E-Learning Enabled Services for Content Development

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Abstract—**This study analyzes the various software engineering methods, approaches and models which are used to estimate the effort for the content development of the educational projects in the e-Learning domain. The design and development of the content require the expertise inputs from the different fields like subject matter experts, instructional designers, graphic designers and programmers. Most of all e-learning needs to be compelling to the audience it targets, offering the learner a resource that is seen as appealing, valuable and productive to their goals and aspirations. Emerging digital technologies and increasing interest in the computerized delivery of higher education have led to e-learning through electronic mail, the Internet, the World Wide Web (WWW), and multimedia**

IndexTerms— **Learning, Estimation Techniques, Content Development**

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I.INTRODUCTION

In the past few years, the employment of knowledge technology has been developed considerably within the education sector. At a similar time, expectations of scholars and lecturers from the technology supported education systems are inflated further. Additionally mature age, part time, and international students with a good type of education, skilled and cultural backgrounds square measure participating in education and coaching to support their career goals. They're progressively distributed globally and have terribly various learning wants and learning designs. Versatile e-Learning solutions square measure needed to satisfy their wants.

The challenge is not to use new technologies to re-create traditional education systems, but rather create new learning environments, providing improvements to both teachers and students, and enhance the quality of education. Through flexible e-learning systems students would receive education - anytime and anywhere - that matches their own pace and learning style. The idea of high quality learning experience is not to move from teacher-centered to technology-centered learning but rather to student centered learning. Learning technologies should allow greater flexibility in supporting and enhancing learning experience. In this paper, we will present the Flex-eL (Flexible e- Learning) system – a learning environment supported by workflow technology. We will also demonstrate how workflow technology can provide a more flexible learning solution.

II.RELATED TECHNOLOGIES

There are many research and commercial web-based educational products that have been developed an deployed all around the world. The most popular ones include Lotus LearningSpace, WebCT, BlackBoard, Topclass, etc . Most products provide two major types of tools: Learner tools and Support tools. A learner tool includes Web browsing - multimedia, security, bookmarks, etc. Asynchronous sharing - email, newsgroup, file exchange, etc. Synchronous Sharing – audio video Chat, whiteboard, virtual space, teleconferencing, etc. Student tools - progress tracking, searching, motivation building, etc.

Support Tools include: Course - planning, managing, customizing, monitoring, etc. Lesson - instructional designing, presenting information, testing, etc. Data - marking on-line, managing records, analyzing and tracking, etc. Resource - curriculum managing, building knowledge, eam building, etc. Administration - installation, authorization, registering, server security, etc. Help desk – student support, instructor support. Generally, these products emphasize on learner tools such as web based multimedia applications. Although several leading packages provide a wide range of powerful support tools for various aspects of course management, most of them are still "task oriented" rather than "process-oriented". Some of their deficiencies can be identified as follows: Tools are designed to support individual learning tasks rather than the learning process. There is no integration of technologies that support various aspects of the study-process. Tools offered by educational packages are content free resources and their adoption and integration into the study program relies on the experience of the course designer. That often results in the technology-centered learning process. Every educational package provides a limited set of tools and inclusion of the new tools as they become available could be very difficult.

Generally, the educational package is used to support several individual subjects through separate accounts or workspaces and no interaction between different "accounts" is possible. Tracking of student learning progress is very difficult. There is very limit coordination between student's study material and time management. Monitoring of individual student study progress is often neglected. We believe that integration enabled by workflow technology would provide more flexibility and a more effective learning environment.

Workflows are process oriented business information systems that offer the right tasks at the right point of time to the right person along with resources needed to perform these tasks. Workflow technologies are capable of supporting control and enforcement of business processes enabling collaboration between business processes, effective time management and monitoring at various levels

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for various categories of users, automatic support for dynamic modification of the existing processes and relatively seamless integration of various tools and applications .

III.FLEX-EL CONCEPT

The Flex-eL project is based on the concept of using workflow technology to support learning technology in order to provide an innovative, workflow-based, fully flexible learning environment to deliver education courses. In particular, Flex-eL is focusing to achieve several specific objectives: Relax enrolment time constraints Remove predefined semester duration Assist in enforcing academic prerequisites Maintain high-quality subject content Provide flexible learning pathways Support innovative learning strategies Allow individual time management during study Encourage true condition and work in groups Provide access to personal teaching assistance Provide effective resource management Provide monitoring study progress Considering the previously mentioned deficiencies in most education packages, Flex-eL aims to support the concept of flexible learning pathways through subjects consisting of modules that, in turn, are managed by a number of learning activities.

Our approach is to create student-centered learning that starts from the concept of the integrated study process that is carefully designed based on the latest educational models and supported by workflow technology. Effective integration of various learning activities is enabled by the study guide while workflow technology offers the right tasks i.e. learning activity at the right point of time to the student along with learning resources needed to perform these tasks. One of the main advantages of workflow technology, which is used as a backbone of Flex-eL, is to provide better integration of the new resources and new tools as they become available in the future. We will also demonstrate how these objectives are achieved by the workflow functionality in Flex-eL.

IV.WORKFLOW ENABLED LEARNING

The idea of utilizing workflow technology to manage the learning and teaching activities came from the nature of the study process. A well-integrated study environment should include components such as learning and assessments into one fully system supported stream of activities. Workflow technology can then be used to manage these learning activities for different roles. The design of Flex-eL takes the workflow technology as the main backbone infrastructure and incorporates other technologies and tools around it to achieve a complete learning environment.
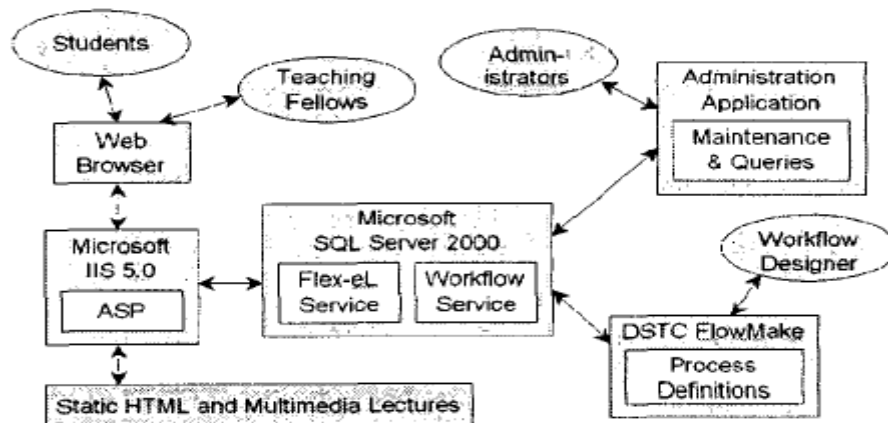

Figure 1 Flex eL technology architecture

The Figure 1 represents architecture of Flex eL Technology; a process-modeling tool called Flow Make is used to capture the study process. The course activities and associated roles are identified and modeled using the tool. This predefined workflow model is then deployed in the workflow server which has been built upon Microsoft SQL server 2000. Flex-eL uses web interface to provide students and teaching fellows accessibility to the system. The study materials are presented in multimedia form. Flex-eL provides internal functionality to build study contents. However, it is also possible to link learning activities to any externally available learning material.

The administration features allow setting up courses, enrolling students, and managing workflow processes. For setting up a new course, we define the teachers in the database that are responsible for managing the new course and assign them a teaching fellow role for the new course. We then define the new course that includes creating study materials, defining tasks needed to be performed in the course, defining assessments, and scheduling assessment time slots. After that we model and export the associated process definition for coordinating the course into the workflow repository and link it with the course definition.

For example, activities in the process model are associated with relevant study materials and performer roles. Exporting the process model in to a workflow repository from Flow Make also includes generating the VML code for the course process visualization. The exported process model provides a process template for the course. Whenever a student enrolls in a course, we create his information in the database if it does not exist already. After that, we enroll the student under the requested course.

Finally we start an instance of the learning process for the student based on the process template. This also means each student will have the same list of activities based on the same activity template of the same process template. It is also possible to have more than one process template for the same course. For example, one process template may have only a single assessment at the end of a study period. Another process template may have smaller assessments during the study period. The teaching fellow and student can decide between themselves which type of process template would be useful for the student. Workflow technology offers many features that can significantly improve e-learning environments.

It can automatically assign the right task to the right person. It supports individual planning of the work schedule. Students can learn at their own pace. It supports management of information and knowledge sharing. It encourages collaboration between students. **It** provides students, as well as teachers, an ability to monitor individual and group activities. In Flex-eL, each course is associated with one or more workflow process templates that define the order of course activities. One of these process templates is assigned to each student when he or she enrolls in the course.

As for teaching fellows, the workload is also reduced because assessment and consultations times can be booked prior to the actual meeting. Overall, the learning and teaching effectiveness of courses is increased because of the more efficient and flexible time management. Flex-eL offers a different learning approach than that supported by other well-known online learning management systems. Rather than making all the course material and activities available to the student at the beginning of the course, Flex-eL coordinates their availability and completion by utilizing its embedded workflow functionality. When the appropriate learning or assessment activity is completed, a new activity is assigned to the work list of the associated person.
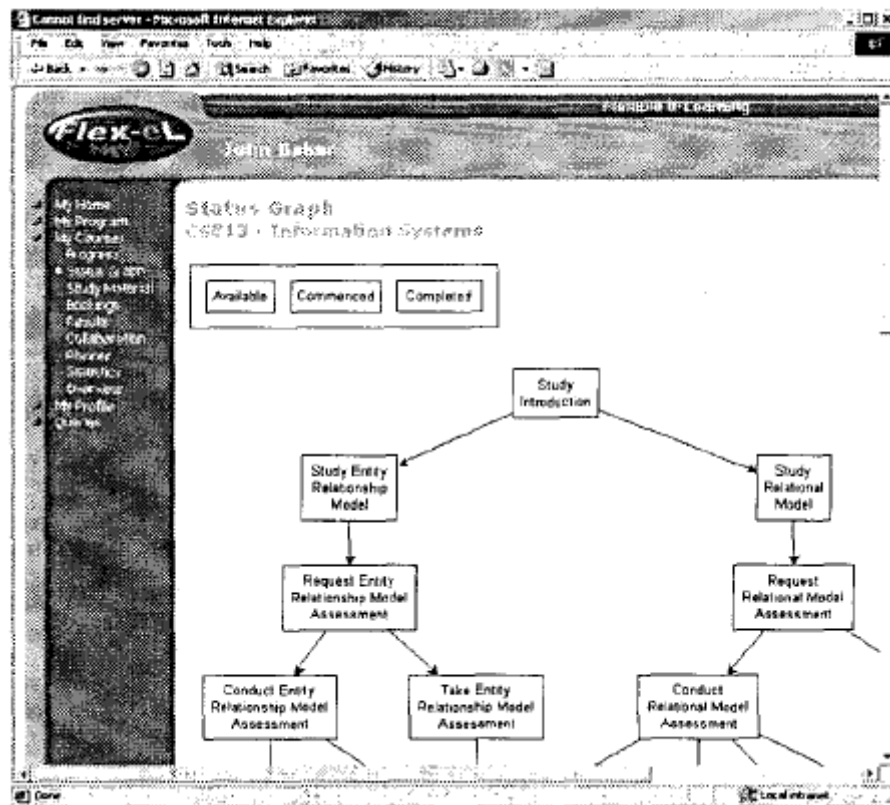
V.RESULT AND DISCUSSION

Figure.2 Flex-eL course status graph

The eL course status graph is represented in figure 2, during the study phase, the progress of each individual is captured by the workflow system. Therefore, the students have the ability to find out the information about other students who are working on the same activity. Such features encourage collaboration among students. The teaching staff is also able to monitor the progress of individual students and may provide assistance to individual students. Flex-eL provides effective collaboration between students themselves as well as students and teaching staff.

In contrast to the other online learning management systems that provide chat room or discussion boards for collaboration, Flex-eL helps to identify groups of people suitable for collaboration. One of the unique features that Flex eL offers is the monitoring of study progress through workflow visualization. Workflow visualization plays an important part in workflow systems. It provides the information necessary to understand the interactions between workflow tasks and the decision processes.

One of the ways to visualize workflow progress is to use a process model graph designed in the modeling tool as a basis for highlighting activities with appropriate status colors. Students can use this workflow functionality to visualize their current study progress and also plan for their future study pathways. Flex-eL uses VML (Vector Markup Language) to display workflow diagrams on the web interface.

The diagram is dynamically generated at **run** time at user request and uses difference colors to represent the state of each activity. This VML workflow visualization approach has the advantage of fast accessibility and ease for understanding. It also helps teachers monitor a student's progress at a glance.

VI.OBSERVATIONS FROM FLEX-EL DEPLOYMENT

We successfully deployed Flex-eL version 1.0 at the University of Queensland for one postgraduate subject in the Master of Information Technology program. One of the positive results of the deployment was that very few students dropped out of the course offered in the Flex-eL mode in comparison to other courses offered in the traditional mode. Because of the flexibility in time management and not having to attend the lectures, students were able to manage their workload effectively.

On the basis of our experiences, we have identified several technical and design improvements that could be introduced in the new version of Flex-eL. We have also made several observations that, we believe, will help us in deploying future courses in Flex-eL environment. Design of the study process workflow is very challenging and critical. Although we aim to provide maximum flexibility to individual study pathways, coordination between the teaching fellows and the students must be considered.

For example, the assessment activity involves contributions from both parties. The definition of completing this activity should be independent for both roles so that one could not delay the other proceeding to the next activity unnecessarily. The definition of the atomic activity is crucial. It is important to define the most appropriate size for each activity, so that the users are not repeating the same "available - commence - complete" cycle for unnecessary activities. Another challenge is preparing students to adopt this kind of learning environment. **As** we provided a fully automatic self-leaming system, we expect the students have basic web computer skills to use the system and it is their own responsibility to manage study time.

VII. Conclusion

We represented Flex-eL- AN innovative and versatile learning atmosphere supported by work flow technology. we've got known some deficiencies of current common e-Learning systems and planned a replacement approach to beat them by exploitation work flow technology. we tend to propose that a well-structured learning atmosphere ought to integrate varied aspects of learning by exploitation the work flow technology. The underlying learning strategy of Flex-eL provides versatile learning pathways and presumably brings the virtual university construct nearer to reality. we've got additionally encounter variety of challenges through the readying of the Flex-eL system. These experiences have helped U.S. determine the problems that require to be addressed once deploying work flow enabled e-learning services.

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