitas Terbuka (UT). Previously he held various positions, including Assistant to the Rector (2001-2003), Secretary of the Institute of Research (1998-2000), and Head of English Language Education Program (1995-1997). He holds a *Bachelor of Education* from *Teacher's College (IKIP) Semarang, Indonesia*; a *Master of Education* from *Simon Fraser University, Canada*; a *Doctor of Philosophy* from the *University of New England, Australia*; a *Graduate Certificate in Quality Assurance for Higher Education* from the *University of Twente, the Netherlands*; and a *Certificate of Leadership* from the *United Nations University International Leadership Academy (UNU/ILA)* in

Amman, Jordan. His research interest is in quality assurance and distance education management.

Universitas Terbuka, Quality Assurance Centre,
Jalan Cabe Raya, Ciputat, Tangerang 15418, Indonesia
E-mail: aminz@mail.ut.ac.id
Fax. +62 21 7434791
Tel. +62 21 7490941, extension 2420

Sri KURNIATI is Head of Non-Printed Learning Materials Production Centre and Lecturer in general biology in the Department of Biology, Faculty of Mathematics and Natural Science, Universitas Terbuka (UT). She holds a *Bachelor Biology* from *Institut Teknologi Bandung*, and a *Master of Science* in agricultural and rural development communication from *Institut Pertanian Bogor*, Indonesia. She has extensive experience in the field of non-printed material design, development and production.

Universitas Terbuka, Non-Printed Learning
Materials Production Centre, Jalan Cabe Raya, Ciputat,
Tangerang 15418, Indonesia;
E-mail: skurniati@mail.ut.ac.id
Fax. + 62 21 7490941, extension 1506
Tel. + 62 21 7490941, extension 1500

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