

## KERALA EDUCATION GRID

### **A THREE PHASE APPROACH FOR STAGING THE DEVELOPMENT AND LAUNCHING OF E-COURSEWARE IN THE COLLEGES**

**Draft submitted to APCU for study and discussions**

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Jan. 2003

#### **1. INTRODUCTION**

An earlier paper by the author [1] described in fair detail the Content Quality Metric [CQM] approach to developing pedagogically sound E-Courseware. ***The CQM approach helps managing quality instructional processes involved in the conduct of a course.*** It provides an outline of how such courses will be placed in the **Course Knowledge and Collaboration Space** [CKCS] through networked Educational Servers in the colleges. A key recommendation in that paper is that this ***CKCS is placed as a facilitation layer for the teachers and students in the hierarchy of different university functions.*** The CKCS processes in each course is managed by a Course expert Group [CEG]. The paper opens several issues when we attempt to develop and manage content or E-Courseware in any given subject. This paper is a sequel to [1]. It addresses the stages in E-Courseware development that will be of help to the teams involved in the identified subjects in the colleges.

The development of E-Courseware for subjects taught in the colleges needs considerable enthusiasm, time, teamwork, and a systematic approach by the concerned Course Expert Group and the authoring team. There is the need to keep the universities and colleges consulted during the process, so that the final output has quality and enthusiastic acceptance on the part of teachers and the university system.

Unlike the individual professor-centric courseware development, Education Grid attempts to put in place a formal group effort that has wider acceptability while concurrently maintaining high standards of quality in the educational processes as suited to our Indian University system. ***Contents available from elsewhere will have only informal reference value unless it is put through a CEG driven CQM processes.***

Since much of what is taught in the university system needs updating, the developers of E-Courseware face the dilemma of whether to go in for syllabi that is current and state-the-art, or to continue packaging the outdated syllabi in electronic form. This problem is not so acute in the sciences and mathematics courses as in the professional core and elective disciplines. Since we will be incurring considerable expenses, and there is urgent need to revamp the syllabi in the technology and sciences subjects, there is a strong case for using the opportunity to modernize the curricula when developing content for the Education Grid. To ensure the above varying and apparently conflicting requirements, we propose in this paper a three-phase approach to develop and launch content for the colleges under the Education Grid.

Once the Government releases the funds, the project will execute the following steps.

- (i) Equip the Resource Centres [RC] at NIT-Calicut, CUSAT, CET (as soon as we get the MoU signed) and IIITM-K to ensure that we are ready to commence the services in the three key cities of Kerala.
- (ii) Release an initial grant of Rs. 5.00 Lakh as advance to each of the RCs after we receive their respective commitments to support the identified courses.
- (iii) Support two fulltime Engineers in each RC for systems maintenance, software installations and technology assistance to authoring teams.

The grant given to each RC will be used for (a) paying the salaries of the two full-time engineers, (b) meetings, training programmes or workshops relevant for the Education Grid (with due approval of each activity by the RC coordinator and notification to the Project Coordinator at the EGOC), and (d) contingent expenditures like travel, consumables and library support.

## **2. THREE PHASE APPROACH TO E-COURSEWARE DEVELOPMENT**

For a courseware development process to benefit from the CQM approach, we recommend that the development processes are staged in the following three phases.

- a) Proto-course development Phase.
- b) CQM driven content development phase.
- c) Course maintenance phase.

This approach is recommended so that the complex problem of full E-courseware development with good CQM rating is made separable into doable and focused components. Under the Education Grid Project, how this is achieved through the three-phase approach is described in the following subsections. Before we discuss the details, we assume that the following actions have been taken.

- a) The APCU has identified and approved the courses to be supported under the Education Grid for funding support.
- b) Each approved course has an associated Resource Centre that will be responsible for its development.
- c) The Course Expert Group [CEG] has been nominated and given the resources to commence the courseware development work. We recommend that the CEG has one or two eminent faculty in the subject area from the host institution of the RC and at least one from institutions outside of their affiliated university and within Kerala. The coordinator of the CEG is preferably be from the host institute.

A fourth expert for a course (optional) may be had from a preeminent institute like one of those funded by the recently approved MHRD under the National Programme on Technology Enhanced Learning [NPTEL]. This may help the augmentation of resources from the MHRD allocation under NPTEL given to premier institutions. Once the above three actions have been taken, we recommend the following three phases towards the development of the courses and their maintenance.

### **3. Proto-course Development Phase**

In this phase, the associated CEG will take total responsibility for creating the Proto-course. By Proto-course, we mean a fairly detailed course consisting of the following components.

1. Collection of existing syllabi for the course in the colleges under the different universities of Kerala.
2. Development of the detailed syllabi for the proposed course, highlighting any variance between the existing syllabi and considerations for curriculum revision.
3. Pre-requisites and learning objectives for the entire course.
4. Breaking the syllabi into number of modules with brief outline of the learning or instructional objectives for each module. The number and variety of modules may be based upon the greatest common denominator of the syllabi of the different universities offering course at the given level. This will ensure that the variations in the syllabi across the colleges are accommodated.

5. Recommended texts, references and URLs for the overall course.
6. Recommended course-specific contents (and their posting) in the Digital Library.
7. Module specific pointers to text/reference book sections, linked digital library and URLs.
8. Approximate number of lectures and list of module specific learning activities recommended for the conduct of each module.
9. Collection and screening of problem sets and (suggested timed release of) solutions for each module to be posted in the Course Management System. This may be built as a continuing process done over the course portal on the Internet.
10. A detailed schedule of course-events that will guide the teacher in conducting the course.
11. CEG may spell out the freedom available to choose alternative threads of modules to suit the syllabi under the different universities.
12. Build a registry of teachers involved in teaching the course in the different colleges across the state.
13. Provide the outline of teacher orientation and training programme for the course.
14. Guidelines to training of teachers (optional at proto-course stage).

The proto-course with above components will gain much from the CQM approach described in [1] to guide its development. Once components 1 to 5 are ready, the same may be circulated in printed form, or over the Education Grid portal for free download to colleges and universities in Kerala to assess the acceptability of the proposed syllabus. After components 6 to 10 are ready, we may deploy the proto-course in the respective college's Education Servers to guide and motivate the teacher(s) and students in the class. The formal approval for deployment may be obtained from the concerned university academic councils.

APCU will assign the development of each identified course to one of the Education Grid Resource Centres. While members of the CEG may work from any of the Resource Centre [RC] as convenient to them, the designated RC for the course will be in charge of supporting the associated course development and teacher training. The responsibility for the total proto-course will be with the concerned CEG. The CEG will have the freedom to consult any expert as it deems fit. CEG will maintain the minutes of discussions and meetings for records in their group web-space and key documents in their group published pages in the main Education Grid Portal. Their expenses – including travel, library support, internet support, invitation to experts from elsewhere to participate, costs of training programmes, etc. - will be met from the budget of the associated RC. The contribution of the CEG members will be explicitly acknowledged in the Course Home Page. Any IPR/copyright related to the proto-course will lie with the Education Grid Project with due acknowledgements of contribution by the CEG members and others who may be involved in significant measure.

#### **4. CQM DRIVEN CONTENT DEVELOPMENT PHASE**

The proto-course development phase would have laid the foundation and a fairly comprehensive skeletal framework for the detailed building of the CQM components. It will achieve the following two major objectives.

- i) Revision and modernisation of syllabi in the different courses without too much initial investment.

- ii) Building course specific digital library and pointers to relevant sections in the printed reference books.
- iii) Giving quick and early start for the benefits of Education Grid to reach the colleges.

The work in creating the proto-course is both necessary and not be that daunting as to require a whole project to develop the full courseware. It will expedite the launch of web-assisted pedagogy in the associated colleges without waiting for the more time consuming development of good CQM rating. It allows for **opportunity to test the acceptance of the beneficiary colleges and build flexibility in the content development process** whereby the user colleges can give feedback of significance and value in building the full course. It will have provided the necessary support materials like course specific digital library and URLs that help build the course content during this third phase.

With the proto-course as a framework, CEG will have a clear evaluation of the different components that constitute the CQM parameters, the nature and kind of work involved. The CEG may safely contract the component works to different teachers, external parties – the students themselves being a major asset to create the components in the process. With the CEG supervised process, the courseware will be able to build the content to high quality CQM rating. Based on specific validated proposals, the development of component contents by different parties may be supported by Education Grid funds. Even before investment in the development of full courseware, proto-course development can be done for a larger number of subjects. This will facilitate the speedy development of content in all such courses.

The earlier paper identified five components in each of the module, namely, **Introduction, Activation, Demonstration, Application and Integration**. During the CQM driven content development phase, we shall be seeing the following activities in each of these five components related to the module as outlined in the proto-course.

- i) Collection, screening and posting of problems and solutions with appropriate control related to each of the modules.
- ii) Quality worked out examples, visual/simulated demonstrations, case studies and recommended group exercises for each module.
- iii) Designing quiz, pre-diagnostic and self-tests.
- iv) Collection and posting of anecdotal and historical information related to the concepts delineated in the module.
- v) Development of 'Integration' part of the content: This will require collection of real-world applications and practices within and related to the subject.
- vi) The main body text of notes, problem sets and solutions for the students in pdf or such platform-independent format that helps in students talking printed notes to their residence and carry out focused study.

The CQM driven process is not and should not be linear. It will be possible for the respective CEG to identify and fan-out component works to different experts in the field so that the quality assured content can be generated in reasonable time. It is up to each CEG to drive imaginatively such processes that promote uses of the course portal itself and invite openly contributions for content. CEG may interact with reputed institutions in India (like those proposed under the National Programme on Technology Enhanced Learning under the Ministry of HRD) or abroad to obtain permissions for copyrighted material of value to the content. The CEGs for the different subjects may share the best practices and thereby establish healthy norms and approaches to developing the content.

It may be possible to follow processes similar to those adopted in the Software Engineering discipline. For example, based on the three-phase model, we may develop a CQM based Content Development Life Cycle [CDLC] with version control. We request the experts in the APCU or others to develop such models. We may start with the proto-course being called as Version 1.0. Version 1.2 may possibly be the one in which the *Activation* and the *Application* parts of the core modules of a course have achieved very good rating under the CQM. Versioning helps in directing our efforts in developing the content. This is a topic that needs to evolve from some experience.

We need to study how this CDLC will depend on the pedagogic approaches in different kinds of courses. Standardisation of content posting format in the college servers will simplify the management and maintenance.

## 5. COURSE MAINTENANCE PHASE

This course maintenance phase will allow the E-courseware to steadily evolve and maintain itself into high quality CQM level E-Courseware. The key to this is to continue the CEG as a standing authoring and refereeing body supported by the Education Grid funds for curriculum maintenance. CEG will guide the teacher training and orientation, evaluation methods to assess and identify good teachers and help maintain the course portal.

During this maintenance phase, we may treat all the teachers of the course in the various colleges and the CEG as a ***community of practice*** in the subject area. We provide opportunities to exchange best practices, exchange of ideas and encourage research into the best method of teaching the concepts in the different modules, etc.

This approach overcomes a major problem in the existing colleges. To help teachers learn and teach better, it is necessary that they are members of an active group of similar subject people. Within a college, this is almost impossible to achieve in the existing system. There are at most one or two teachers – not necessarily experienced and motivated – in a subject specialty within most colleges. By forming this ***community of practice***, they now belong to a much better equipped group of similar teachers across several colleges with good chance of guidance by the best. This also implies that CEG members be given adequate recognition and compensation for the work they are being assigned to. Education Grid may negotiate with the institution employing the CEG member to recognise their efforts in their workload and freedom to visit the corresponding RC for carrying out their work.

It is recommended that wherever feasible, members of the CEG be provided with 24 hrs Internet access at home. This is affordable in Kerala with local telephone, or, wherever Asianet Satellite Communications' services (DOCSIS Internet) are available. The EGRCs may have a few local call telephone lines terminating upon modems attached to access routers for the members to log on to and work with.

## 6. HOW TO BEGIN THE EDUCATION GRID SERVICES

The following steps are recommended to launch the Education Grid without loss of time.

- i) Set up EGRCs in each of the following places first: (a) NIT Calicut, (b) CUSAT, (c) CET Tvm and (d) IIITM-K Tvm (as EG Operations Centre, it is also default EGRC). Kerala University may use IIITM-K (being across the road) initially until they are ready to host the services. Each RC will have the following systems and software for their services: One Acado Education Server; two high end content development stations; a proxy, thin client Linux server with Gateway Systems linked to the EG backbone network; authoring software packages such as Macromedia Suite, Star Office, Adobe Suite, etc. as

recommended by the APCU or its subcommittee for this purpose. To the extent possible, we minimise expensive and proprietary office and such other packages in developing and maintaining content. A few additional desktop stations for content development may be supplied to the RCs. Video lecture recording and web-server mounting facilities may be added in each of the RCs.

- ii) Establish Points of Presence at CUSAT (major PoP), NIT Calicut and IITM-K (Medium PoP); 2 Mbps leased lines between the three. 2 Mbps link between CUSAT and VSNL Gateway at Cochin. These are best coordinated with ERNET coming to set up the backbone network. In addition, ERNET may link CUSAT to ERNET satellite hub at Bangalore.
- iii) Get agreements from the colleges (about 40 Government aided and the self-financing colleges with their own funds) to join the Education Grid. Link them to the nearest EGRC by local leased lines.
- iv) Establish EG master portal services at the EGOC and commence the services.
- v) Identify the first 10 courses to be supported under the EG and appoint the CEG for each of them after a thorough validation process. Our goal is to produce 10 courses of the highest CQM rating in the first year of operation. This will act as reference for others to emulate in other courses.
- vi) The CEGs thus appointed are recommended to follow the proto-course development process as outlined in section.

To launch and sustain the various operations as stated above, the components of activities that will be sustained by funding from the EG Project are stated in the next section. APCU will have to come up with necessary recommendations and funding modalities to support the above initiatives.

Once the Education Grid project equips the RCs and funds the courseware development, the host institutions of the RCs will be encouraged to develop content for courses for their own subjects that are not necessarily supported under the Education Grid. An approach for this is stated in the next section.

## **7. SUPPORTING COURSEWARE DEVELOPMENTS**

Funding support or assistance may be given for three categories of courses. The three categories are

- a) Courses recognised by the APCU as core and to be supported from the Education Grid funds.
- b) Courses of the host institution (like NIT-C, or, CUSAT) that the host itself desires to develop.
- c) Individuals or autonomous groups desiring to develop content for a course of their choice.

The first category has the process for identification as already laid out in this paper. The initiation and funding for this activity comes from the Education Grid funds. The second category needs to be encouraged by the host institutions themselves. If needed, they may submit proposals for specific basket of courses and the same may be forwarded for funding from sources such as MHRD, AICTE, ISTE or such agencies.

The third category is important as it encourages and invites competent experts in whole lot of courses that form outside of core courses. This category is supported by asking interested faculty to submit a detailed course development proposal in a format that is being developed by

Prof. S.S. Prabhu and his group at IIITM-K. Such proposals will be screened by the APCU or a nominated group for the purpose and supported by funds under the Education Grid.

With the three-phase approach, and the combination of quality educational processes with quality content to go with, Indian education system has the potential to become world class. We should not stop till we make our educational system attractive enough to be recognized as the teacher of the world in at least some of the areas.



#### Reference

[1] K.R. Srivathsan, "Management of refereed content generation and utilization for formal higher education", a paper for discussion written for the Kerala Education Grid Project. Available for circulation upon request through e-mail to [director@iiitm.ac.in](mailto:director@iiitm.ac.in)