Models of Course Design and Development*

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Introduction

Whether universities teach at a distance or adopt online teaching, the most crucial foundation and pre-requisites to their operation are the learning packages. An equivalency to classroom teaching (the foremost role of the teacher) at the open universities is undoubtedly writing or development of (or teaching through) self-learning materials (SLMs); all other tasks centre around this main task. In tele-teaching for instance in the United States, the role combines both material development and online teaching (Gunawardena, 1992; Olcott and Wright, 1995). For single-mode open universities, distance teaching through pre-produced SLMs has been the major task; and the Course Team approach to material development, pioneered by the British Open University, has invariably been adopted by many open universities and distance teaching institutions (DTIs) in both developed and developing countries (Inglis, 1996). From the institution’s point of view, the considerations of cost, time, constraints and quality output are crucial; and for the students, quality and learning effectiveness of the materials and responsiveness of learner support services are of utmost importance.

In this chapter, we describe briefly some of the course development models generally used by DTIs, and concentrate more on analysis of some of the selected models of material development in the distance education system in India – dual-mode university Distance Education Institutes (DEIs), State Open Universities (SOUs), and the National Open University – which is the second largest system of open learning in the world with about four million cumulative and about one million annual enrolment.

Course Development Models

A variety of course development models have been adopted by distance teaching universities. The most commonly adopted one is the Course Team (CT) model, followed at the Open University (UK), Athabasca University (Canada) and Deakin University (Australia). The course team model comprises academics (subject experts), radio and TV producers, educational technologists, editors, graphic designers, counsellors, student representatives, and course chairperson with varying levels of responsibilities. Because of the representation and active involvement of different categories of experts, the quality of materials thus produced are normally high. But one of the serious criticisms of this model is that it takes too long (two to three years) to produce a course, thereby making it cost-intensive and at times obsolete before being printed.

Universidad Estatal a Distancia, Costa Rica follows the Author-Contract Model (ACM); the FernUniversität, Germany, also follows the ACM, with the difference that an individual teacher takes up the overall responsibility of course development. Everyman’s University of Israel also works with the same model (Rumble and Harry, 1982). Lockwood (1992, 1993, 1994) has discussed four course production models, viz. personalised training, workshop generated, text transformation, and wrap around which are considerably different from the original CT model. These are described briefly as follows:

Personalised Training

In this model authors are equipped with skills and techniques that they need to use exactly at the time they decide to plan and produce self instructional materials (Lockwood, 1994). This method is suitable for producing self-instructional materials in a shorter time and with people having no previous experience in this area.

Workshop Generated

In this model, the materials are generated in workshop situation, and the experts (such as subject experts, media experts, graphic experts, language editors, etc) are from different background. The time taken to produce materials is relatively shorter than other models. IGNOU developed a large portion of materials for its Certificate in Guidance programme and the B.Sc. Physics laboratory courses (Panda and Garg, 2003) through this model. This model has also been used partly to edit materials received from course writers for the M.A. (Education) and M.Ed. programmes.

Text Transformation

This involves a process of transforming existing correspondence materials into self-instructional materials. In India, the DEIs have correspondence study materials which are being transformed into SIMs. The process involves organisation of workshops for the transformer-authors, as also extension of follow-up support to hasten the process of transformation.

Wrap Around Text

Since high quality SIM development is time consuming and cost-intensive, existing printed texts are used along with a wrap around text. The cost of developing course material through this model is as such low, but the copyright implication is a major issue in this model. At IGNOU, M.A. (Applicable Mathematics) is being developed through this model.

Educational Advisor Model

The educational advisors are senior subject experts with experience in educational technology. They advise and work in collaboration with the faculty within their discipline/subject area to produce course materials. This model is followed at the Murdoch University and the Darling Down Institute of Advanced Education, Australia.

Contract Author-Faculty Model

In this model, external authors write units and the materials thus produced are vetted by internal faculty. In IGNOU, this is the usual practice, though the course is designed by a team of experts. The editor is responsible for content editing and content quality. This model, with slight variation, is also known as ‘Author-Faculty-Editor Model’ or ‘Coordinator-Writer-Editor Model’.

Contract Author-Editor Model

In this model, the materials developed by outside experts are vetted and edited by internal or external editors, who work on the materials as surrogate students. The courses of Master Degree in Library & Information Science and B.Tech (Civil) of IGNOU were developed in line with this model.

Seminar Generated

This model of course development is useful when published literature in the subject is limited, and the subject is in the nascent stage of development. Naturally due to this, there shall be very few experts in the field. In this context, seminar turns to be a better approach to generate new ideas and thoughts, thoroughly discussed by peer groups. The papers presented in the seminar and the proceedings of the seminar become the basic material, and study guides and activities are developed and edited by internal faculty on the basis of the outcome of the seminar. Such an approach leads to faster development of course material.

A variety of individuals/agencies/institutions are involved in the use of these models for course development, and each model has its own complexities and constraints at the procedural level. We discuss below some selected models of course development and production. This is followed by a brief reflection on the changing nature of course production for distance learning in the changing context of multiple media based blended learning.

Distance Education Institutes

There are 106 dual-mode universities and institutions of higher learning in India offering correspondence courses/distance education programmes, ranging from undergraduate programmes
to more skill based and professional programmes in information technology, management, agricultural sciences and electronics. We have selected three DEIs (Madras, Osmania, Kurukshetra) based on accessibility of data, for describing and analysing course development approaches adopted by them. The selected DEIs represent three different but typical course development approaches adopted in most of the DEIs in the country. It is essential to have a comparative understanding of the processes/systems, and the factors responsible for the approaches adopted by them.

**ICE, University of Madras**

The Institute of Correspondence Education (ICE), University of Madras was established in 1981; and till the University of Madras Act was amended in 1984, the ICE depended on university faculty for course design and development. In 1984, the state government deputed faculty against substantive posts to ICE. The planning of a programme/course starts with the Advisory Committee, which acts as the Planning Board for the ICE and comprises the VC, Director of ICE, one expert from IGNOU, two members from the university Syndicate, and the senior-most Professor from the ICE. The recommendations are placed in AC for policy decision on the desirability of a programme. The proposal is then put up to the Syndicate, Senate and the Academic Council in that order for final approval. Any proposal for a new programme passes through the Board of Studies (BOS) to go to the Syndicate. Recently, a decision had been taken to constitute a BOS (the 50th one) exclusively for ICE by amending the university Act with the approval of the Chancellor. The ICE-BOS shall act for those courses which do not exist in the university. Such approved programmes can simply be adopted by the main university Subject-BOSs for their offer in the mainstream departments.

One lesson, on an average, consists of 20 pages, and 20-25 lessons comprise a paper. Only a few lessons are in SIM format, and, except for MCA, BCA, M.Com. and MA(Eco), all the papers are offered in both English and Tamil. After approval by the AC, the DE staff or a Committee recommended by the DE Staff Committee identifies course lessons/units: sometimes, it is just a one-person committee. Lessons are written by ICE or outside faculty, who edit, proof read and prepare final CRC, vis-à-vis the DE Staff Committee (Fig. 1).

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**CDE, Osmania University**

At the Centre for Distance Education (CDE), Osmania University, (which does not have full-time faculty at the CDE), the Director of the Centre appoints (subject-wise) ‘Editors’ (who are usually senior faculty from the University or external consultants), and puts up the case for a new
programme/course, on behalf of the CDE, to the Curriculum Development Body (Fig. 2). The CDB for DE (which is different from the CDB of formal education) comprises of BOS members, course writers, subject experts; and after detailed deliberations, the syllabus is put up to the BOS for DE (different from BOS for formal education). The CDB-DE and BOS-DE almost conform to the syllabus of their respective CDB and BOS of the formal system. The course writers and subject experts are from the formal system; and the Committee of CWs, SEs and ET organises workshops for lesson design and writing, and puts up the draft written by CWs to the BOS-DE for clearance, which then becomes the authorised draft fit for final printing. While the ‘Editor’ acts as the overall coordinator of the programme/course, the HOD of the parent department puts up cases to the BOS-DE for revision of courses.

**DCC, Kurukshetra University**

At the Kurukshetra University (KU) (Fig. 3), the Board of Studies in the concerned discipline at the main department approves the syllabus prepared jointly by the KU and the M.D. University for ensuring parity in the state of Haryana. The Joint Syllabi Committee is chaired by the concerned HOD of KU, with members drawn from both the universities; and the JSC prepares the syllabus for approval in the BOS, followed by approval in the Academic Council of the respective university. The syllabus is adhered to by both the formal system and the Department of Correspondence Courses. In the DCC, the subject committee takes up the responsibility of planning the course development, drawing up of panel of writers and experts, and allotment of lessons to faculty members as also writers from outside the university. Vetting is done internally, so also final proof reading and clearance for printing.
We discuss the case of Yashwantrao Chavan Maharashtra Open University (YCMOU) as a representative but more sophisticated case for course development in state open universities. The procedure of academic programme development adopted at the initial years YCMOU is presented in Fig. 4. Three sources – client needs, social demand, and the university authority – determine launch of a new programme. Feasibility studies are conducted, the results of which, coupled with the advice of the State-level Advisory Committee, lead to programme proposal being put up to and approved by the Planning Board and the Academic Council of the university. State-wise curriculum groups are formed, and the instructional packages are determined, followed by approval by the university Board of Management and formation of course teams. Course units, audio-visuals and practical components are developed and finalised after expert editing/vetting/preview. Most of the course materials are in the language of the State – Marathi, and the university had also initially adopted a few courses from outside (especially IGNOU) offered mostly in English. Subsequently, the course development processes at the university have been sharpened, modified and diversified (see Fig. 5).
Fig. 4: YCMOU: Development of academic programmes

Source: (Deshpande, 1999)

Fig. 5: YCMOU – modified common model of instructional material development

(Courtesy: Prof. A.N. Joshi & Dr. Rajguru)
The approach that has generally been adopted for the last few years is given in Fig. 5 and is self-explanatory. All sources of knowledge are tapped while developing the concept paper for a new programme. It is discussed and approved in the School Council, Planning Board, and Academic Council. While the SC proposes the programme, the AC approves, as it is, the resolution of the former. The Programme Advisory Committee, which is formed by the AC (by drawing experts from all over the country, but usually from within the state) designs the programme, develops framework of courses, and establishes the Course Development Committee. The CDC develops detailed structure of course units, provides instructional design support, and identifies course writers and editors. In consultation with the Director of school concerned, the Academic Services Division (IT Centre) provides orientation to writers and editors, followed by unit writing and editing (content, language and instructional technology). While the ASD extends IT support, the school faculty have of late taken up this responsibility. The SIM is finally approved by the school Director for printing. In the process, four forms are filled up for consideration and approval of concerned authorities: Form A for PB, Form B for AC, form C for PAC and Form D for CDC. It may be noticed from Fig. 5 that the Director of the concerned School of Studies is the key person in organising and handling the process, and exercises authority in the process even if he/she does not specialise in more than one discipline within the School. Further, the Co-ordinator of the programme (i.e. the concerned faculty) is responsible for overseeing the writing and editing activities, and is responsible to the Director. Sometimes, the Co-ordinator specialising in the discipline concerned, is nominated from outside the university to carry out the tasks that an in-house co-ordinator does.

**Indira Gandhi National Open University**

The Indira Gandhi National Open University, the second largest mega university in the world, was established by an Act of the Indian Parliament in 1985 with dual objectives of offering need-based programmes at a distance, and coordinate and maintain standards of distance education systems in the country. A third objective, which has been functionally operative with the gradual growth of the university, concerns with acting as a regional resource centre for materials, human resources, system expertise, training and research. The university is known internationally for the quality of its academic programmes and course materials, and for the huge operation that it handles in a vast country with geographic remoteness and isolation. The university enrolls about 0.3 million students annually, and has a cumulative enrolment of active students of about 1.3 million. A network of 62 regional and recognised regional centres, four sub-regional centres, 1300 study centres (study centres, programme study centres, sub-centres, work centres, web centres, multimedia learning centres, tele-learning centres, etc.) and 35 partner institutions work towards the implementation of its academic, training, research and extension programmes developed through eleven Schools of Studies and the offer of student support services.

**Academic Programmes**

Starting from just two programmes – Diploma in Distance Education, and Diploma in Management – in 1987 with a combined enrolment of 4381 students, the university now offers 108 academic programmes comprising 980 courses at masters, bachelors, diploma, certificate and non-credit levels. Many programmes are modular in nature, and follow a credit system (where 1 credit = 30 student study hours). A certificate programme is of 12-18 credits, a diploma programme worth 24-36 credits, a bachelors degree programme of 96 credits, and a master programme of 64-72 credits. The programme areas range from bachelors degree liberal arts/commerce/science to professional areas like management/computer and information science/medicine and health care/engineering/services/teacher training at different levels. Other programmes relate to society and life, and continuing professional development, like rural development, maternal and child health, food and nutrition, early childhood care and education, to name a few.
Curriculum Design and Course Development: Policy and Practice

In its formative years, programme identification, design and development were based on experiences of in-house faculty and the associated experts. But the University gradually developed procedures and norms for carrying out these activities. The initial curriculum identification and design processes included the following:

- The academic programmes of the university were required to conform to the objective of reaching the disadvantaged sections of society, with emphasis on secularism, and national integration.

- The University hired the services of Educational Consultants (India) Pvt. Ltd. to survey and suggest the programmes to be initiated; DDE and DIM programmes were initiated in 1987 out of this prioritised list.

- In the light of its Act, Bachelors Degree Programme (BDP) was identified for offer as the first step towards reforming and providing equal opportunity for tertiary education. It was also a bold step to design the three-year programme into foundation, elective, and application-oriented courses.

- Rural development and food and nutrition were suggested by the Union Government as prioritised areas to develop academic programmes for awareness and skill development.

- The programmes were prioritised as per the felt need, and were designed on the basis of past experiences of faculty in each discipline, and the views of outside experts involved in the course team of the respective programme. The ‘faculty coordinator-writer-editor’ model of course design and development evolved in this process (and which has become the mainstream course development approach in the University).

- With increasing experience, more flexibility, openness and learner-centredness were introduced. These eventually got reflected in the course design too. Relaxation of entry qualifications; increased duration for completion of the programme; addition of audio, video, teleconferencing, radio counselling into the printed course materials as either supplementary or complementary – all had implications for curriculum and course design.

- It was gradually realised that more factors need to be considered while thinking of initiating an academic programme. While financial viability and relevance currency of a programme dominate the decision making now, the needs of the prospective students, employment avenues, and the like have also been important considerations. The programme coordinators (i.e., the internal permanent faculty members) have since been concerned with: i) establishing academic credibility of programmes, ii) optimum utilisation of limited resources for programme development and implementation, iii) availability of experts in the area, iv) availability and preparedness of delivery mechanisms, and v) credibility/valuing of degrees and diplomas by other academic institutions and the prospective employers.

A programme can be initiated by any faculty (teacher or academic), who acts as the ‘programme coordinator’. He/she has to follow well-laid down steps in the process of course design and development to finally reach the stage of printing and production of materials. The processes followed for course design and development prior to and after 1999 are delineated in Figs. 6 and 7, respectively. While following the steps noted in these diagrams, the programme coordinator needs to fill up four forms – each one corroborating to certain stage/phase of course design or development. The four phases, that a programme passes through before its launch, include: programme proposal, programme concept, programme design, and programme launch.
The processes

Idea

School

Coordination Committee for project clearance

Planning Board: concept & design (I & II)

School Board for detailed designing and project preparation

Academic Council for approval (III)

Implementation/launch

School/Operational Divisions

Launch authorised by Coordination Committee

The stages

Development of idea of new programme

Appointment of Expert Committee/course writers, clearance of programme outline by School Board

Planning Board approval and allocation of resources

Integrated report on development, delivery and student assessment in Form III to Academic Council with information to P&D

Approval of Academic Council

Modification suggested to be incorporated

Modification suggested, if any, to be incorporated

Submission of Phase I & II forms to Administration (Governance) through P&D as agenda item for the Planning Board

Completion of programme development/establishment of delivery system and other logistics

Launch approval by the Coordination Committee

Preparation of operational schedule by SRED and advertisement for admissions

Fig. 6: Procedure for approval of academic programme proposal followed till 1999
(Courtesy: Pankaj Khare)

Idea/concept:
- Programme proposed by an academic in the School
- Programme proposal from government/external sources
- Programme proposal from a Project/Division/Unit

Discussions on the idea/proposal in concerned Discipline Group and School

Approval by APC (Planning Board) after presentation on need assessment, programme fee

Report to Planning Board

School to hold Subject/Course Expert Committee Meetings

Development of design and detailed programme structure (Phase III Form)

Submission of Phase III Form to the School Board for approval

Submission of School Board Recommendations to Academic Council/Standing Committee of AC for approval

Submission to School Board for approval

Launch clearance by PIC

Launch announcement by SRED

Fig. 7: New programme development procedure
(Courtesy: Task Force on Student Support, IGNOU)
Programme proposal (Phase-1)

A programme proposal is initiated by the faculty based on four variables:

- need survey conducted by the faculty in collaboration with Planning and Development Division and/or outside designated agencies;
- request of the agencies/departments of the union/federal government;
- expertise of in-house faculty;
- collaboration with national and international agencies (with or without funding support).

A programme to be initiated by a faculty member is discussed in the discipline group within a school, and the phase-1 form is prepared. The proposal may be discussed in the School Council (which is optional), and is submitted to School Board for approval. Following this, budgetary approval is obtained from the competent authority for conducting a need assessment survey, external visit to discuss with experts, convening a meeting of experts for designing the programme, and the like. The programme structure is placed before the Programme Expert Committee, for guidances.

Programme concept (Phase-2)

Phase-2 proforma is submitted to the Planning Division of the University, along with the resolution of the School Board and the phase-1 proforma, for consideration of the Academic Programme Committee, a Standing Committee of the Planning Board. Once the proposal is discussed on points concerning availability of funds, fulfilment of the mission and objectives of the University, programme fee, feasibility of implementation, and the like, budgetary approval for design and development of the programme is obtained, and course-wise expert committee meetings are convened to develop detailed syllabi.

Programme design (Phase-3)

Phase-3 form, along with the Phase-1 and Phase-2 forms and the detailed course design, are placed before the School Board for approval. At this stage, the programme coordinator obtains programme and course codes from the Planning Division. Such codes are based on variables such as level of the programme (awareness, undergraduate, postgraduate, and research) designated as A,B,P,R; discipline where the programme originated from (like PH for physics, TS for tourism studies, etc.); for a laboratory course, the symbol (L) is added; the stage of preparation (new/revision) of the course/programme (new course is assigned 0, 1 for first revision, 2 for second revision, and so on till 9 for 9th revision); and the last two numerals for the number of the courses in that discipline (starting from 01 to 99). Therefore, a course code like MPH(L)001 would indicate that it is a: "Master level physics lab course offered for the first time".

This by implication also suggests that an UG course can never be a part of a PG programme, but a Certificate Course can be part of a Diploma or UG programme.

The programme, after discussion, is approved by the Academic Council or its Standing Committee (ACSC). At this stage, budgetary approval is obtained for course development and production (in print, audio, video, and digital form). On approval from AC/ACSC, the programme coordinator with the approval of competent authority, convenes the meeting of course writers for orientation and assigning course units; preparation of CRC and master copies of audio and video programmes. A programme package includes most or all of the following:

- Printed materials in the form of one or two credit blocks (or even a full course in one booklet)
- Student programme guide
- Handbooks on practicals/experiments/hands-on experience/projects
- Kits for experiments and practicals
Audio and video programmes
- CD-ROM, multimedia materials on the Web
- Student assignments (TMA and CMAs).

The approaches that have been adopted for development of various academic programmes at IGNOU are discussed in the next section. It is, however, worth mentioning here that curriculum and course design heavily depends on the approach adopted, and therefore, this is categorically reflected in the programme proposal by the programme coordinator (which also reflects the costs involved in course development).

Programme launch (Phase-4)

The programme coordinator submits Phase-4 form to service divisions (Regional Services, Student Registration & Evaluation, Material Production & Distribution and Electronic Media Production), indicating their exact role in the implementation of the programme, as also alerting them in advance for their preparedness. However, submission of these forms are initiated only after 50% of the course materials (print, audio, video, etc.) are ready at hand, and that student support services (like counselling, assignment evaluation, lab experiments, practicals, teleconferencing, phone-in radio counselling, etc.) have been put in place. No programme can be put on offer without approval of Phase-4.

Models of Material Development

The ‘coordinator-writer-editor’ model/approach evolved in the initial stages of course development in the university due partly to the existing exigencies and partly to such a necessity. Gradually, through experience and based on course-specific needs, various other models got evolved. It is important to point out here that:

- a programme is initiated either by an in-house faculty (programme coordinator) or by the discipline group (within the school) as a whole, or even by an inter-disciplinary group;
- besides the programme coordinator, there may be course coordinators (within the programme) who may specialise in that area;
- the programme is developed by a ‘course team’ comprising the in-house faculty (programme coordinator/course coordinators, other faculty members), course writers drawn from outside the University, course editors drawn largely from outside the University (sometimes in-house content editors), language editor from the editing unit (sometimes by in-house discipline-based faculty and external editors) and media producers from the EMPC. In initial years, format editor from STRIDE were also associated but as number of programmes increased and in-house faculty developed necessary expertise, the part has been abandoned.

Following the submission of Phase-3 form, a two day orientation programme of course writers is organised where the process and format of developing self-learning materials are discussed; course contents (units) are thoroughly looked into; audio and video components are concretised; and the time frame for writing course units is decided. The usual course development process involves the following steps:

- Organisation of a 2-day orientation programme by the programme coordinator, followed by writing of course units by course writers, and dispatch to the programme coordinator in a floppy/CD and also a hard copy.
- Preliminary editing and formatting by the course/programme coordinator before sending a copy each to content editor (block-wise or course-wise) for authenticity of content and its
appropriateness at the given level and instructional designer from STRIDE to test comprehensive communication.

- Editing and dispatch to programme coordinator by editors.
- Correction and finalisation, and dispatch to language editors for language editing; simultaneous design of graphics, initiation of the process of audio and video programme production.
- Simultaneous or post-course development translation of units by translators of different languages (if needed).
- Simultaneous development of assignments and student handbook, and other handbooks.
- Preparation of CRC, and master copies of audio and video programmes, and their further printing/duplication, depending on expected size of enrolment.

A broader framework depicting the processes of development of an academic programme is given in Fig. 8, which depicts seven stages in the course design and development process.

While developmental testing has been tried out in a few courses, this phase needs to be built, as a regular mechanism, into design and development of all programmes.

The typical model of course (print) development process is depicted in Fig. 9. While the programme coordinator handles the entire process and is responsible for the final outcome, the ‘content editor’ (non-IGNOU senior academic) is largely responsible for the quality and presentation of the content. The format, language and copy editors contribute further to the readability, conversational nature, easy comprehension, etc. of the course units. Translators come in at a later stage; to translate the finalised materials, written in English, into different regional languages. While this process of translation itself has been a gigantic but satisfying task for the University to have produced authentic materials in the Indian context, there is a realisation that it is easier and more qualitative to develop/write course materials afresh in regional languages (based on existing detailed course and unit design) than translating from English. The Bachelor’s Degree Programme better represents this model of course design and development.
The faculty, over the years, have deviated from the established ‘coordinator-writer-editor’ model to approaches based on factors like nature of the programme, availability of course writers and editors, strict time schedule and the like; availability of financial resources has so far been the least important factor influencing the approach adopted. A variant is the ‘non-IGNOU editor-coordinator model’ (Fig. 10) in which the course editor (based in any region in the country) acts as the coordinator of the course, and course units are developed regionally with the help of experts available in the city. While the concerned faculty at the headquarters of IGNOU is responsible for organising regional orientation programmes for course writers and the editor-cum-coordinator (ECC), format and language editing and printing at the headquarters, etc. the ECC is responsible for getting course units, assignments, audio and video scripts, practical manuals, etc. written by the regional course writers, editing those, and presenting to the concerned faculty/school for further editing and compilation. Some of the good examples at IGNOU are the Postgraduate Diploma in Journalism and Mass Communication, B.Sc (Nautical Science), B.Sc (Ophthalmic Techniques), among others.
In the case of ‘in-house faculty’ model of course development (Fig. 11) (like the Postgraduate Diploma in Distance Education), the entire responsibility rests on the in-house faculty. The faculty members were exposed to staff development programmes in distance education, but the senior-most faculty acts as the chief editor of all the courses. Content, format and language editing were carried out in-house. Such a model is appropriate only when enough expertise is available in-house. There have been variations to the approach adopted for the PGDDE programme development in other programmes within the in-house faculty model.

A very interesting model is the development (writing and editing) of materials in a workshop mode (Fig. 12). This model have been followed in situations where a programme has been developed either in collaboration with a national or international agency (in which case the outside agency provides content expertise for smooth implementation of the programme) or exclusively in-house (where the internal faculty feels competent and confident that quality of the programme will not be compromised if such a strategy is adopted). The Certificate in Guidance and Certificate Programme in Laboratory Techniques programme better represent the former, and lab courses in Physics within the B.Sc. programme are an example of the latter approach.
Quality Benchmarks

There have been deviations to the above models in some courses, as also within each of the models described above. However, what needs to be considered as benchmarks for adoption of an approach to course development include:

- **Time** taken to produce an academic programme.
- **Costs** involved in producing an academic programme.
- **Constraints** involved at various stages of design and development of an academic programme.
- **Quality** of the output, i.e. the self-learning package.

A recent study (Panda and Garg, 2003) conducted on the development of the Physics lab courses (within the B.Sc. programme) for the three years of the programme following the workshop model analysed the above four variables. Their findings are suggested that the role of the course coordinator and the in-house course team assumed greater significance in achieving course production with low cost, time constraints and of high quality. In the context of these physics lab courses, the role of the course coordinator was pivotal in consideration of the parameters influencing course development, production and delivery.

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